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Consumer behaviour perspective analysis of the automotive industry

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I. INTRODUCTION AND OBJECTIVES

As a car enthusiast I have always been really interested in the automotive industry because a lot of reasons that are related to my family, cars have always been a big part of our lives and my family saw and supported my motivation regarding the Automotive industry. Further on, as I was growing up, I got in depth with how vehicles operate and in the types of technology that are used in building them.

The latest technology development processes are focusing on electric vehicles, many manufacturing companies are introducing all-types of vehicles but with transplanted drivetrains.

They are known as a promising technology to reduce carbon emissions and achieve the transition to more sustainable transport. (Wolf et al., 2015)

Electric vehicles are not new inventions, in fact, one of the first concepts of small- scale electric cars were built and developed between 1834 and 1836 in the USA by Thomas Davenport (Westbrook, 2007).

Further attempts to build electric vehicles was taken place in the UK and the US at the end of 19th century, to be more specific in the early years of the 20th century electric cars gained popularity. The scientists of those days were also fond of the idea of electric cars, so people like Thomas Edison were working on developing better batteries. ("Timeline: History of the Electric Car", 2021). In recent years, Jordan has experienced a significant upswing in the adoption of electric vehicles (EVs), posing a challenge to the dominance of conventional gasoline-powered vehicles. This case study explores the factors behind this rapid growth, shedding light on the various elements that have powered the EV revolution in the country.

Historically, Jordan has grappled with issues related to energy security and environmental sustainability. The nation's heavy dependence on energy imports, along with the imperative to curtail greenhouse gas emissions, created a compelling need for sustainable transportation solutions. In response to these challenges, the Jordanian government initiated a series of policies and initiatives aimed at promoting the adoption of EVs.

Early adopters have played a pivotal role in normalizing EV adoption in Jordan. These individuals, who have seamlessly integrated electric vehicles into their daily lives, have generously shared their positive experiences, thereby encouraging others to explore the advantages of EVs. The Jordanian case serves as an instructive example of how a blend of

government policies, incentives, infrastructure development, environmental concerns, and the real-world experiences of early adopters can propel the surge in electric vehicle adoption.

As Jordan continues its journey toward sustainable transportation, the insights gleaned from this case study offer valuable lessons for other regions seeking to expedite their own EV adoption initiatives.

II. LITERATURE REVIEW

II.1. Electric and petrol vehicles explained.

Like everything, electric vehicles have their advantages and disadvantages. Obviously the most noticeable advantage that they are “greener” both mechanically and technologically related. Manufacturers introduced the feature that allows the car to operate on renewable energy, since you can plug the car with a special kind of chargers that gets power from solar panels, windmills or nuclear power (Z S Gelmanova1, 2018)

They are quieter, some say that they are more enjoyable, convenient to drive. ("The benefits of electric vehicles", 2021). As if they were built to reduce emissions and save money for the consumer.

Charging up the car offers a lot of advantages that you cannot find in combustion engine vehicles because electric motors are known that they are more responsive than a normal combustion engine.

In my opinion, it is unfortunate that we are witnessing how the development of cars is going to a new phase which is significantly different than the previous one, and that is because the combustion engine cars have a whole different entertainment level than an electric car, but I guess nothing is more important than our world and its condition.

Electric cars showed a noticeable reduction of emissions, in fact, the energy usage and friction losses in battery-driven electric passenger cars are compared to combustion engine powered cars and prove the advantage of electric cars, with overall energy use being 3.4 times lower on average. If the power comes from renewable energy sources, CO2 emissions for a combustion engine vehicle are 4.5 times higher than for an electric car (Kenneth Holmberg a, The impact of tribology on energy use and CO2 emission globally and in combustion engine and electric cars, 2019)

The steam and gas-powered automobiles were loud and smelly, but the electric cars are more comforting and delicate to drive, so they quickly became popular especially for women among urban residents.

Carbon dioxide emissions are the primary driver of global climate change. It's widely recognized that to avoid the worst impacts of climate change. (Roser, 2021)

In 2009, the EU imposed a new average CO2 emissions cap for passenger vehicles, requiring a gradual reduction in average CO2 emissions to 130 g/km until 2015 and according to the study of the article, it shows that manufacturers could keep the CO_2 emissions under 130 g/km by reducing tire rolling resistance and weight reduction of the petrol operated vehicle. (Georgios Fontaras, 2009)

Consumers are increasingly concerned about the environmental impact of vehicles and are showing interest in electric vehicles due to their environmental benefits, quieter operation, driving experience, and energy efficiency. Consumer behaviour is influenced by various factors, including environmental awareness, regulatory requirements, and personal preferences, all of which are relevant to the automotive industry (Nils Hooftman *, 2015).

II.2. Electric vehicles in Jordan

Jordan was an early adopter of electric vehicles as, unlike its neighbors, the country is not an oil producer.

The country first started importing electric cars in 2015 and its National Green Growth Plan approved in 2017 aimed to promote their use.

As a result, electric cars represent at least 5% of all cars on the road in Jordan, with sharp rises in petrol prices driving up demand among the population of 11 million.

Jordan stands out as a pioneer in the realm of electric car mobility. The year 2018 marked a significant milestone with the presence of over 18,000 electric vehicles (EVs) gracefully navigating the streets of the country. What's fueling this surge in EV adoption? Two primary factors contribute to this phenomenon. (Kenneth Holmberg a, The impact of tribology on energy use and CO2 emission globally and in combustion engine and electric cars, 2019)

Firstly, electric cars have gained substantial traction due to their competitive pricing in comparison to traditional internal combustion engine vehicles. With the cost of EVs becoming increasingly affordable, many Jordanian motorists have made the switch to electric propulsion as an economically sound choice for their daily transportation needs.

Secondly, the Jordanian government's support for the EV industry has been instrumental in driving this growth. Exemptions from customs duties and licensing taxes have substantially reduced the financial barriers that typically deter individuals from embracing electric mobility. This favorable fiscal environment has not only made electric vehicles more accessible but also incentivized prospective buyers to consider them seriously.

However, as the electric vehicle landscape flourishes, it's evident that the supporting infrastructure, particularly charging stations, is racing to keep pace. This lag in infrastructure development has introduced certain challenges for EV owners. At charging stations, EV owners often find themselves waiting for approximately 1.5 hours to recharge their vehicles, which is less than convenient in the fast-paced world of today's commuters. Moreover, the provision of appropriate advice and maintenance services for electric car batteries appears to be an area that requires attention and expansion to ensure a seamless and efficient EV ownership experience. (Fatima Bani Ahmed, 2023)

Despite the challenges, there is a promising silver lining. Various businesses and organizations have expressed a keen interest in investing in EV infrastructure, recognizing the tremendous potential of electric mobility in Jordan. However, one roadblock on this journey to widespread infrastructure development is the current tariff system. It poses economic viability concerns that need to be addressed to encourage further investment and ensure that EV charging stations are strategically located and adequately equipped to meet the growing demand for electric vehicles in Jordan.

In summary, Jordan's foray into electric mobility is commendable, with thousands of electric vehicles gracing its roads. This shift is driven by cost-effectiveness and supportive government policies. Nevertheless, challenges in infrastructure development and tariff structures need to be tackled for a more seamless and prosperous electric vehicle ecosystem in the nation. (Organization, 2016)

Chinese vehicles in Jordan face difficulties despite their rising popularity. Some buyers are concerned to own Chinese vehicles because they have doubts about their quality and reliability. Complaints have also been raised over the accessibility of replacement parts and post-purchase assistance for Chinese vehicles in Jordan.

A short while after importing these vehicles, Chinese car manufacturers have established partnerships with local Jordanian companies to provide better access to their products and services. This has led to an increase in the number of Chinese cars on Jordan roads and has created more job opportunities in the local automotive industry (Statistics D. o., 2023).

Overall, Chinese cars have gained a significant presence in the Jordanian market, and their popularity is expected to continue to grow in the future.

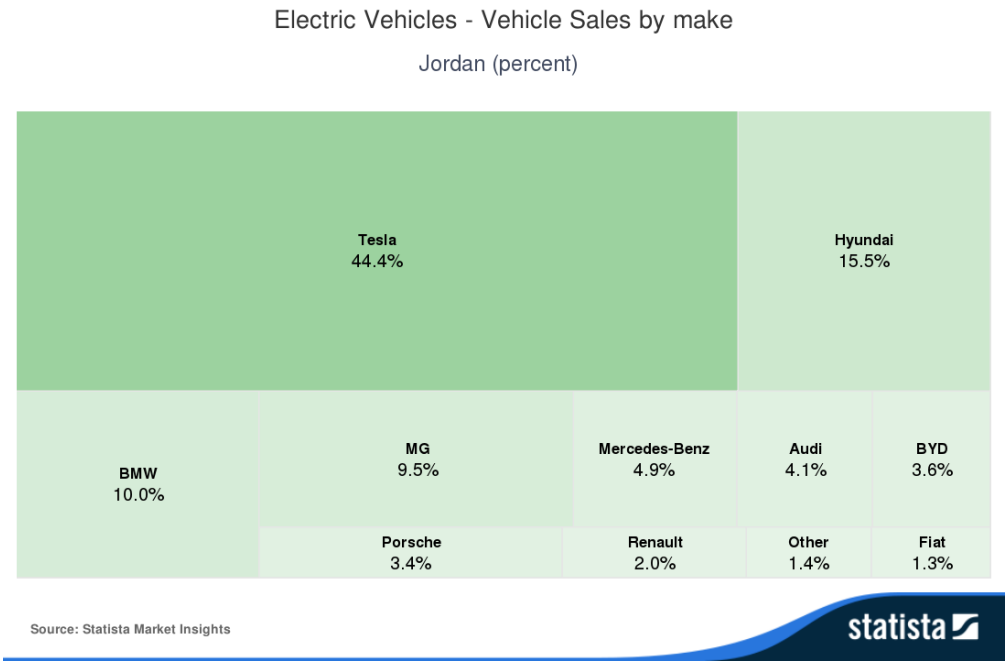
The Jordan Electric Vehicle Company (JEVCO) has also been established to promote the use of EVs in the country and to provide charging infrastructure for EV owners.

Despite these efforts, the adoption of EVs in Jordan is still in its early stages, and the number of electric cars on the roads remains relatively small compared to traditional gas-powered cars. However, the government's initiatives and the increasing availability of EV models in the country suggest that the use of electric cars in Jordan is likely to grow in the upcoming years.

Jordan's successive governments have promoted e-mobility through the enactment of ground-breaking laws regarding electric vehicles. The infrastructure for EVs that are needed to support the growing number of EVs charging stations and connectors is still under-development.

Figure 1: Electric Vehicles - Vehicles Sales by make

Source: Statista Marker Insights



Nissan, Hyundai, Tesla, Fiat, and Volkswagen are the main players in the Jordanian electric vehicle market (*Figure 1*). These businesses' existence is essential to the introduction of electric vehicles into both private and public transportation. The government has also switched out hundreds of its fleet's gas-powered vehicles for Tesla EVs, not because of emissions, it’s just a fancy trend. Meanwhile, electricity costs are stable, the cost of operating electric vehicles does not rise at the same rate. As a result, it is becoming more advantageous in Jordan to own an electric vehicle. Due to their eco-friendliness and economic viability, electric vehicles are anticipated to outnumber conventional ones in the near future (Mustafa, 2022 proved a good start for electric cars in Jordan, data show, 2022).

II.3. Adoption of electric vehicles

As a result of the government's numerous initiatives to promote the use of electric vehicles (EVs) in the country, Jordan has been slowly converting to EVs *(Figure 2).* After being in impact for several years, the government's restriction on EV imports was repealed in 2019, allowing Jordanians to buy EVs from other countries.

The Jordanian government has also implemented several incentives to promote the usage of EVs. For instance, owners of electric cars receive discounted electricity rates and are excused from paying customs charges and sales tax.

The combination of growing awareness, government incentives, infrastructure development, and environmental consciousness creates a favourable environment for the adoption of electric vehicles in Jordan. Continued efforts to expand charging infrastructure, provide incentives, address range anxiety, and improve affordability will contribute to the further growth of electric vehicle adoption in the country (Ibrahim, 2022).

With that being said, it is important to highlight the elements that encourage the growth of EV`s in Jordan.

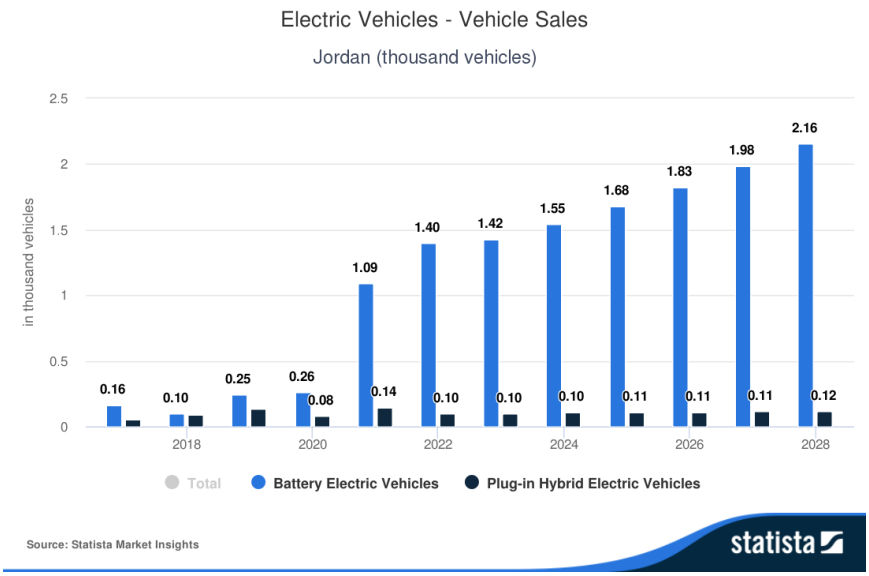
- **Governmental motivation**

Consumers in Jordan appear to be influenced by government initiatives and policies aimed at promoting EV adoption. The mention of the government repealing restrictions on EV imports and providing incentives suggests that consumers are likely to respond positively to such measures.

It is a good move on the part of the Jordanian government to introduce tax exemptions, remission of customs taxes, and lower registration fees for electric vehicles. Consumers may find electric cars to be more financially appealing because to these incentives, which help to lower the upfront cost of buying one. The government promotes the shift to sustainable transportation by offering such incentives, which promote the use of electric vehicles.

Figure 2: Electric Vehicles - Vehicle Sales

(Source: Statista Market Insights)

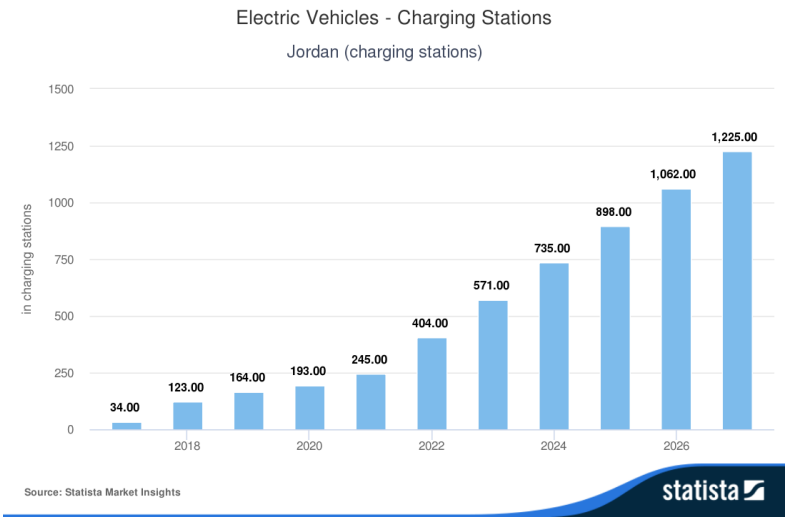


- **Infrastructure Development**

The mention of efforts to expand charging infrastructure is significant. Consumer behavior is likely influenced by the availability and convenience of charging stations. If the infrastructure is well-developed and easily accessible, consumers may be more willing to adopt EVs. As more charging infrastructure becomes available and accessible, more consumers are likely to consider purchasing EVs. Knowing that they can charge their vehicles conveniently encourages the adoption of electric vehicles, which can contribute to reducing greenhouse gas emissions and dependence on fossil fuels. Jordan has been working to establish a charging network throughout the country, including the installation of charging stations in public spaces, shopping centres, and residential areas *(Figure 3).* The accessibility and availability of charging infrastructure is a crucial factor influencing consumer behaviour.

Figure 3: Electric Vehicles - Charging Stations

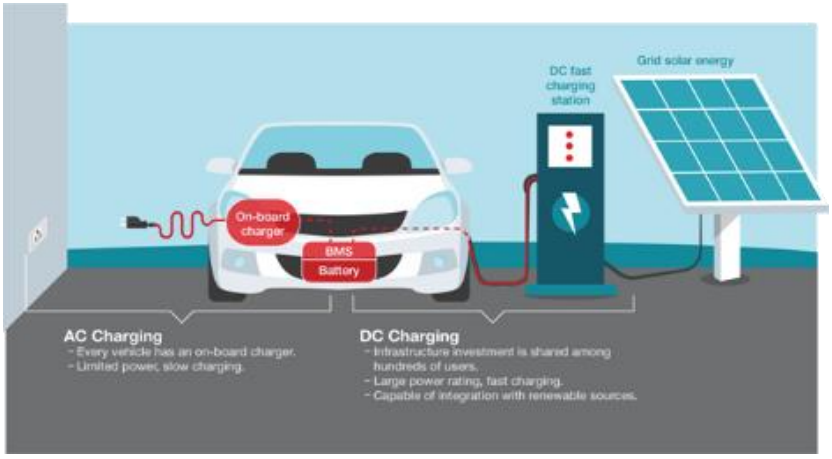
(Source: Statista Market Insights)



Currently in many places they are working on changing the charging stations with better technology and faster charging ports (*Figure 4.*) (Dr. Arar, 2020).

Figure 4: AC and DC Charging

(Source: Texas Instruments)



- **"Addressing Range anxiety"**

One of the main concerns for potential EV buyers is "range anxiety," the fear of running out of battery power while driving. Having a network of charging stations readily available helps alleviate this anxiety, as drivers can charge their vehicles when needed, providing peace of

mind. If measures are taken to alleviate range anxiety, such as increasing the number of charging stations and improving battery technology, it can positively impact consumer confidence in adopting EVs, but it is yet a concern for potential buyers of electric cars, even if the driving range of electric vehicles has increased, some consumers might still think of it as an obstacle to adoption (Statista, 2023).

- **Awareness**

"Growing awareness" indicating that consumers in Jordan are becoming more informed about electric vehicles. This suggests that as consumers become more educated about EVs and their benefits, they may be more inclined to consider them as a viable transportation option.

- **Environmental Consciousness**

It suggests that there is a segment of consumers in Jordan who are concerned about the environmental impact of their choices. This group may be more inclined to choose EVs.

1. **Preference for EVs**: Given their environmental awareness, this consumer segment is more likely to consider electric vehicles as a transportation option. EVs are generally considered to be more environmentally friendly than traditional internal combustion engine vehicles due to their lower emissions.
2. **Sustainability Focus**: These consumers may also extend their environmental consciousness to other aspects of their lives, such as making sustainable choices in terms of energy consumption, waste reduction, and lifestyle.

- **Price**

“Affordability” is a key factor in consumer behaviour. Efforts to improve the affordability of electric vehicles, through incentives or subsidies, can encourage more consumers to consider them as a viable option. Compared to conventional gasoline-powered cars, the initial cost of electric vehicles is typically higher. Despite the long-term cost reductions in terms of gasoline and maintenance, this price gap may be an inhibitor for some consumers.

In conclusion, the consumer behaviour in Jordan regarding electric vehicles appears to be influenced by a combination of government policies, financial incentives, environmental

awareness, infrastructure development, and efforts to address practical concerns like range anxiety and affordability. These factors collectively contribute to creating a favourable environment for the adoption of electric vehicles in the country. It is essential to understand that consumer behaviour is fluid, and a variety of factors may affect the uptake of electric vehicles. Consumer preferences and choices can be influenced throughout time by, including changes in government regulations, market competition, and developments in technology.

II.3. Values and competition of electric vehicle companies

Plenty of car manufacturers have started to introduce EV models in Jordan, including Tesla, BMW, Nissan, and Renault. Logically, everybody is aware of the core values of electric vehicles and since Tesla is the most mentioned brand when it comes to electric cars, they got popular in a surprisingly convenient way to accelerate the advent of sustainable transport by bringing compelling mass market electric cars to market as soon as possible.

Tesla wanted to spread their product all around the world, people would usually mention that having a Tesla is expensive, for example, Tesla Model 3: (The most affordable option) is starting around 38000 Euro for the Standard Range model and higher for the Long Range and Performance versions. Tesla wanted everybody to have their product, that is why they were pursuing their three-stage Market entry which is by developing high price- low volume cars such as the roadster, then developing mid- price mid- volume cars such as the Tesla S, the starting price for the Tesla Model S was approximately 76,074 Euro for the Long-Range variant and higher for the Plaid model. X model was around 85,600 Euro for the Long-Range version and higher for the Plaid model.

Continuing how Tesla kept surprising people with their inventions, old and new competitors started dominating the industry (especially in Jordan) where car dealers started importing a lot of Chinese brands and Chinese-assembled European electric cars (the cost of the Chinese-assembled European brands are way cheaper than the European-assembled cars) for example; a 2022 Volkswagen ID-4 is worth around 40000 Euro here in Hungary while the Chinese-assembled ID-4 is worth around 29000 Euro in Jordan, that's great right? Though the thing is about these Chinese-European imported cars that they don't have an actual dealership for them, which means that they come without any kind of warranty.

In my opinion, it is really risky to buy such product due to the number of times I have witnessed Chinese assembled-European Volkswagen ID-4 catching fire out of nowhere and all what you can do about that is to hope you can find a VW specialist who is willing to fix the car (that fact itself raised the competition between Electric Vehicles workshops at the industrial area in Jordan).

Regarding that fact I have just mentioned, the demand is so high, banks started sponsoring car dealers/showrooms, to keep importing these vehicles. In return, offering discounted-rate loans for people to own these electric cars.

I believe that every one of us noticed how hybrid cars started showing in the streets and how everyone was inspired by this technology and the way the manufacturers made people buy hybrid cars, now we are witnessing the same with electric cars but with masses of options and varieties.

Despite the perception of Tesla products being expensive, the company pursued a three-stage market entry strategy, starting with high-price, low-volume cars like the Roadster and gradually introducing more affordable models like the Model 3. This approach aimed to make EVs accessible to a broader range of consumers but the competition in the EV market in Jordan has increased by the importation of Chinese brands and Chinese-assembled European electric cars.

These Chinese-assembled EVs are often priced lower than their European-assembled counterparts, making them more affordable to consumers, yes, there are potential risks associated with Chinese-assembled EVs, such as the lack of official dealerships and warranties and the malfunction of these cars such as, catching fire underscores concerns about safety and reliability yet, people in Jordan are very pleased with the discounted-rate loans that in fact, encouraged people to own electric cars and it is still a successful strategy for the bank, even though risk calculation was not an important factor when importing/purchasing these vehicles. This financial incentive can play a significant role in driving consumer behavior towards choosing electric vehicles.

Car companies are pursuing intelligence and strategies that are related to the technological industry, they were producing expensive products and targeting wealthy people to buy their product and then launch it to the mass market. That means that they entered from high-end market and moving towards mass market, they had a high level of innovation of adaptation and learning by giving attention to reduce anxiety on how much an electric car would go in one charge by developing a high-capacity battery, also trying to perfect the information technology into a lot of aspects of electric vehicle business model such as enhancing in-car services and digital distribute channel. They are making new values which involve in high level of integration towards battery and recharging network (Yurong Chen, 2018)

In summary, the car companies' recognition of changing consumer preferences in the electric vehicle market. They are adapting their strategies to cater to a broader audience, addressing consumer concerns, and integrating technology to create value for consumers. These actions reflect an understanding of the evolving consumer landscape within the automotive industry.

II.4. Job creation and economic opportunities

When businesses thrive and generate employment opportunities, they exert a favourable impact on the economy. As these companies grow and increase their profits, they contribute to tax revenue, which supports public services and infrastructure development.

This, in turn, enhances the nation's appeal as an investment destination, further fuelling economic expansion. Additionally, the government can utilize tax revenue from businesses to invest in education and training programs, ultimately boosting workforce productivity and fostering additional job creation.

Electric vehicles (EVs) have the potential to significantly increase employment possibilities and drive economic growth in a variety of industries. The transition from internal combustion engine (ICE) vehicles to electric vehicles (EVs) require the development, manufacture, and maintenance of new technologies and infrastructure, creating jobs across a variety of industries.

As we mentioned previously about how the government is supportive for the growth of EV`s, some other key aspects are highly involved in the automotive sector (Statistics D. o., 2023).

- **Renewable energy integration**

Electric vehicles offer a chance to incorporate renewable energy sources like solar and wind power into the grid. As the number of EVs rises, they can be employed as distributed energy storage systems to balance the supply and demand for electricity. This integration calls for experienced workers in the renewable energy industry, creating jobs in industries like grid integration technology, energy management systems, and solar panel installation.

- **Software Development**

Electric cars are essentially computers on wheels, relying on sophisticated software for functions like battery management, vehicle control, and connectivity. Job opportunities in software development and IT-related roles increase with the rise of electric vehicles.

- **Government Initiatives**

Many governments are promoting the adoption of electric vehicles through incentives and regulations. This results in job opportunities in government agencies related to transportation and environmental policy.

- **Increasing Demand for Education**

There is a rising demand for education and training programs related to electric vehicle technology. This demand is driven by the growing popularity of electric cars and the need for individuals to acquire the skills and knowledge necessary to work with electric vehicles. Job Opportunities for Educators and Trainers involves institutions, educators, and trainers who offer educational services. As the demand for electric vehicle education and training grows, there are opportunities for educators and trainers to provide these services and potentially expand their businesses.

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III. MATERIALS AND METHODS

I have used Google forms for my questionnaire, because in my opinion that is the most convenient and most frequently used way, and, because it is quite easy to use.

The period when the questionnaire was available was between 9th of October 2023 and 18th of October 2023 on the mentioned pages.

In this period of time, I collected 104 responses, which is in my opinion a good number, as well as provided me with lots of information which I am going to present now.

I utilized Google Forms as the primary tool for gathering participant opinions in my study. This choice was grounded in the platform's user-friendly nature, making it accessible to both respondents and the researcher. I shared my questionnaire on different online platforms such as Facebook (mostly groups for electric car/ car user, as well as private messages) and on Instagram. The

The study was centered on the electric vehicle landscape in Jordan, particularly in the city of Amman, where these vehicles have been gaining traction. The focus was on evaluating the practicality of electric cars in Amman's context, given the extensive area that is around 1680 square meters and the common electric vehicles in Jordan could go from 130 to 500 kilometers on a single charge. (Database, 2022)

To ensure a well-rounded sample, the survey was distributed to diverse groups, including taxi drivers, food delivery workers, university students, retirees, and individuals from various professions. This diversity was essential due to the significance of personal vehicle ownership in Amman, driven by the inefficiency in public transportation system, which is 2% of total of around 2.5 million vehicles in Jordan and 80% are passenger vehicles that approximately 15% of these passenger vehicles are electric vehicles, given the fact that this shift started not long ago and yet it is demographically rising in the Jordanian market. (CEIC, 2021)

The survey questions were designed with clarity and more straight forward perspective. They aimed to determine ownership of electric cars, the option of advising ownership of electric vehicles or not, concerns and doubts whether they are efficient and reliable enough to operate

on daily bases, as well as the perceived advantages of electric vehicles compared to conventional ones. Additionally, the survey inquired about the impact of government policies and financial institution support, both of which have a substantial influence on electric vehicle adoption. My questions were varying widely from what kind of car the respondent has, what they prefer to drive, how many kilometres they drive daily, and of course general questions about their age, gender and occupation.

The questionnaire form was presented in two languages: mainly in English, as well as in Arabic – because, as my thesis hypothesis says, I was interested mostly in Jordan's consumers' perspectives, and even though lots of people speak English in Jordan it was necessary to provide translation.

The findings consistently highlighted the appeal of electric vehicle ownership, often driven by factors such as tax benefits and government incentives.

A significant portion of my research was dedicated to uncovering the dynamics of consumer behaviour in Jordan. This exploration led me to discover valuable insights from academic journals and official government resources regarding the evolving landscape of electric vehicle ownership in Jordan.

However, I did not stop at theory and analysis. I also engaged in discussions with my friends who are electric vehicle owners and went in-depth on how to spot the differences and the extras that an electric car could provide and when would it be inefficient for some consumers that we know. These conversations provided me with firsthand experiences. What's more, I organized practical tests and experiments to simulate real-life situations that potential electric vehicle buyers might encounter or in their decision-making process. This direct approach offered an understanding of the factors that influence consumer choices and behaviours in the facts of electric vehicle ownership in the Jordanian context.

For my methods I have used data analysis from previous data collections, and for the software for analyse the collected data I have used the help of Microsoft Excel.

With the help of Excel after cleaning and preparing the data for analysis, I visualized them with different type of charts (pie, diagram, etc.)

The open-ended questions needed to be cleared out as well and after that I used text analysis to extract meaningful data and patterns from the texts.

Also, crosstabulation was used for finding meeting point between different points and views, so later I confidently can say my valid information.

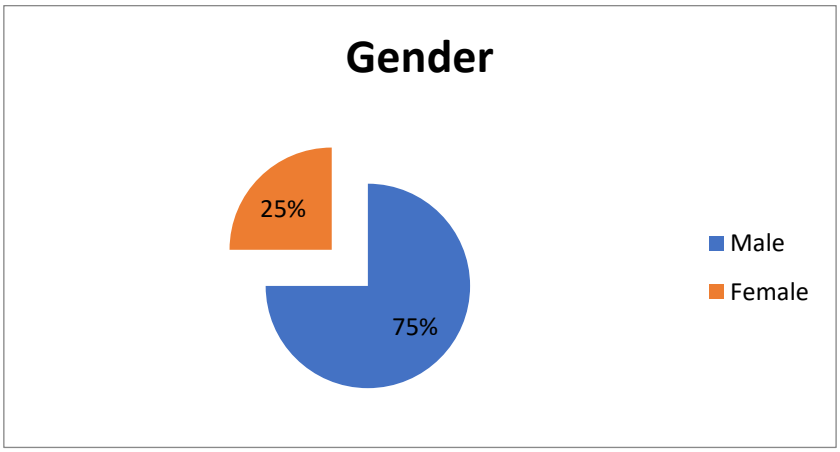
Last, but not least, I want to mention, that the questionnaire was available in both English and Arabic languages.

From my questionnaire I have some data of the responders' demographic descriptions.

My first question about their background was about their gender.

Figure 5: The gender of the responders

(Source: own work)

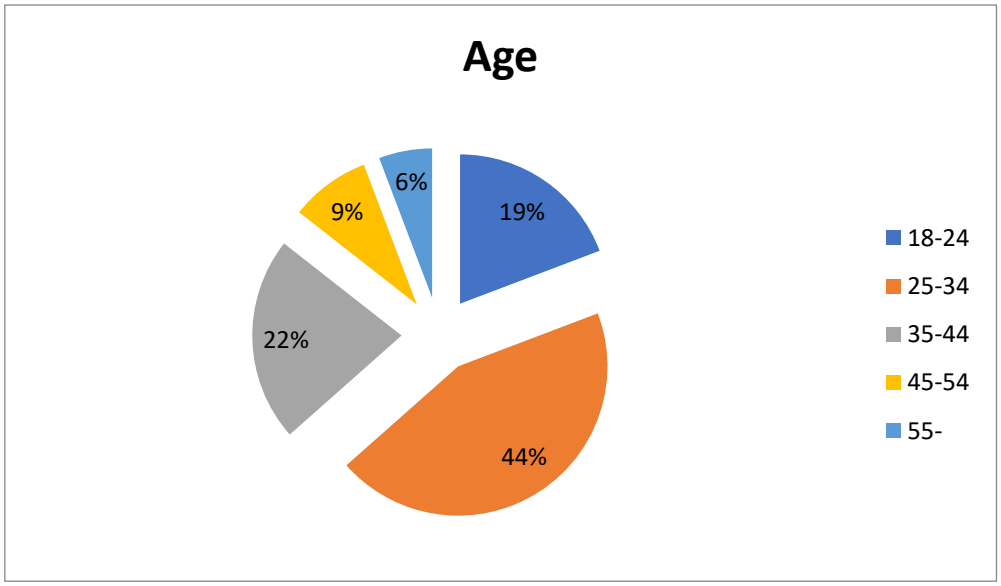


As I have expected, (75%) of the respondents are males (78 people) while the rest of the respondents are females *(Figure 5)*.

The next question was about their age *(Figure 6).*

Figure 6: The age of the responders

(Source: own work)



Those who are 25-34 years old (46 responders) have filled my questionnaire, I'm glad that this age category has participated in my research because it means that they have owned, drove or witnessed a lot of vehicles driving in the streets of Jordan and they could tell the differences of technologies and the development of the automotive industry in general. (23) responders aged between 35 and 44. This is the generation that was the most interested and curious about electric cars in general because they have witnessed a wild change (shift) of the automotive industry and here they are answering my questions and sharing their opinions whether they do or don't own electric vehicles. The rest are the ones who can't wait to get a driving license to actually own an electric vehicle while the elderly people who participated are enjoying their retirement by driving electric cars and facing nearly zero issues due to their minimal driving range.

I have got 98 responses, some of them were different, some of them were similar such as student, tourism sector, teachers, retired, lawyers, construction workers, taxi drivers, delivery drivers, accountants, car enthusiasts, contractors, hairdressers etc.

From this, I calculated that 27,56% of the responders (27 person) are using their cars for work each day. These people are working in such occupations like taxi/bus/truck/private drivers, delivery people. Other 15,3% (15 people) are using their cars occasionally for their jobs, like lawyers, people in tourism sector, charity workers, etc. These people mostly work in the services sector.

The rest of the people, probably using their vehicles to go to work, go shopping, picking up their children, etc.

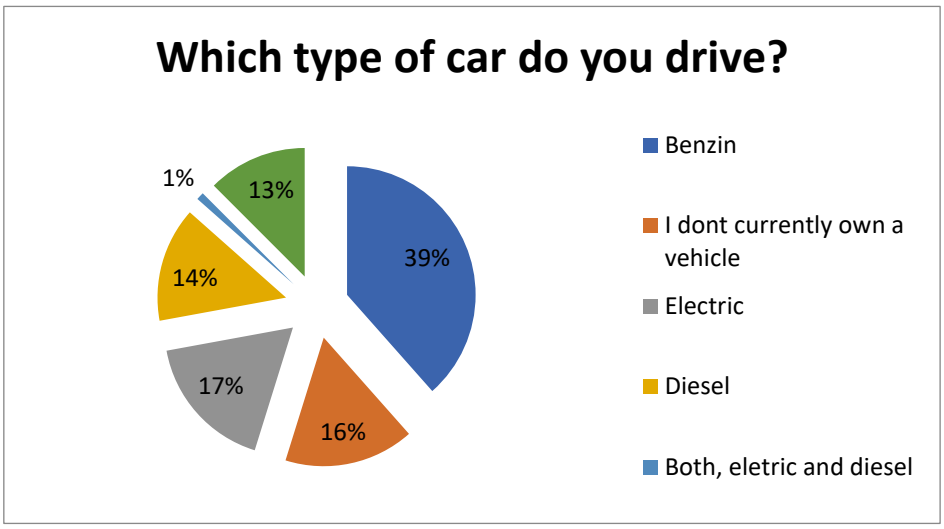
The biggest number of the responders marked their occupation as students – 15 people (15,3%).

IV. RESULTS AND EVALUATION

Which type of car does the responder drive? It was a multiple-choice question, where they could choose between six already given answers and it was available for them to choose the option for “other”.

Figure 7: Types of cars driven by the responders.

(Source: own work)



From the chart *(Figure 7)* we can see that the mostly driven cars are fuel by benzin. From 104 responders 40 people said they usually drive a benzin car, which is 39%. This is not a surprise, because in Jordan that is the most used means of transportation. In an article published in The Jordan Times, it was mentioned that out of 56000 vehicle clearance in 2022, it was 14,733 gasoline vehicles in the first 11 months. It means yearly roughly that is 26.23% of the cars. In my questioner this percentage number was even higher, which can be also supported with my personal experience in the country.

The second most used car with 17.3% of the responders (which means 18 persons) was the electric cars. In the previously mentioned article in The Jordan Times, this number is roughly 25%. It was an interesting data, that according to the Jordan Free Zone Investor Commission the numbers should have been higher, but still, I believe it is a significant number in my questionnaire as well.

Diesel cars are driven by 15 people of the respondents, which is 14,6% - and again, it was not a surprising data for me, because diesel cars are not common in Jordan.

Hybrid cars are fairly common in Jordan – 13 people responded to this question with diesel cars, which is 12,5% of the 104 respondents. This number is also higher in The Jordan Times article – with roughly 12000 hybrid cars out of 56000. (Mustafa, 2022 proved a good start for electric cars in Jordan, data show, 2022)

One person out of 104 drives both electric and benzin cars, and 17 people do not own a vehicle currently.

My second question was: Do you think electric cars will become more popular soon? Why or why not?

For this question, I used the short answer option. I would say, there were three categories of the responders: one, who are on the side of the electric cars, one, that who are supporting the idea, but only with conditions, and those who are just do not really think that the electric cars are going to be more popular soon.

Here are a few examples of what the respondents said: The first "category" who are on the side of the electric vehicles said yes, the electric vehicles are going to be more and more popular in the future, because: they are going to cost less and less, the world is going to run out/will be low on fossil fuels, or non-renewable fuels. They also mentioned a lot about the electric cars being much more environmentally friendly, and a variety of this, such as "more green", "there are always going to be renewable energy resources", etc. Some people said, they are going to be more popular and common, because they are less noisy, make better designs each year. Other mentioned also the governmental help, or just said that the EVs are already quite popular. Lower operating costs and related answers were commonly used as well. Interestingly EVs were compared to the hybrid cars in a way that they also became quite popular in the same way.

Those who had some kind of conditions said that to become more popular, the car manufacturers must work on their battery life, driving range and the charging points, also, they have to accommodate the different needs of their customers and on their technology in general and last but not least, they need to become more affordable and sustainable.

Those respondents who are in general do not believe that electric vehicles are going to be more popular reasoned with the following statements: they do not run in a long range that

well, they cost too much, fixing them costs a fortune, or just said they can only hope that the World will not shift to that side.

Some questions could not be categorized in this list, and they were really interested in my opinion. Some said that they still like old cars and petrol cars, of both yes and no, because in a city there are a lot of charging points, easily accessible and you do not have to be anxious about charging your car, but in a long range, the responders said, they still trust more in their petrol driven cars – mostly because of the battery life.

The third question was about what factors influence the responders' decisions to consider buying an electric vehicle.

they were able to choose between already given answers or they added their own opinion. The biggest influence on purchasing an EV is cost saving on fuel and maintenance, which was chosen by 76 people out of 104 responders. The second most popular opinion was environmental benefits, such as reduced emission (63 people), and just once responders less, improved technology and performance. I thought that range and charging infrastructure and governmental incentives and subsidies are going to be more common answers, but apparently, for people, these are less important than the others.

Also other opinions were mentioned, such as “nothing” influences them to purchase an electric vehicle, or the opposite: the trend makes them. Also, one person mentioned that they do love petrol cars and then one answer says that the possibility of visiting the mechanic less frequently inspires them to purchase an EV.

In the fourth question the responders also had to choose multiple choices if they wanted to. The question was what the barriers are and worries of purchasing an electric vehicle.

Most people are worried about the price - which is a reasonable concern. Nowadays a brand-new Tesla model S’ price is around 40 000 000 HUF, which is a huge amount of money - you can easily buy a flat from it. Obviously, you could get one used, but those prices are not that much cheaper and not anybody could afford it. Naturally, there are other alternatives, such as the Volkswagen ID-4, which is half of the price of the Tesla Model S.

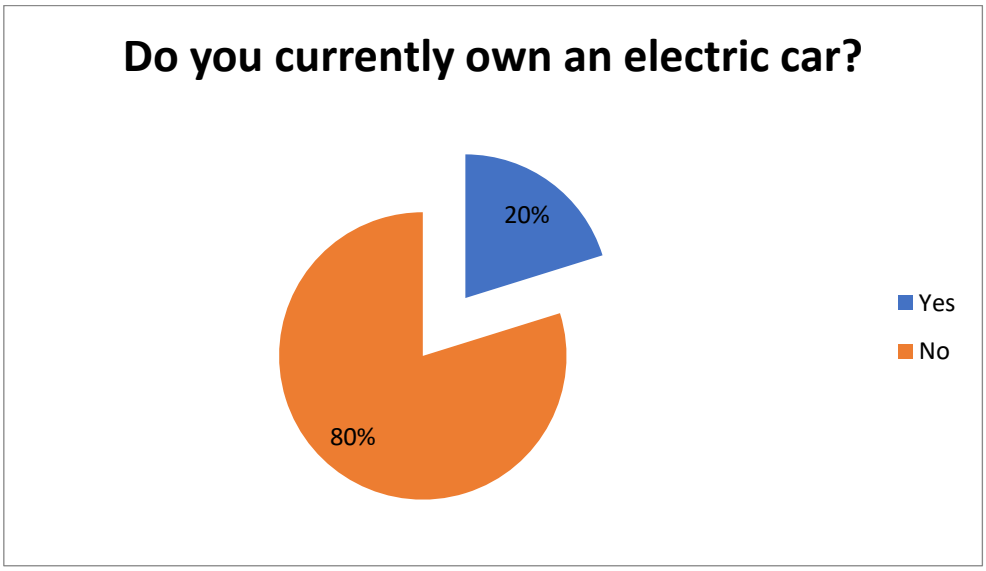
Almost the same number of people (64-65 people) mentioned their concerns about the electric cars limited driving range and the lack of charging structure. These two things in my opinion are related to each other, because if the infrastructure is not well built in a city or in a

country, obviously people are going to be more worried about buying a vehicle which needs to be charged daily/weekly. Also, 57 people, which is more than half of the responders, are worried about these cars' battery life. 27 people mentioned (27.2%) that for them, there would be less barriers and concerns if there were a bigger variety of cars. Someone also mentioned that they are expensive to fix, and one person's opinion is that they had similar fear before they bought their electric vehicle, but they still purchased the car.

Question five was a simple yes or no question. I wanted to know if the responders own an electric vehicle *(Figure 8).*

Figure 8: Ownership of electric vehicles

(Source: own work)

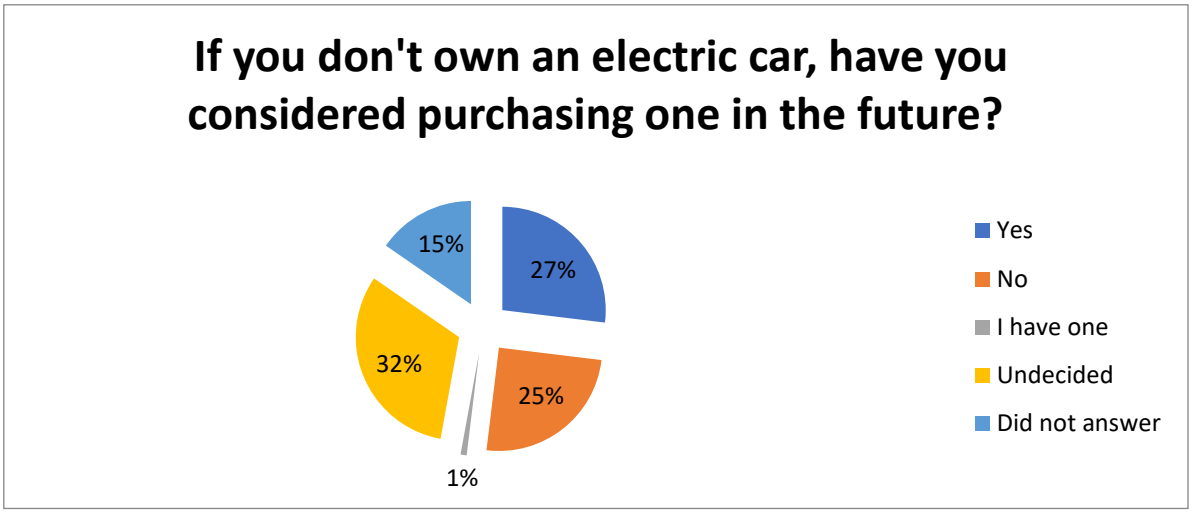


80% of those who filled out the questionnaire do not own an electric vehicle - it means 83 people, but 20,2% of them (21 people) do own them.

The sixth question was if they do not own an electric vehicle, would they consider purchasing one in the future? They were able to choose between three answers (yes, no, undecided), or they were allowed to say their own opinion *(Figure 9).*

Figure 9: Consideration of owning an electric vehicle

(Source: own work)



The answers were divided into thirds almost: 32% of the responders (33 people) said they did not decide about this question yet, 27% (28 people) answered that they would consider purchasing an EV, and 26 people said that they would not even consider purchase in the future.

Question seven was about the advantages of owning an electric car.

The most common answer was reduced noise and vibration (66 people). This was quite surprising because in the beginning of starting this questioner, I would not have thought that this would be even in the first top three answers not alone this would be the first one.

With 62,7% (62 responders) on the second most mentioned advantage is the environment impact. That is obvious that people should care about our environment and our planet itself much more, because there are big problems are happening each day: pollution, deforestation, climate change and the list is almost never-ending.

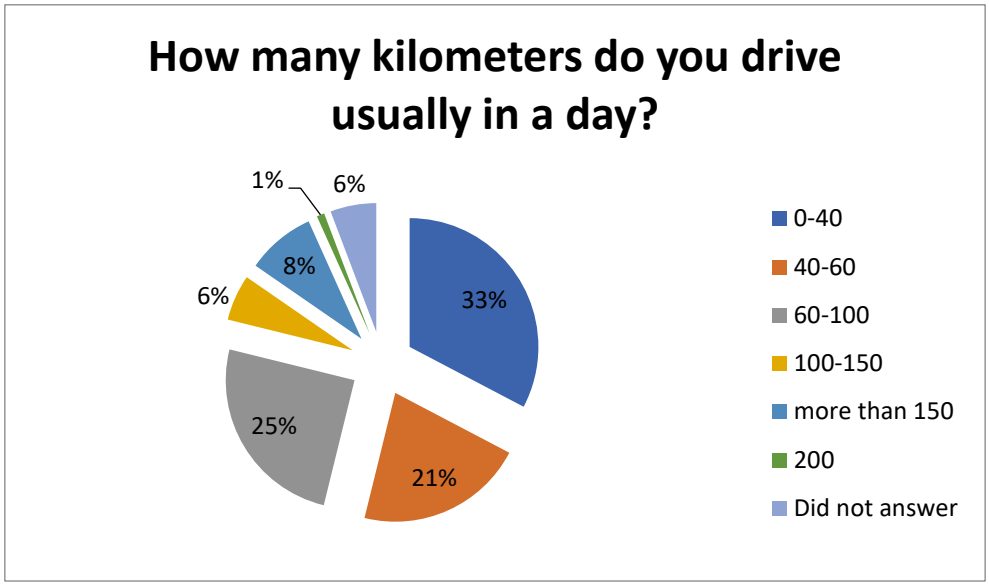
The third advantage head-to-head with 59.8% (meaning that 61 people chose this as a benefit) are the cost saving and the electric car discount rate loans. Around half of the responders said that for them convenience of home charging (54,9%) and tax incentives and rebates (50%) are important advantages.

Usage rate was only chosen by 22 people (21,6%).

In the next part of the questioner, I asked the responders about their daily driven kilometres (*Figure 10*).

Figure 10: Kilometer ranges driven by the responders

(Source: own work)



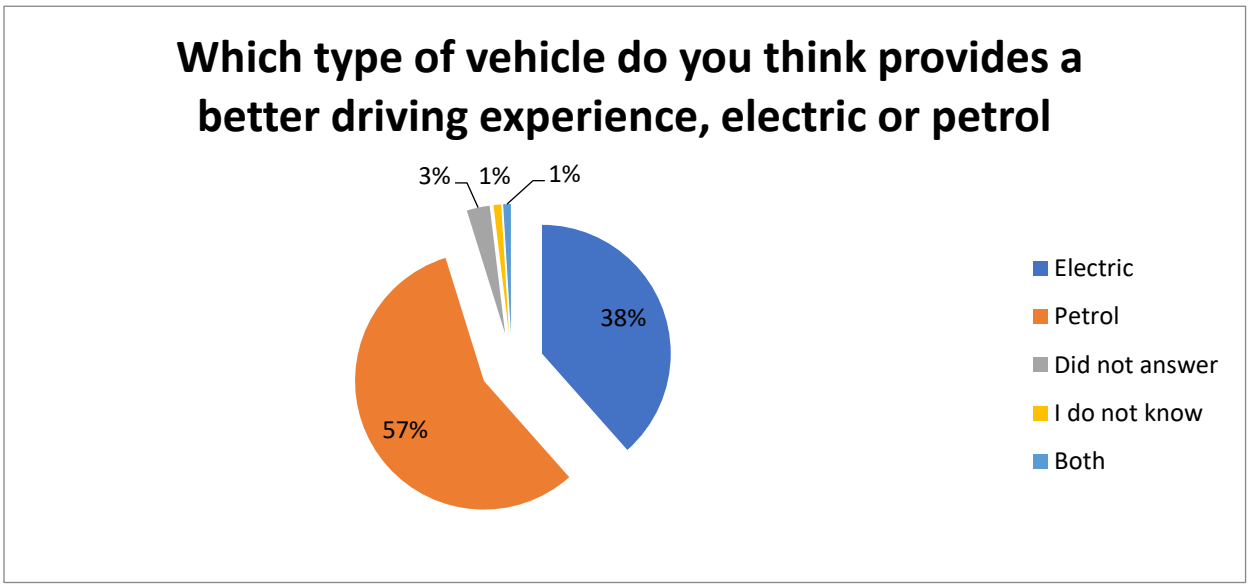
This question was answered by 98 people - it is because not every responder had a vehicle. Most people do not drive many kilometres a day, since as the chart shows it, 34,7% of the respondents (34 people) are driving between 0-40 kilometres a day. This could be a daily commuting to work or school, and probably some grocery shopping, or picking up the children from their educational institute. 22,4% are driving between 40-60 km a day (22 responders), and 26,5% (26 people) are driving between 60-100 km which is kind of a big distance for daily drive. Between 100 and 150 km it is 6 people (6,1%) who are driving daily, and more than 150 km is driven by an even more (9) people, which is 9,2% of the responders. And one person who answered drives 200 kilometres a day.

Question nine was about the driving experience of the electric and petrol cars. Originally, I thought, people were just going to answer this simple question, but a lot of other type of answers were also received.

Let's take a look at the chart *(Figure 11).*

Figure 11: Driving experience of electric and petrol vehicles

(Source: own work)

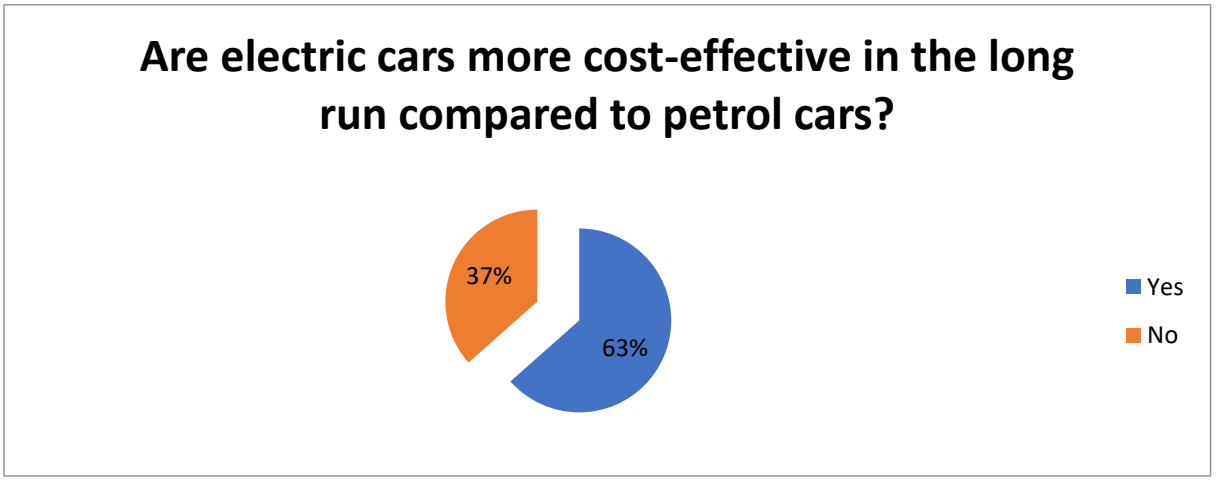


More than half (57%) of the responders said that they prefer driving a petrol car, but more than a third of them (38%) said they enjoy driving an electric car more. The other answers were the following: "I don't know" (which makes sense for those who only drove on type of car), or simply said they never drove a car which is electric, or they are both different experiences.

Question ten was a decisive question about if the electric cars more cost effective in long run compared to petrol cars *(Figure 12).*

Figure 12: Cost-effectiveness of electric and petrol cars on the long run

(Source: own work)

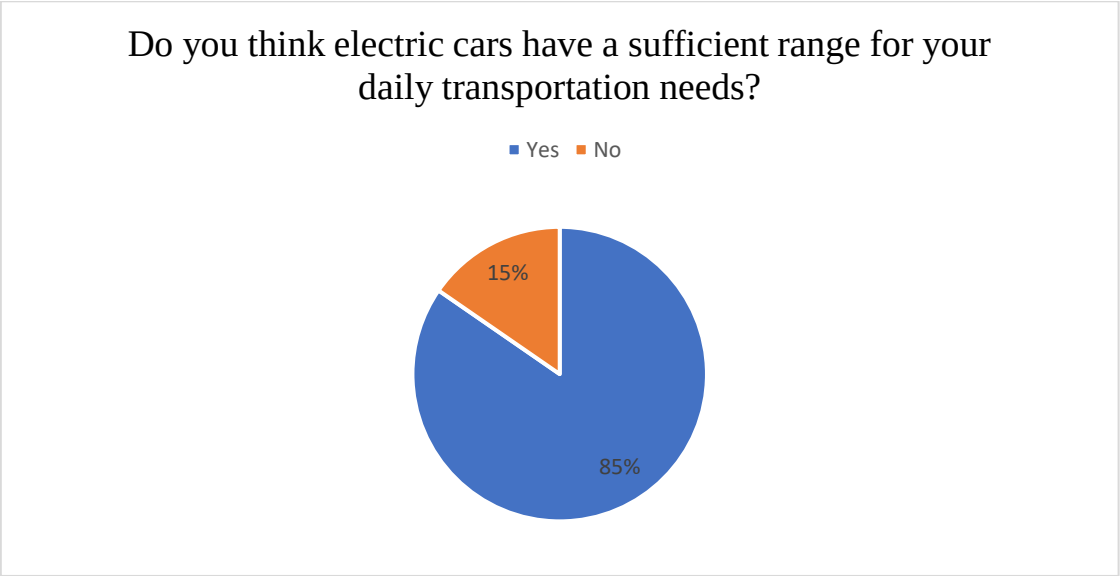


Most of the responders (66 people) said that they believe that the electric cars are more cost effective in the long run (63%), and 37% (38 person)said the opposite which means, in their opinion, they are not.

The next question was also a determining question *(Figure 13).* In this question I asked the answerers' thoughts about the sufficient range for daily transportation needs.

Figure 13: The responders answers if the electric cars are enough for their daily transportation needs

(Source: own work)



This is a simple chart. 85% of the responders (88 people out of 104) said that the EVs can satisfy their daily transportation need, and 15% (16 out of 104) said no, it is not enough. In general, an electric vehicle has around between 130 and 500 kilometres by a full charge, which is more than enough for daily use - as it was seen in question number 8, people are not driving more than 200 kilometres frequently on a daily basis.

Question twelve was an interesting one because it was asking the participants if they would advise others to purchase electric cars and why. Most of the answers were advising to buy electric cars for its nice features such as its green footprint, aesthetic designs, its efficiency especially on Amman roads and advising it as a second or third car or for the retired people who don't drive that much anymore and delivery services. While the ones who were against

advising that are the car enthusiasts, those who are driving for long ranges and who are anxious about driving ranges and potential malfunctions.

I'm glad that this age category has participated in my research because it means that they have owned or drove or witnessed a lot of vehicles driving in the streets of Jordan and they could tell the differences of technologies and the development of the automotive industry in general. (22.1%) (23) responders aged between 35 and 44. This is the generation that was the most interested and curious about electric cars in general because they have witnessed a wild change (shift) of the automotive industry and here they are answering my questions and sharing their opinions whether they do or don't own electric vehicles. The rest are the ones who can't wait to get a driving license to actually own an electric vehicle while the elderly people who participated are enjoying their retirement by driving electric cars and facing nearly zero issues due to their minimal driving range.

I can only say that I am proud of myself for knowing most of those who responded to my questionnaire and I am truly impressed by their opinions because it gave me even a deeper understanding about how consumer behaviour work especially in Jordan due to its complicated circumstances whether it was related to economy, politics and culture that I as a Jordanian need to get through to reach consumers in the most precise, efficient way.

In conclusion, the survey conducted through Google Forms offered valuable insights into the perspectives of respondents regarding electric cars, particularly within the context of Jordan. This research was conducted by sharing the questionnaire on various online platforms, including Facebook groups and Instagram, within a specified time frame. A total of 104 responses were collected during the survey period, which was deemed a substantial number, providing a wealth of information for this study.

Demographic data, including age, gender, and occupation, was collected, aiding in understanding the backgrounds and viewpoints of the respondents. The survey findings revealed that gasoline (benzin) cars are the most prevalent in Jordan, closely followed by electric cars. Diesel vehicles are less common, while hybrid cars maintain a moderate presence.

When exploring the factors influencing the consideration of an electric vehicle purchase, respondents primarily cited cost savings on fuel and maintenance as the most influential. Environmental benefits and government incentives were also significant factors.

However, the survey also unveiled the main barriers and concerns for potential electric car buyers. Price, limited driving range, and the absence of sufficient charging infrastructure ranked as the top impediments. Worries about battery life and the availability of a variety of models were also noted.

Furthermore, a significant portion of respondents did not currently own electric vehicles. However, it's noteworthy that a notable and the higher percentage expressed consideration of purchasing one in the future.

In evaluating the advantages of electric cars, respondents mostly highlighted reduced noise and vibration, environmental benefits, and cost savings. This illustrates the growing importance of sustainability and cost-efficiency in the minds of consumers.

The findings also shed light on the daily driving habits of respondents, with the majority driving between 0-40 kilometers per day. While some drove longer distances, it was evident that the average daily travel within the surveyed group was relatively short.

Additionally, the comparison of driving experiences between electric and petrol cars revealed an interesting split in preferences, with a significant portion expressing a preference for petrol cars.

The data suggested that most respondents believed that electric cars are:

- more cost-effective in the long run, despite certain reservations and concerns about driving range.
- Respondents generally felt that electric cars offered sufficient range for their daily transportation needs, aligning with the notion that such vehicles are suited for urban or short-distance travel which generates our research problem`s results that specifically answers the question:
- Would you consider buying an EV? & Why wouldn’t you buy an electric vehicle?

Table 1: Crosstabulation analysis of consideration of buying an electric vehicle

(Source: own work)

Reason for consider	Efficiency	Cost saving	Governmental help	Improved technology	Infrastructure availability	Other
Considering electric car	63	67	49	62	33	5
Not considering electric car	70	65	64	57	27	0

On this table *(Table 1)* we can see the numbers of different positive and negative reasons of buying an electric vehicle and the two main groups who answered consider and not consider buying an EV.

Considering (individuals who are considering buying an electric car):

Approximately 60.58% (63 people) are considering an electric car because of its efficiency. Around 64.42% (67 respondents) are considering it due to cost savings. Approximately 47.12% (49 participants) are considering it because of governmental help. About 59.62% (62 individuals) are considering it for improved technology. 33 people (31.73%) are considering it based on the availability of charging infrastructure. A smaller fraction, about 4.81% (5 individuals), cited other reasons for their consideration.

Not Considering (individuals who are not considering buying an electric car):

The majority, approximately 67.31% (70 people), mentioned not considering an electric car primarily due to the high purchase price. Roughly 62.50% (65 participants) mentioned not considering it due to the lack of charging infrastructure. 64 respondents (61.54%) mentioned not considering it because of the limited driving range. 54.81% (57 people) mentioned not considering it due to battery uncertainty. A smaller group, about 25.96% (27 individuals), mentioned not considering it because of a perceived lack of options.

Among the surveyed group, more people are not considering buying an electric car (67%) compared to those who are considering it (62.50%).

The top reasons for considering buying an electric car are cost savings (64.42%) and efficiency (60.58%), followed by improved technology (59.62%) and governmental help (47.1%).

Among those who are not considering electric cars, the primary reasons are the high purchase price (69.2%) and the lack of charging infrastructure (62.5%).

It's important to note that these conclusions are based on the specific reasons mentioned by participants in the survey, and the decision-making process for buying electric cars can be influenced by various factors and personal preferences.

V. CONCLUSION AND PROPOSAL

The transition to electric vehicles (EVs) in Jordan represents a multifaceted shift that includes not only technological advancements but also significant economic and societal implications. This transition is propelled by a confluence of factors, with government incentives playing a huge role in steering consumers toward electric mobility. These incentives, ranging from tax exemptions to discounted electricity rates, have made EVs an attractive and affordable option for a broad spectrum of Jordanian motorists. The affordability and accessibility of EVs are further underscored by the influx of Chinese-assembled European electric vehicles, although concerns about safety and reliability.

While the adoption of EVs is on the rise, car manufacturers are adapting their strategies to cater to a more extensive consumer base. Acknowledging that the consumer landscape is evolving, manufacturers are addressing the growing consumer concerns regarding range anxiety, affordability, and technology integration. The transition from internal combustion engine vehicles to electric cars has ushered in a new era of automotive innovation, with electric vehicles essentially becoming computers on wheels. Software development and information technology are playing an important role in enhancing the EV driving experience, providing job opportunities in these technology-related fields.

The evolution toward electric mobility extends beyond the automobile sector. It embraces a broader scope, bringing forth economic opportunities in renewable energy integration, governmental initiatives related to transportation and environmental policy, and education and training programs focused on electric vehicle technology. The electric vehicle ecosystem is not merely about changing the way we drive but also redefining how we generate and manage energy, how we educate and prepare the workforce for a sustainable future, and how we craft and enforce policies for a greener tomorrow.

However, it is worth noting that this transition is not without its challenges. Traditional automotive industries may witness job losses as consumer preferences shift. Nonetheless, the economic potential unleashed by the rising demand for EVs offers new avenues for job creation. The electric vehicle revolution is not just about changing what's under the hood but also about transforming economies, enhancing environmental consciousness, and improving technology and infrastructure.

Considering the gathered data, I advocate for a deeper exploration into the desires, requirements, and apprehensions of consumers pertaining to electric vehicle ownership in Jordan. If an additional analytical approach were to be integrated into my research, I propose conducting interviews with both electric and traditional car drivers. Furthermore, I extend a cautionary note to prospective buyers, emphasizing the importance of meticulous consideration, especially regarding factors such as warranty availability, the availability of maintenance parts, and overall purchase diligence. Additionally, I recommend broadening the scope of this research to encompass a wider geographical region, possibly extending the study to the Middle East, to capture a more comprehensive understanding of the dynamics influencing consumer choices in the realm of electric vehicles.

VI. SUMMARY

As the topic of my thesis, I chose a topic that is really interesting and close to me, and the research was successful.

In my thesis, I delved into the factors influencing Jordanians in their decision to purchase electric vehicles (EVs) while also exploring the concerns and dislikes associated with owning such vehicles. The central research question focused on determining the efficiency and cost-effectiveness of electric cars compared to traditional vehicles. Given the rising significance of the electric car industry in Jordan, I conducted a comprehensive study using a bilingual questionnaire in English and Arabic to ensure a targeted analysis of the local market.

Employing a mix of closed and open-ended questions, I gathered valuable data that underwent thorough analysis, including correlation studies and crosstabulation. The results highlighted discernible consumer behavior factors that act as deterrents to the adoption of electric vehicles. Despite the growing presence of electric vehicles on Jordanian streets, my findings underscore the need for professionals to closely monitor the evolving landscape of consumer preferences.

Throughout the research, I emphasized the critical importance of understanding both the advantages and disadvantages associated with electric vehicle ownership from the perspective of the Jordanian consumer. The thesis contributes valuable insights to the ongoing discourse on the transition to electric mobility, shedding light on the factors influencing consumer decisions in this emerging market.

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LIST OF TABLES AND FIGURES

ACKNOLEDGEMENTS

The completion of this thesis marks a significant milestone, and it's essential to express my gratitude to those who have played a huge role in this academic journey.

I owe a debt of gratitude to myself for conceiving the initial idea and embracing the academic challenge that allowed me to integrate my passion for the automotive industry with my studies in Commerce and Marketing. This convergence has been both fulfilling and academically enriching.

To my esteemed professors, especially my dear consultant Krisztina Bence-Kiss, your guidance, support, and confidence in my abilities have been instrumental throughout this journey. Your commitment to nurturing academic growth has been truly invaluable, and I hope this research stands as a testament to your investment.

I extend heartfelt appreciation to my family for their unwavering encouragement and belief in my ideas. Their support has been a cornerstone in my academic journey.

I am sincerely thankful to all the respondents who participated in the survey, including friends and family. Your insights and involvement were invaluable, enriching this academic pursuit.

A special acknowledgment goes to my fiancée, whose steadfast support, unwavering patience, and enduring encouragement have been a source of strength during the challenges of my academic years.

With immense pride and joy, I, Rakan Qasem, conclude this thesis.

DECLERATIONS

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As a supervisor of Rakan Qasem (V3Y244), I here declare that the thesis has been reviewed by me, the student was informed about the requirements of literary sources management and its legal and ethical rules.

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Year of publication:	2023
Department:	Department of Agricultural Logistics, Trade and Marketing

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