

## PEOPLE'S ATTITUDES TOWARDS USE OF ELECTRIC CARS IN AOTEAROA NEW ZEALAND

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### Abstract

*This study aims to explore the attitudes and perception of people and their intention to use the electric cars based on its cost, usefulness, satisfaction, enjoyment, ease of use and their expectation from government in the form of subsidies to the owners of electric cars, which finally results in their purchase intentions. A descriptive research design is used for this study and the data have been collected from 203 participants from New Zealand. A survey method was used and the questionnaire was developed. The results of the survey indicate that a higher percentage of the respondents are ready to embark on the use of electric cars and the only factor that acts as a constraint in their buying interest is the cost of the car. It is also evident from the results that people are concerned about environmental sustainability and with a little push from the government can convince the people and can initiate their switch to electric cars.*

**Key Words:** *Electric cars, environment, buying behaviour, perceived usefulness*

### INTRODUCTION

It is evident that the harmful emissions of petrol vehicles are a major cause of polluting the environment; hence, the switch to electric cars is being warmly welcomed by a few countries. However, there is a need to understand how the people are going to react or what they think about using the new technology because satisfaction of the end-

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users plays a vital role in the success of any product. Even though the New Zealand government is working on measures to make this change of technology, therefore, there is a need to understand the attitudes of people towards this change so that it can help the policy makers to make this change in a smooth and successful way. It is important to consider users' perception and preferences for maintaining a success in the transportation. The main objective of this study is to find out the respondents' point of view towards electric vehicles and the factors that influence them to buy or refrain from buying an electric car. Hence, this study investigating New Zealanders' attitudes and perceptions towards electric cars addresses the following questions:

1. What is the public perception and acceptance of electric vehicles as next-generation models for the automobile industry?
2. What are the main factors that motivate people to buy electric car?

## **LITERATURE REVIEW**

There have been various studies to analyse the ways to control the problem of energy insecurity and environmental pollution and it has been observed that there is a need to change the existing energy consumption, which can reduce the fuel consumption and harmful emissions (Murshed & Tanha, 2020). According to Walls (2020), Prime Minister Jacinda Arden declared a climate emergency on 2<sup>nd</sup> December 2020 and announced that all the government agencies and ministry will buy electric cars to achieve the goal of the government to make the public sector carbon neutral, which is aimed to achieve by 2025, which is in next five years of time. This is a great step to start with and many other countries are aiming to work towards achieving similar goals. Electric cars differ from traditional petroleum engines because the emission of carbon dioxide from the burning fuels contribute to climate change. The carbon dioxide (CO<sub>2</sub>) emissions can stay for thousands of years in the atmosphere, which is piled up with time (Nunez, 2019). The fuel engines in vehicles contribute to noise

pollution and atmospheric pollution, especially, in dense traffic areas. With the current wave of economic viability and efficiency, electric cars are digitally connected to combustion systems that are time and cost-efficient. Over the last decade, automotive industries have continued to invest in technologically enabled electric vehicles to produce cost and time-effective cars (Tagliapietra & Veugelers, 2021). The future of e-mobility seems bright as the dependence on oil is being challenged by the growing interest in electric driving and using renewable and self-generated source of energy and its ease of manufacturing and ease of use is another factor that supports the future of electric cars.

It is true that electric vehicles are a promising solution for the transportation systems in the future, however, this decision of transition from traditional vehicles to electric is challenging because of the technological differences and other limitations (Proost & Dender, 2010). The conventional vehicles remain viable and highly recommendable than electric cars. Automated vehicles threaten economic growth by reducing job opportunities and revenues and increasing recharging time. Vehicles contribute to high income from the sales of petroleum and gas. Similarly, the oil companies add up to the Gross Domestic Product (GDP) and employ individuals in different positions. There is also a range anxiety associated with the introduction of electric cars, which is also an obstacle in the success of EV's (Nilsson, 2011). It was said that electric cars can travel up to 100 miles only at a single charge, however Tesla Model S can run approximately 337 miles and Chevrolet Bolt can run up to 238 miles and the future models aims to have an improved range (Riley, 2020). Even though electric cars have its advantages and are in trend, however, previous studies indicate that there are several hindrances in adapting it (Khandakar, Rizqullah, Berbar, Ahmed, Iqbal, Chowdhury, & Zaman, 2020).

## **Global Warming and People's Attitude in New Zealand**

New Zealand accounted for only 0.17 per cent of world's greenhouse gas emissions; however, it has an exceptionally large carbon footprint on a per capita basis, which is around 18 tons of greenhouse emissions per person each year (Fyers, 2018). According to Ministry of Transport (2019), one of the main factors, resulting in poor air quality in New Zealand is vehicle emissions. After the win of the Prime Minister of New Zealand, Jacinda Ardern has pledged to invest \$50 million dollars to buy electric buses and the government's agenda on feebate for electric cars is also on the cards (Wannan, 2020; Xu, 2021). According to Strang (2020), the per passenger kilometer emissions of electric car in New Zealand is much lower than produced by petrol or diesel vehicles because 80-85 per cent electricity is renewable here. Hence, it is evident that the future is electric. According to Wannan (2020), initially the plan was opposed by NZ First, the nationalist political party, to make the electric cars cheaper and making the gas vehicles more expensive to purchase, however, it was supported by the Greens. Kiwis are moving towards making the switch to electric cars, however, there are many that feel that the purchase cost is something that is refraining them to buy it (Warhurst, 2019). The decision-making power relies on the cost of the electric cars in New Zealand.

Lloyd and Cackette (2001) have concluded that petrol and diesel cars contribute to increased gaseous emissions that contaminate the environment by polluting the air, water, soil, and global climate change. Due to the oil consumption of the cars with internal combustion engines, the silent sufferers are the children as they experience high chances of asthma and slow lung development and this over dependence on oil can result in a big burden on the children and future generations, hence, there must be strict regulations and dedication to get off the fossil fuels (Metz, 2020). Diesel and petrol

emissions contribute to high levels of nitrogen oxides (NO<sub>x</sub>) than regulated and these excess levels have led to approximately 38,000 premature deaths as they suffered from heart and lung diseases and these deaths are mostly caused in Europe, China, and India where the polluting gas-cars are the main culprits (Carrington, 2017). The auto emissions also pose other health risks to humans for example the sensitive individuals like infants, young adults, children experience respiratory symptoms, decreased exercise capacity, lung function decrements and risk to health comes with a price (Gautam & Bolia, 2020). A recent survey conducted on more than 3000 people from eight countries portrayed that during the pandemic situation of covid-19, people became more concerned about environment. Additionally, they are now more committed towards contributing to advance sustainability by bringing a change in their own behaviour. According to Ministry of Transport (2019), in New Zealand, there were 256 premature deaths in the year 2012 due to the harmful emissions caused by vehicles costing NZD\$934 million and the diesel vehicle emissions plays a vital role in contributing to the bad air quality in Auckland, New Zealand. It is evident that how vigorously the gas cars are affecting the environment and the people. The people are unknowingly the silent victims fallen into the trap of the fuel dependency and its harmful consequences. Electric cars being zero emissions cars can help benefit the environment and can save the people from the various health problems caused by the petrol and diesel car emissions. For introducing a new technology or era, it is important to study how the people think about using electric cars.

### **Future of Electric Cars**

People are adapting to a more sustainable lifestyle to make efforts towards achieving a goal of cleaner environment, which has become a social trend, which has pushed towards electrification of transport (Cohen, 2020). The recent trend depicts that the people have started to believe that the global environment have shifted in favour of electric cars, however, there is a big question mark if the world is

genuinely serious about switching to electric cars (Shukla, 2021). The people have a positive opinion towards electric cars, however; they expect that there should be subsidized prices for purchasing electric cars. There are many people who still think that electric cars cannot replace the gas cars (Loveday, 2020). One of the reasons people do not invest in electric cars is because they expect that the electric cars should have the same features and price like the gasoline cars (Lane, 2020).

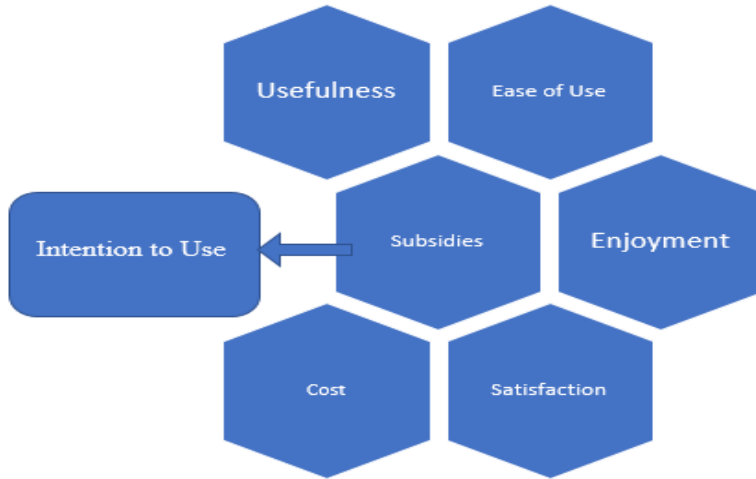
According to Johnson (2020), the carbon-emitting vehicles will be replaced entirely by zero-emission types by 2025. There are high possibilities of increased sales of wireless charging pads in the near future. From the economic perspective, communities and lawmakers from the United States and Europe are positively welcoming the switch and respond by influencing tax exemptions and policy changes (Interfax, 2017). Resultantly, the end-users enjoy reduced prices for both the vehicles and recharging facilities. The European Union targeted a decade ago to bring down the CO<sub>2</sub> emissions by 2020 (Singh, 2010). The German manufacturer, BMW plans to increase the sale of electric cars soon under its sustainability plan where it aims to sell 4.6 million electric cars within the next 10 years with an average sale of 460,000 cars per year (Kable, 2020). According to Hawkins (2020), Elon Musk of Tesla announced that they are working on ways to lower down the purchase cost of its electric cars. Elon stated that they are making new battery cells and might alter some parts of the battery that can bring the cost to half which means that the special model will be priced at around \$25,000, which is equal to the purchase price of gas cars. UK is also doing its bit. The prime minister of UK, Boris Johnson announced that the country will ban the petrol and diesel cars in the future and gave a move on to the manufacturers to produce affordable range of electric cars. Hybrid cars are not very green as it uses fossil fuel and internal combustion engine so these will also disappear from the UK market (Wilsons, 2020).

According to Chatham (2016), the expansion of electric car markets poses a potential threat to infrastructural development and although the entire electronic-enabled industry is perceived to be cheap, setting up the charging stations in all parts of the world is challenging. Another difficulty is indicated as the initial cost of purchase where the electric cars are usually expensive. However, the prices tend to balance once the electric car is operational (Vliet et al., 2011). There are also questions being raised about the harmful effects associated with the lithium-ion batteries, which is used in electric cars (Rapier, 2020). According to O'Lochlainn (2019), the toxic fumes produced by the damaged lithium-ion batteries are extremely harmful to human, however, companies are working towards finding cost effective ways to recycle these batteries.

## **MATERIALS AND METHODS**

To examine the research objectives, quantitative primary data is procured through a survey. The participants for the survey are being approached online due to the COVID-19. The survey has been designed to get the views of people about electric cars. After data collection, it was analysed to get the findings of the research. The questionnaire was adapted from the study of Park, Lim, and Cho (2018) and Emsenhuber (2012), which had investigated the acceptance of electric vehicles and focuses on consumer related buying criteria. The questionnaire comprised of demographic questions, general questions, which were designed to take a general viewpoint of the respondents and finally last section was broken down into six main categories to derive the intention of the respondents to use electric cars. The questionnaire had been distributed through "Google forms" via emails, WhatsApp and Instagram. The sampling technique chosen for this research is a convenient sampling mainly because of the COVID-19 situation prevailing at the time of data collection (October 2021) made the availability of the respondents 'in-person' difficult. The conceptual framework is presented in Figure 1.

Figure 1: Conceptual Framework



For this study, ethics approval is taken by the ICL Research Ethics Committee. The fundamental ethical consideration is ensuring voluntary responses where all participants give consent as the questionnaire starts with a question seeking their agreement on participating in the survey by clicking yes or no.

## FINDINGS AND DISCUSSION

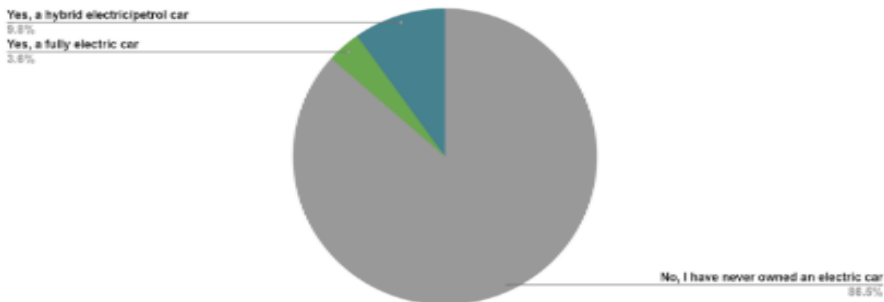
The survey received 203 responses in total. The basic demographic details of the participants include 59.6 per cent of male and 40.4 per cent is females. Almost all the participants had a good education level where 57.5 per cent had Bachelor's degree, 26.9 per cent were participants with a Master's degree, 1.6 % of the respondents have a PhD and the few have studied high school. Most of the participants about 77.2% drive less than 50 kilometres in a day, 14% travel in between 50 to 100 kilometres and only 6.7 per cent drive around 101 to 200 kilometres in a day.



### Ownership of Electric Cars

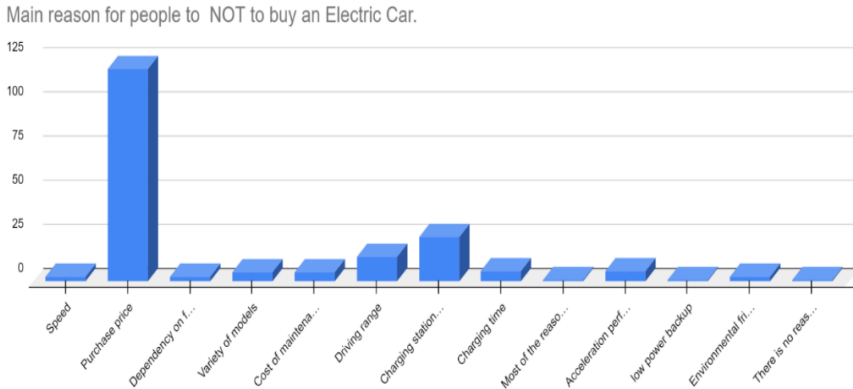
Here, 86.5% of the respondents have never owned an electric car and only 3.6% of the respondents are owner of electric cars. Whereas, 9.8 % of the respondents are owners of a hybrid electric/petrol car. This shows that a large proportion of the respondents do not own electric cars. This finding reflects the ownership of the electric cars in New Zealand in general. The car ownership of the participant is shown in the below Figure 2.

Figure 2: Ownership of Electric Cars



### Reasons for not buying electric cars

There were some general questions included in the survey to study a broad view of the respondents towards electric cars and to get information regarding the main reason for not buying electric cars as given in the below Figure 2:

**Figure 3: Reason for Not Buying Electric Cars**

The result shows that 62.2% believe that the purchase price is a major factor that influence people not to buy an electric car and the second factor is the charging infrastructure, however, only 13% of the respondents think that lack of charging infrastructure makes people of not to buy an electric car. Hence, the two main factors that acts as a hindrance to buy an electric car are its high purchase price and the charging infrastructure. Although, a breakthrough in the use of electric cars came with the invention of rechargeable battery (Guarnieri, 2012). Purchase price is the first and foremost consideration to the customers while buying any product.

### **Usefulness of Electric Cars**

The above result shows that 93.3% of the respondents agree that electric cars can significantly contribute towards the environment. Apart from the usefulness to the environment, 68.9% of the respondents think that the use of electric cars can increase their work efficiency and performance and 22.8% of respondents are neutral towards this. Furthermore, 50.3% of the respondents agree that using electric cars can increase their productivity whereas 23.3% of the respondents are neutral to this. Hence, the result of respondents' intention to use in terms of usefulness of electric cars does not show

incredibly positive response in terms of electric cars helping them to increase their work efficiency and productivity. There is acceptance of using electric cars, as these are ecological clean transport option (Liu & Lai, 2020)

### **Ease of Using Electric Cars**

When it comes to ease of use, it is a fact that respondents who have not used electric cars may have a neutral view about so, here 71% agree that electric cars are easy to drive and 28% responses show a neutral view about it. On the other hand, only 59.1 % of respondents think that use of electric cars does not require lot of physical effort and 34.7 % of respondents are neutral about it. In addition, 49.7 % of respondents think that driving electric cars does not require a lot of mental effort and 41.5 % of respondents are neutral to this statement. The result of this almost neutral point of view about the ease of use of electric cars is because the majority respondent has never driven an electric car. According to Wu et al. (2019), perceived ease of use and perceived usefulness have a positive relationship with people's intentions to use electric vehicles.

### **Enjoyment in Driving Electric Cars**

The respondents gave a positive response for the statements related to enjoyment in using electric cars. Only 3.1 % of the respondents do not agree that they would enjoy driving electric cars and electric car driving is more enjoyable than the traditional vehicle. Whereas 86.1 % of the respondents agree and strongly agree that they will enjoy driving electric cars and 91.7 % of the respondents agree that they are happy to use electric cars in future. According to Morthe (2020), everyone likes to use up to date technology. This is the reason people are positive to use electric cars when it comes to the enjoyment in using it. Enjoyment in driving electric cars is a probable factor for people to buy electric cars (Khazaei & Tareq, 2021).

## **Satisfaction**

The result here shows that 60.1 % of the respondents agree that they are overall satisfied with the electric cars and 58 % of the respondents have a positive feeling towards electric cars whereas 35.3 % of the respondents do not agree to have a positive feeling and 32.7% of the respondents are not satisfied with electric cars. In addition, 57.5% of the respondents also agree that they would recommend the use of electric cars to others.

## **Purchase Price**

Cost is the main factor when it comes to consumers' attitude towards any product (Yan, Qin, Zhang and Xiao, 2019). Table 5 reveals that 79.3 % of the respondents think that it takes a considerable amount of effort and cost to use electric cars and 86 % of the respondents believe that the purchase price of electric car is high whereas, 50.2 % of the respondents believe that the maintenance cost to run electric cars is not expensive. According to Loveday (2019), there are quite many ranges of electric cars available than before but still the purchase price acts as a roadblock to many people when it comes to buying an electric car (Sparrow, 2020). Even in the European countries, it has been found out that the purchase price is a deterrent to buying electric cars (Gómez Vilchez et al., 2019).

## **Environmental Sustainability**

The result of the statement shows that people are really concerned about protecting the environment and believes that it is the respondents' efforts that can make a difference. 90 % of respondents agree that it is high time that we all should start worrying about the effects of air pollution and 91.7 % of the respondents think that saving the environment requires immediate efforts from us. Interestingly, only 5.2 % of the respondents are not willing to pay more to save the environment; however, 84.4 % of the respondents are willing to pay more for products that can help save the environment. It is a positive

note for the electric car sellers that respondents are not environment friendly and are willing to make their efforts to make it better. A recent survey conducted on more than 3000 respondents from eight countries portrayed that during the pandemic situation of COVID-19, people became more concerned about environment and in addition, they are now more committed towards contributing to advance sustainability by bringing a change in their own behaviour (Kachaner et al., 2020; Wu et al., 2019). People concerned about the environment pollution are more likely to buy electric cars (Kim, Tanaka, & Schmöcker, 2020)

### **Intention to Use Electric Cars**

The results show that respondents' intent to use electric cars if we keep all other factors aside. 79.8 % of the respondents are interested to drive electric vehicles than other vehicles and 87.1 % of the respondents would like to use electric cars as much if possible and would also like to would like to continue using it. The results show that respondents have a positive intention to use electric cars if given a chance. The electric cars are becoming immensely popular mainly because of the new technology that replaces the expensive means of gas with the cheaper mode of electricity to run it (Avdievich, 2019). People with higher purchasing power and innovativeness are more likely to use electric cars in India (Pandey & Mohan, 2021).

### **Subsidies**

The result shows if the government can introduce some subsidies on buying electric cars, then the respondents are more likely to buy it. The responses from the respondents have been acquired based on their views on three types of subsidies where 89.7 % of the respondents are willing to consider buying an electric car if they are provided free charging for a certain time. Additionally, 93.8 % of respondents responded positively on buying electric cars if there are some tax exemptions offered and 92.7 % of respondents have shown their expectations from the government to make the electric car

purchase easier. So, the data here depicts that the people can be persuaded and convinced to buy electric cars if the government make some easier policies and ways that can help the people purchase electric cars. This finding is similar to the study conducted by Sovacool et al. (2019). The subsidies are one effective way that can increase the number of electric cars on the road as it brings down the overall purchase cost of an electric car (Yan et al., 2019) and people are ready to buy if get subsidies or tax relief. The public policies supporting electric cars is the main reason of an early adoption in the lead countries (Olson, 2018).

## CONCLUSIONS AND RECOMMENDATIONS

From the findings of the study, it can be stated that the people have a positive thought for the use of electric cars. It depicts that the people are ready to embark on this new technology with a few alterations and promotions made by the government that can help the consumer to own it with some ease. Hence, the main aim of the study was to find out the people's attitude towards the use of electric cars, to determine constraints and restrictions that limited people to buy electric cars, and to find the main factors that motivate people to buy electric car. Zero-emission vehicles can contribute to the environment in a great way as the increasing fleet of gas vehicles on the road all over the world is harming the environment drastically. With a diversion in people who are now being more concerned about the environment can be convinced by the government towards switching their gas vehicles with the electric ones. People are becoming more and more concerned about environment sustainability and the demand for electric cars is increasing (Mickiewicz, 2019).

It can be concluded that the attitude of people towards the use of electric cars is positive. The only hindrance can be seen is the cost factor and lack of motivation or subsidies from the government. It seems respondents are not familiar with the benefits when it comes to the comfort in driving it, however, the respondents are remarkably

aware of the benefits that electric car can give to the environment. It is natural that respondents are not too aware of the benefits of electric cars related to its driving because 86.5 % of the respondents are those who have never owned an electric car in New Zealand and only 3.6 % of the respondents are owners of a fully electric car. It clearly shows that people are interested to use electric cars if made possible. In addition, in relation to making it possible, the results show that people are ready to buy electric cars if the government provides some subsidies like tax exemption, free charging and other ease in policies that can promote buying of electric cars. The result is an evidence that people now are concerned about the environment so they have a positive attitude towards electric cars because they are definite to buy electric cars to contribute towards environment sustainability if the electric cars purchasing is made a bit easier and affordable.

Price is one thing that is glued to the image of electric cars; however, there are other factors that motivate people to buy electric cars. The survey in this study shows that people are willing to use electric cars if they get some leverages from the government such as tax exemption, free charging and there could be others. Like Norway, if the government in every country work or invest towards promotions of electric cars, then a substantial increase in the use of this emission free cars. Subsidies are one effective way that can increase the number of electric cars on the road as it brings down the overall purchase cost of an electric car (Leard, 2019).

The findings of the study can help the government and the related businesses to develop an understanding about the needs of the end users. The viewpoint of people can help to curb the constraints that hinders the purchase of electric car. The results of the survey can also help depict if the electric car purchasers can be motivated if the government grants lucrative subsidies to the owners. Hence, it can be stated that with a few alterations and with further analysis there can

be a successful switch to electric vehicles if initiated by the policymakers and the results of the study shows it will be welcomed by the people.

The current study only found the attitudes of people towards use of electric cars where the participants were the owners or non-owners of electric cars however; the research could be more robust and could bring a strong meaning to the research if a group of participants could have been some environmentalists or individuals working in an environmental organization. Due to the time limitation and the COVID-19 situation, reaching to these groups were avoided. To reach to this group of participants, an interview methodology could be adapted. The environmentalists and the policy makers are the decision makers. It could have been helpful if their viewpoint could be added about giving out subsidies like tax exemption, free car charging and any other policy that could help to lure consumers to buy electric cars. Hence, the reach to special groups was limited in this research.

Lastly, the participants were chosen by convenience sampling technique, so the distribution of the participants was not fair in terms of ownership of electric cars. The study involved 86.5 % of the respondents who have never owned an electric car, 9.8 % of the respondents owned a hybrid petrol/electric car and only 3.6 % of the respondents were owner of a fully electric car. The questions regarding the ease of use and the usefulness of electric cars could not be answered effectively. The scores for these questions were not extremely high. Here, 22.8 % to 41.5 % of the respondents gave a neutral response to the questions that were related to the usefulness and ease of use.



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