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Electric Cars Market Development in Jordan and Ukraine (Comparative Analysis of Ukrainian and Jordanian Experiences)

This work is devoted to a comparative analysis of the electric cars market development in the Hashemite Kingdom of Jordan and Ukraine. The work gives the concept of advantages and disadvantages of electric cars. The main goal of the work is to study the socio-economic aspects of using electric vehicles in Jordan and to determine what experience Ukraine can gain from Jordan to optimize the electric cars market development.

Keywords: electric car market, internal combustion engine vehicles, electric vehicles, hybrid vehicles, market development, Bottom-up-approach.

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1. Introduction

World countries are striving in search for clean power sources to run the millions of different vehicles on the road on daily basis, as they are the main contributors to toxic emissions releases from internal combustion engines to the atmosphere. Wilberforce et al. [1] argued that these toxic emissions contribute to climate change and air pollution and impact negatively on people's health. Hardman et al. [2] stated that the automotive sector is moving towards a transition from primarily petrol and diesel fueled IC electric vehicles to more sustainable

HVs and BElectric vehicles. BElectric vehicles are considered to be the most beneficial of these due to them having zero emissions, high efficiencies and having the potential to be fueled entirely off renewable electricity. The transport sector is one of the main contributors to anthropogenic climate change worldwide, accounting for 23% of global energy-related greenhouse gas (GHG) emissions, which expected to double in 2050. This number is similar in the European Union (EU). Lévy et al. [3] stated that transport has the second biggest share, after energy industries, accounting for almost a quarter of total emissions. The model decomposition of transport GHG

emissions shows that road transport had the primary role in greenhouse gases emissions with a share of seventy three percent in 2014.

Ashby et al. [4] argued that at the end of 2014 there were 665.000 electric vehicles deployed globally, with the top three markets for electric vehicles being the US (39%), Japan (16%) and China (12%). It is estimated that the global production of electric vehicles – either hybrids, pug-in hybrids, or fully electric vehicles will exceed sixteen million per year in 2021 and will account for twenty percent of all vehicles manufactured. Electric vehicles, particularly, are seen as the new trend in road transportation.

Yang, et al. [5] and World's top 10 best-selling electric vehicles [6] mentioned that the popularity of the Tesla and other electric vehicles such as the Nissan Leaf, Toyota Prius and the recent introduction of the BMW i3 indicates that the automobile industry is investing heavily in transport electrification and believes that there is a market and future in electric vehicles. Figure 1 shows number of several BEV units sold in USA from January to August, 2017.

The market for electric cars in the world is gaining popularity. Given that in the early 2000s the electric car business was not considered promising, today we can say with confidence that the future lies in electrified cars. In 2016, the number of electric cars purchased worldwide amounted to 1 million, sales increased compared to 2015 by 53%. In 2016, investments in the development of electric vehicles amounted to more than 2 billion dollars, which is twice as much as in 2015. China, Sweden, France, the United States, Germany, Norway, the Netherlands are interested in environmentally friendly transport and stimulate their development in their countries. Large car manufacturers

and technology companies, relying on government support, plan to expand and improve their products. Thus, the prospects for electric cars in the near future become wider and more realistic.

Advantages and disadvantages of Emobiles

The popularity of electric cars in the world is due to the fact that they have a number of advantages over cars with internal combustion engines. Among the advantages of electric cars are the following:

- cheap refueling (the most economical electric cars consume an average of 10 kW per 100 km) and the ability to charge an electric car from a regular outlet;
- simple design of the electric car allows to simplify and make the most convenient its operation and use, to facilitate repair;
- ease of operation and cheap operation (no gearbox, internal combustion engine and various types of pumps);
- complete absence of harmful exhausts to human health. The electric car is completely safe for ecology;
- the electric car does not create strong noise pollution as its structure

contains much less technical details capable to create noise, unlike traditional cars;

- energy efficiency (efficiency of the fuel engine — 16%, and efficiency of the electric motor — almost 85%).

Despite the rather significant advantages, electric cars have disadvantages:

- high price when buying a car;
- limited mileage on one recharge;
- poorly developed infrastructure limits the range of trips;
- charging the car takes much more time; high price for battery replacement (approximately half the cost of the car); lack of consumer choice (the market of electric cars today is not as diverse as the market of cars with internal combustion engines). However, today electric transport in the world is developing rapidly due to government incentives, in particular, tax cuts and benefits, as well as bonuses for buyers of electric vehicles.

China (Government Support)

Electric cars are most actively distributed and produced in China. In 2009,

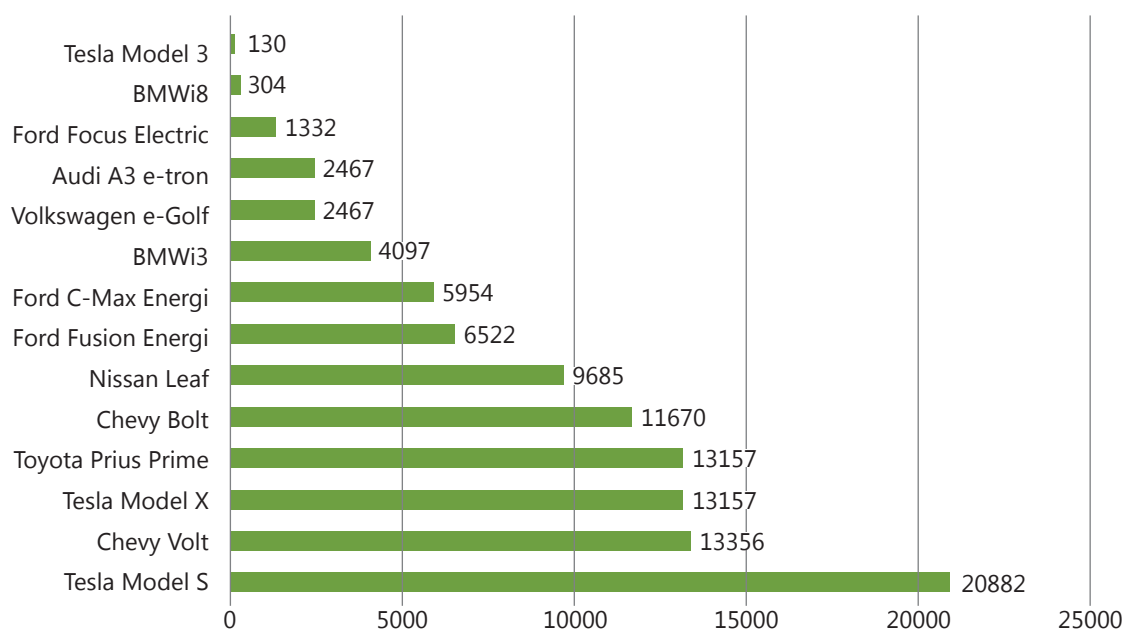


Fig. 1. USA electric vehicle sales (January to August 2017)

the country's authorities introduced a number of pilot programs in selected cities, based on the introduction of local subsidies for the development of electric vehicles. These projects aim to improve the environmental situation in the country related to air pollution and reduce dependence on petroleum products. According to Chinese law, the purchase of electric vehicles provides national and local incentives. Thus, in 2011 China introduced subsidies for the first 50 thousand electric vehicles in the amount of 60 thousand yuan (9.281 US dollars). However, in 2013, these subsidies were changed to 67.710 yuan (\$9.800) for electric vehicles and 563.790.71 yuan (\$81.600) for electric buses. In 2014, the Chinese government decided that by 2016, 30% of all vehicles purchased by the state should be electric cars.

The buyer of an electric car in China also receives tax incentives: exemption from consumer tax. From September 1, 2014 to December 31, 2017 in the exemption from purchase tax; registration fee is reduced by 50%; exemption from import duties.

From 2017 to 2020, subsidies for electric cars should be reduced by 20% annually, due to violations in the provision of these monetary incentives, which, in turn, affects the number of purchased electric cars, because the level of sales directly depends on the level of financial subsidies.

Recently, Ukrainians have bought about 3.000 electric cars. Currently, 4% of the Ukrainian new car market belongs to electric cars. The rapid development of the electric car market in Ukraine has been confirmed by research of the largest independent publication on electric vehicles, InsideEVs.com. Ukraine ranked fifth in the international ranking of the pace of development of the electric car market, behind Iceland, Sweden, Norway, and China.

The publication estimates that this figure has increased fivefold over the past year, and the number of electric cars sold per year has exceeded 2.500. However, most electric cars were in use and came to Ukraine after more than

two years of use in European countries. Ukraine is significantly ahead of other Eastern European countries in terms of the pace of infrastructure development for electric cars.

Due to the difficult economic situation in the country and external armed aggression, the issue of developing energy-efficient, environmentally friendly modes of transport and infrastructure for it is extremely important.

One of the areas that will significantly reduce the consumption of petroleum products is the further promotion of vehicles equipped with electric motors among the population, which provides for significant changes in the country's legislation.

Thus, on December 16, 2015, the President of Ukraine signed amendments to the Law "On the Customs Tariff of Ukraine" regarding the abolition of import duties on electric vehicles.

The law provides for the abolition of import duties on vehicles equipped with electric motors, which makes it possible to reduce costs when buying a car.

Currently, the committees of the Verkhovna Rada of Ukraine are considering the draft Law № 5494 "On Amendments to the Tax Code of Ukraine on large-scale development of the electric car market in Ukraine" dated 06.12.2016. I. and others.

This law is designed to create at the legislative level favorable conditions to encourage the purchase and use of environmentally friendly transport in Ukraine. The purpose of the bill is to reduce the tax burden on the supply of electric vehicles, exemption from value added tax services for the transportation of passengers by taxi, equipped with electric motors, and the provision of passenger transport for rent (leasing, rental).

The draft law provides for temporary exemption from value added tax for operations on importation into the customs territory of Ukraine of vehicles equipped with electric motors and components for them; exemption from excise tax on vehicles equipped with electric motors and components for them; temporary exemption from

value added tax until 2021 for services for the carriage of passengers by taxi, equipped with electric motors, and the provision of passenger transport for rent (leasing, rental, transportation to order), if such wheeled vehicles are equipped exclusively with an electric motor. If the bill is approved, the cost of electric cars will be significantly reduced, which will ensure a rapid increase in demand among the population.

At the beginning of 2015, the draft Law № 1912 "On Amendments to Section XX "Transitional Provisions" of the Tax Code of Ukraine on Peculiarities of Taxation of Imports and Supplies of Vehicles Equipped with Electric Motors" was submitted.

The main task of the bill is to reduce the tax burden on imports of vehicles equipped with electric motors, which will reduce their cost by up to 20% and create the appropriate infrastructure for their use. The law provides for temporary, until January 1, 2020, exemption from value added tax and excise tax on transactions of import into the customs territory of Ukraine and supply in the customs territory of Ukraine of vehicles equipped with electric motors. However, the bill was rejected and withdrawn.

On December 20, 2016, the parliament registered an alternative bill № 5494-1 "On Amendments to the Tax Code of Ukraine to Stimulate the Development of Electric Vehicles" submitted by MP O. Ryabchyn. The draft law proposes legislative consolidation of temporary, until January 1, 2021, exemption from VAT and excise tax during the import of cars equipped exclusively with electric motors into the customs territory of Ukraine; temporary, until January 1, 2021, exemption from value added tax of operations for the supply of services for the carriage of passengers by taxi-electric vehicles; assigning to the executive bodies of councils, which are regional centers, the obligation to arrange parking spaces for paid charging of electric vehicles, in the amount of not less than 5% of the total number of parking spaces; free until January 1, 2025

parking spaces for electric vehicles on parking lots for state and municipal vehicles; allow electric cars and hybrids to travel in public transport.

Minister of Infrastructure of Ukraine V. Omelyan during a round table on the prospects for the development of electric transport in Ukraine, which took place on December 22, 2016, said that Ukraine should move in the European and global direction and continue to pay attention and support the development of electric transport. On April 13, 2017, V. Omelyan presented the Concept of Electric Transport Market Development in Ukraine, which was reflected in the draft law "On Amendments to Certain Laws of Ukraine on Stimulating the Development of the Electric Transport Sector in Ukraine."

The purpose of the bill is to give Ukrainians the opportunity to buy environmentally friendly vehicles, new or slightly used, instead of driving old cars that are exported from Europe due to non-compliance with environmental regulations.

V. Omelyan proposes to implement the project within three components, synchronized in time: "In the first component, which will last for five years, we are developing the market of electric transport. Under the second decimal component, we plan to attract strategic information resources in the production of finished products — electric vehicles and charging stations. The third, final component, which will last 15 years, is aimed at localizing the production of components for the electric conveyor, special batteries, as well as components for charging stations.

The project plans to exempt from January 1, 2023 from VAT the import and further supply of electric vehicles, as well as charging stations and exemption of electric vehicles from excise duty. After the return of VAT on electric vehicles, domestic and localized by strategic investors production of electric vehicles will remain competitive in terms of price due to measures. From 2028, it is planned to abolish import VAT on components for electric vehicles and charging stations. At

this stage, it is possible to start mass production of electric cars in Ukraine. From January 1, 2033, it is planned to introduce a zero VAT rate on electric vehicles manufactured in Ukraine, components for it, charging stations and components for them.

Today there is a draft law to stimulate the development of the electric car market, however, it is under discussion. The head of the Ministry of Infrastructure noted that electric cars for the population could become cheaper by more than 40% if the bill "On Stimulating the Development of the Electric Transport Market in Ukraine" is adopted in Ukraine [7]. This bill envisages measures to stimulate demand for electric transport, create favorable conditions for attracting strategic investors and develop national production, improve the business climate for small and medium-sized businesses in the field of passenger transport, develop infrastructure and increase the comfort of electric transport. The bill plans to amend the Tax Code, among which the most striking — a tax rebate of 20% on the purchase of a car: buyers are actually offered to reimburse 20% of the cost; zero excise duty on the purchase of a car, which allows the buyer to save the amount equivalent to 109 euros; abolition of VAT on imports of electric vehicles for five years, which will reduce the cost of electric cars by another 16.8%; exemption from paying the fee to the Pension Fund at the first registration of an electric car, which reduces its cost by another 4.8%; zero excise duty on electric motorcycles and electric bicycles (for vehicles with a motor up to 250 W is a reduction in price by 22 euros); permission of electric cars to move in public transport lanes.

If you add up all the discounts: $20\% + 16.8\% + 4.8\% = 41.6\%$ + 109 euros, the cost of purchasing and registering an electric car can be significantly reduced. This example of calculations was presented by deputies.

Case 1 — famous previously used electric car.

Approximate price: 340.000 UAH without VAT

	Now	Offered
+VAT 20 %	68.000 UAH	0 UAH
+ PF 5 %	17.000 UAH	0 UAH
+ excise tax	≈3.000 UAH	0 UAH
Tax discount	None	-61.200 UAH
Price for customer	428.000 UAH	278.8 UAH

Case 2 — new electric car at an average price.

Approximate price: 800.000 UAH without VAT

	Now	Offered
+VAT 20 %	160.000 UAH	0 UAH
+ PF 5 %	40.000 UAH	0 UAH
+ excise tax	≈3.000 UAH	0 UAH
Tax discount	None	-144.000 UAH
Price for customer	1, 003 million UAH	656.000 UAH

Business Support

0% VAT	Electric cars transportation
0% VAT	Rent, leasing, etc.
2 years	Minimum amortization period

General Director of Hyundai Motor Ukraine I. Gladkovsky, praised by the law about the installation of MPE on an electric car, it was a good step. This formula could be universal. Some countries provide direct grants, others tie subsidies to certain indicators, but

in general, if this law is passed, as well as in the case of increased competition and entry of official players, we can talk about reducing the cost by 30%.

State support for the development of the electric car market in Ukraine requires detailed calculations of its impact on the level of financial capacity of the state budget.

Ukraine has recently launched an interest-free loan program for the purchase of electric vehicles. State Bank Ukgasbank together with Oxygen Group and ULF Finance offer a minimum interest rate of 0.001% yearly for up to four years with a down payment of 40% of the car value. The Ministry of Energy and Coal Industry of Ukraine, the Ministry of Infrastructure of Ukraine and the State Automobile Agency of Ukraine have initiated a new project to establish a large working group to develop "Electric Strategy for Ukraine's Global Transition to Electric Vehicles".

During the presentation of the project, the Minister of Energy and Coal Industry I. Nasalik stressed the importance of one of the initiatives "Night Charging". He noted that the technology of production of batteries for electric vehicles is constantly being improved in the direction of increasing their capacity and reducing charging time, therefore, in 3–5 years, electric cars will be fitted with higher quality batteries with a much longer service life and other quality characteristics, which will facilitate the transition to electric cars. In addition, 57% of the country's energy balance is nuclear power, and such an initiative will make it possible to use nuclear power.

2. Hybrid and Electric Vehicles in Jordan

Tala El Issa [8] stated that Jordan is a unique example of Arab key players which invest in electric vehicles for a sustainable transportation system. In Jordan, the Tesla, Nissan electric Leaf, BMW i8 and i3 plug-in hybrids were available since 2015. Jordan has introduced fully Electric vehicles into pub-

lic transportation, such as "Tawsileh", which was launched in May 2016. According to Jordanian Department of Statistics (as cited in [9]), there are 5 Electric vehicles distributors, which are Nissan, Renault, Tesla, BMW, and BYD. Additionally, there were 3,586 Electric vehicles registered in May 2017 "Manaseer group" had established 8 fast charging stations in different sights in Amman, Jordan. Electric vehicles need forty-five minutes to an hour for a complete charge, knowing that Electric vehicles at homes require up to 8 hours for a full charge. The price of Hybrid and Electric vehicles is connected directly to fuel prices. As diesel and gasoline prices rise up, the hybrid vehicles operating cost increase too, at the same time the electric vehicles' operating cost does not increase at the same rate; therefore, it is becoming favored in Jordan to own an electric vehicle. Most individuals in Jordan like to own a family vehicle, unlike mini-vehicles. Some of considerable problems in Hybrid and Electric vehicles are the less kilometers that they can travel, plus less comfort that riders can have, because high speed and AC consume much energy stored in the battery.

3. Jordan Energy Trends

The European Union Support to Research, Technological Development and Innovation in Jordan project 2016 report stated that Jordan imports about 96% of its energy needs from outside. However, to overcome the threatened of increasing oil prices a strategy in energy mix in 2020 was adopted (Fig. 2).

Renewables had a share of 2% in 2013 and 7% in 2015. Renewables including solar and wind have an excellent energy share with 10%. This value is expected to increase next years, since green vehicles are involved rapidly in Jordanian renewables market. Future Fuel Strategies 2017 report stated that in 2014, 2015, 2016 and 2017, there were 9, 336, 885, and 2258 electric vehicles registered in Jordan, respectively. The accumulated number till 2017 is

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Social Interaction with Electric Vehicles

To find out the barriers concerning investment in hybrid and electric vehicles in Jordan, 19 vehicle showroom owners and 118 Potential vehicle buyers were surveyed by an interview for the same questions. The results are illustrated in Table 1.

4. Results and Discussion

The results of the surveyed sample of potential vehicle buyers were somehow astonishing. In the first question, for example, twenty eight percent did not wish to own an electric vehicle instead; they wished to own an internal combustion engine vehicle. They added comments such as "We prefer the characteristics of the internal combustion engine, we feel excited and thrilled when we hear the engine's sound". On the other hand, fifty-nine percent showed consent to own an electric vehicle. Their motives were obvious in their comment; "Electric vehicles are very important nowadays as fuel prices are very high in Jordan". Furthermore, thirteen percent were doubtful due to their lack of knowledge concerning electric vehicles. Sixty-nine percent of Jordanian individuals in response to the second question said: "Yes, the prices of electric vehicles are very high, but we wish to own them to save on fuel". Oth-

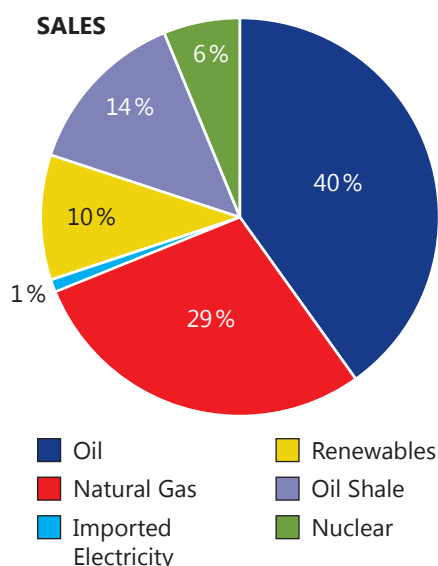


Fig. 2. Jordanian Energy Plan 2020

ers said "No" due to the fact that this issue is new to them. Moreover, sixty-four percent who have experienced electric vehicles said electric vehicles have higher performance than internal combustion engine vehicles; in response to the third question. The results in question four varied, because there was no tax on Electric vehicles until 2016. Anyone who owned an electric vehicle before 2016 gained a handsome amount of money when he decided to sell his vehicle after 2016 that is why thirteen percent approved the statement "Electric vehicles will have a high resale value". After this year, people said: "No", since electric vehicles that you buy now on will depreciate after a period.

Amazingly, fifty-one percent of the people surveyed said that Electric vehicles have some drawbacks. They

argued that the maintenance costs including vehicle's parts are still expensive. They said, in addition, that maintenance shops are not familiar with the new technology of this type of vehicles in Jordan. Despite the citizens' poor knowledge of Electric vehicles, most (ninety-one percent) believe that electric vehicles are sure friendly to the environment. Sixty five percent of the people surveyed were very optimistic that Electric vehicles will have an excellent future and believed that more than fifty percent of the Jordanians will own electric or hybrid vehicle after 10 years.

However, nineteen percent were not sure about that and sixteen percent electric vehicles will not be prevalent in the next ten years Around fifty percent were definite that their electrical bill will slightly increase if they

Table 1. Electric vehicles questionnaire

No.	Question	Potential Absolutely (%)	Vehicle May be (%)	Buyers Not at all (%)	Vehicle Absolutely (%)	Showroom May be (%)	Owners Not at all (%)
1	Do you prefer to own an electric vehicle?	59	13	28	N/A	N/A	N/A
2	Do you think that electric vehicles in Jordan are cheap relative to other countries?	14	17	69	18	15	67
3	"Electric vehicles have high performance". To what extent do you agree to this statement?	64	24	12	100	0	0
4	Do you think that electric vehicles will have a high resale value?	13	33	54	0	19	81
5	"Electric vehicles have some drawbacks". To what extent do you agree to this statement?	51	31	18	52	17	31
6	Do you think that electric vehicles are environmentally friendly?	91	9	0	N/A	N/A	N/A
7	Do you expect that next ten years electric vehicles will be more than 50 % of all total vehicles sold in Jordan?	65	19	16	62	28	10
8	Do you think that charging an electric vehicle in your home will raise your electrical bill value?	19	35	46	13	48	39

charge their electric vehicle from their house electric supply. Some thirty-five percent were not sure since electric vehicles are new for them. Regardless the slight experience in electric vehicles no one was against the idea that Jordanian government should support electric vehicles; ninety percent said yes in response to question ten. On the other hand, Question eleven asked for a personal opinion on the strategies that Jordanian government should adopt for Electric vehicles. Most of the answers emphasized the importance of adding more charging stations for electric vehicles in Amman and other provinces in Jordan, to train local mechanics on the maintenance of electric vehicles, to provide low interests loans for people wanting to own an electric vehicle and to increase public awareness about electric vehicles. It is worth to mention that Jordan Times daily journal reported that the Jordanian government is planning to build ten thousand electric vehicles charging stations in the near future, in their March 14, 2018 issue (as cited in [9]). The survey conducted with electric vehicle show room owners was just as important. Questions 2 and 6 were excluded, as they are not of interest to this group. Electric vehicles showroom owners stressed that Electric and hybrid vehicles have higher performance than internal combustion engine vehicles.

In response to the question five, fifty-two percent answered that electric and hybrid vehicles have some disadvantages. That is because of the high maintenance cost and limited battery lifetime. Electric vehicles showroom owners were also optimistic about the future of electric and hybrid vehicles as the sale figures of these vehicles between 2014 and 2018; show increase in demand (Table 2).

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It is important to point out that hybrid vehicle sales in Jordan market started in 2015 and electric vehicles in 2018. The astonishing number of hybrid vehicle sales sharply dropping to one and zero in February and March 2018; respectively. This is because of the new legislation enforced in 2018 on hybrid vehicles that led to a huge reduction of the number of hybrid vehicles sold in Jordan. In response to the question eight which asked if they think that charging an electric vehicle at home will increase the electrical bill, showroom owners answered they are not sure or cannot give you a definite answer, as this depend on the electric vehicle user. Eighty six percent of showroom owners surveyed in response to question eight said that Jordanian government should encourage this type of technology rather to stop it. This can be done by increasing

Table 2. Sales figures in 2014–2018

Year/Item	Internal combustion engine vehicle	Hybrid vehicles	Electric vehicles
2014	62.047	—	—
2015	52.710	21.591	—
2016	44.011	26.906	—
2017	33.713	37.454	—
2018 Jan.	2.226	2676	299
2018 Feb.	1.499	1	311
2018 Mar.	1.853	0	464
2018 Apr.	1.910	13	548
2018 May.	2.041	186	723

public awareness of electric and hybrid vehicles. The response to question ten that states: "Do you think that recharging the battery of your electric vehicle will cover the distance you travel every day?" was vague and uncertain. Showroom owners said that it depends on the user journey's distance.

Vehicle showroom owners recommended in response to question eleven to reduce the maintenance cost by promoting the vehicles parts trade and enforce the vehicle's agency. They argued that one of the solutions that the Jordanian government should implement is to eliminate old internal combustion vehicles in service before the year 2000 and give incentives for people to replace them with electric or hybrid vehicles.

5. Conclusions

To conclude, most Jordanians are encouraged to buy an electric or hybrid vehicle as the fuel prices continue to fluctuate. However, some barriers stand against owning such vehicles. For instance, raising the taxes and customs, implementation of car recharging in car parks, and the need for a large vehicle that accommodate all family members. Depending on that, and after analyzing the answers in the questionnaire for showroom owners and potential customers, the answers show that Jordanian government should encourage the investment in electric vehicles as well provide loans with zero interest for members of the society to facilitate owning an electric vehicle.

As you can see, in Ukraine electric cars have prospects for development in the domestic market. The main problem in the near future, in our opinion, will be the speed of adoption of relevant legislative innovations that would stimulate this process. On the other hand, the experience of implementing state reforms has repeatedly shown that progressive ideas are held hostage to openly lobbying bills, and the desire of domestic lawmakers to offer something original and unlike

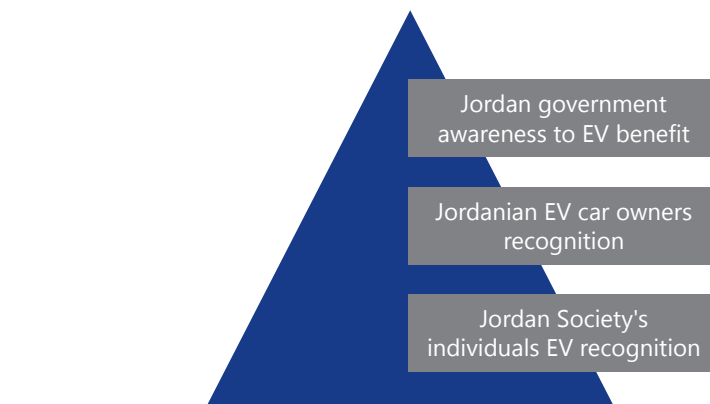


Fig. 3. Bottom-up-approach for helping electric vehicles idea succeed

others in the law, usually overrides the best intentions. Time will tell what will happen to electric cars, but the experience of the unresolved problem of so-called "average people" proves that the domestic car lobby at the level of legislative initiatives is based only on their own economic interests.

6. Recommendations

It is recommended, additional to proposed solutions, that Jordan government should adopt the Bottom-up-approach (Fig. 3) to increase the awareness of green vehicles for different residents who live outside Amman, since the first have a global promising future, besides making a social accepted price of these vehicles.

Bottom-up-approach stated that the citizens must recognize the importance of green vehicle that leads to encourage the upper society (policies and agreements) to distribute the product. Therefore, as Jordanian individuals are aware about these ideas, it becomes easy for political committees to encourage the use of electric vehicles all around the country.

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Шаламай О. А.

**Розвиток ринку електромобілів у Йорданії та Україні
(порівняльний аналіз українського та йорданського досвіду)**

Дана робота присвячена порівняльному аналізу розвитку ринку електромобілів в Йорданському Хашимітському Королівстві та Україні. У роботі дається поняття про переваги та недоліки електромобілів. Основна мета роботи — вивчити соціально-економічні аспекти використання електромобілів в Йорданії та визначити, який досвід Україна може отримати від Йорданії для оптимізації розвитку ринку електромобілів.

Ключові слова: ринок електромобілів, транспортні засоби з двигуном внутрішнього згоряння, електромобілі, гібридні транспортні засоби, розвиток ринку, метод “знизу вгору”.