**Theorems on Adoption of Electric Vehicles**

**Content:** After analysis and visualisations were generated from the registered electric vehicle (EV) data, outliers and trends were detected which required questioning for the causalities for said outliers and trends.

These questions then indicated possible theories on why certain regions had high or low adoption of EVs, these theories were proven or disproven against multiple sources of community data to reach conclusions.

**Initial Questions** from Data Analysis on EV Registered Data:

* Australia
  + Victoria, New South Wales and Queensland have 8,000 EVs or more, compared to the remaining states with 1,500 or less?
  + Compared to Latin America (LA) with a population of nearly 650 million people, Australia has only 25 million people and has tripled the adoption of EVs of that in LA?
* China
  + Dominates the world when considering the adoption of EVs, at 2.5 million which is 2.5 times more than its nearest competitor United States, are these figures fraudulent, or legitimate?
* Canada
  + 38 million people compared to LA with 650 million and they have achieved 5x more adoption of EVs than LA?
* Europe
  + Key countries with strong adoption of EVs; Germany, UK, France Norway?
* United States
  + California has over 400,000 EVs with the other states having roughly 50,000 EVs or less?
* Latin America
  + Despite having the second largest population compared to the other locations, it has the least amount of EVs being used?

**Initial Theorems:**

* Population density results in more EVs being used
  + For:
    - China contains 18.47% of the world’s population and is the most populated country
  + Against:
    - India contains 17.7% of the world’s population being the second most populated country, yet has less EVs than US which has less than a quarter of their population
* Countries’ economy causes increase/decrease in EV adoption
  + For:
    - 2010+ China’s economy has been rapidly increasing allowing consumers to buy their own cars including EVs
    - Latin America is still a developing country, they do not have the resources to fund charging infrastructure to accommodate the changeover to EVs
  + Against:
    - Canada has the 9th largest economy in the world and yet their charging infrastructure to accommodate EVs is underfunded, thus the low adoption of EVs along with it
* The more affordable EVs are, the more that are purchased
  + For:
    - The Chinese car ‘Wuling Hong Guang MINI EV’ consumed nearly a 5th of their EVs on the road in 2021 coming in at a price of $8,000 brand new
    - Germany contains the second largest EV company ‘Volkswagen’ with a market cap as of March 2022 of 98.34 billion. Germans have a locally sourced EV provider, thus the prices of these vehicles are cheaper for locals.
  + Against:
    - Battery prices to power EVs are still considerably high, all electric vehicles are still un-feasible for long distances in rural areas where EV charging stations are lacking.
    - Tesla’s EV line-up has some of the most expensive price-tags yet has the biggest share in the EV market
    - Due to Latin-America still being a developing country, citizens find it unaffordable to pay for the upfront costs of EVs despite Chinese EVs being so affordable and cheap
* Petrol/Diesel prices climbing causes more EVs to be adopted
  + For:
    - Sales of EVs in Australia increased by 200% in response to the rising petrol prices that were incurred from the sanctioned bans of oil exports from Russia.
  + Against:
* Popularity and advertisement of EV companies encourages more EVs to be adopted
  + For:
    - When Tesla’s most iconic car was premiered in 2013 it made global headlines selling 2,500 units in its first month of release and 10,030 by the end of Q1 2015.
    - Germany has the largest amount of EVs used due to the exposure their citizens receive of their local company ‘Volkswagen’ and are inclined to support local communities.
  + Against:
    - Tesla leads the EV market share holding 14%, yet they spend equivalent to all other EV manufacturers on advertisement but 3 times or more funds are diverted into their R&D
* Threat of environmental damage promoting adoption of EVs
  + For:
    - China heavily relies on oil imports to power traditional fossil fuel powered vehicles, hence the introduction of their 2009 policy
    - China contributes to 30% of the words pollution, their 2009 policy was to aid in reducing their damage
  + Against:
* Government Policies encouraging purchases of EVs
  + For:
    - Chinese government introduced a policy in 2009 to provide subsides (paying for a portion of the EV) until 2020.
    - 2020+ the Chinese government implemented a mandate on car manufacturers, to meet a minimum percentile of total vehicles sold were EVs otherwise financial penalties are incurred.
    - California’s government made an executive order to have 100% of cars/trucks sold to have zero-emission by 2035 causing a massive shift to EV accommodation with 73,000 charging stations already installed
    - In Australia NSW, VIC and QLD have the most EVs used compared to their other states, this is reflected by these 3 states having the best funding programs for public charging and rebates collectively.
  + Against:

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