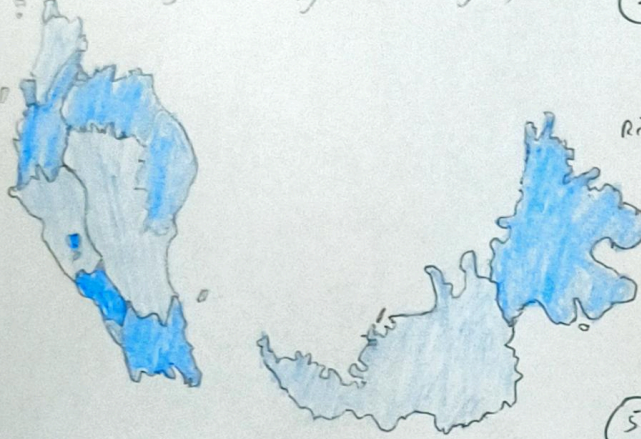# 1. IDEAS
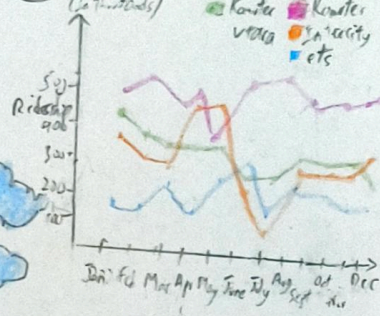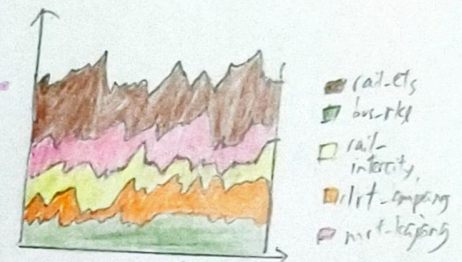
① Vehicle Registration by State (Malaysia)
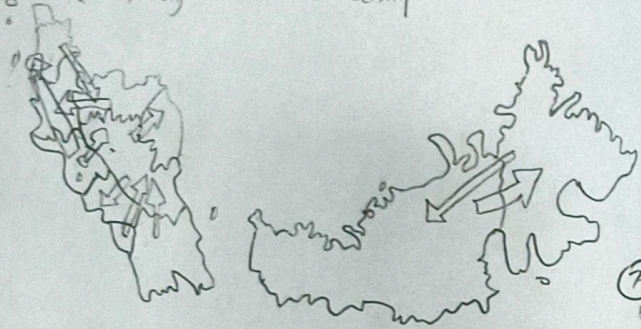


② Monthly KTMB Ridership (in thousands)
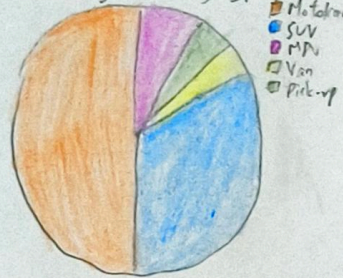- 🟢 Komuter utara
- 🟣 Komuter
- 🟠 Intercity
- 🔵 ets



③ Ridership by Mode
- ☐ rail-ets
- ☐ bus-rkl
- ☐ rail-intercity
- ☐ lrt-ampang
- ☐ mrt-kajang



④ KTMB Origin-Destination Ridership



⑤ Vehicle Registration by type
- 🟠 Motorcar
- 🔵 SUV
- 🟣 MPV
- 🟡 Van
- 🟢 Pick-up



⑥ Adoption of EV cars
- ☐ EV
- 🟠 Non-EV

Registrations

Jan Feb March April May Jun Jly Aug Sep Oct → Month



⑦

Car models: Honda, Toyota, Ford, Proton, Perodua

Number of registrations (in thousands)



⑧ Bus Ridership against rail ridership

Total Bus Ridership

Total Rail Ridership
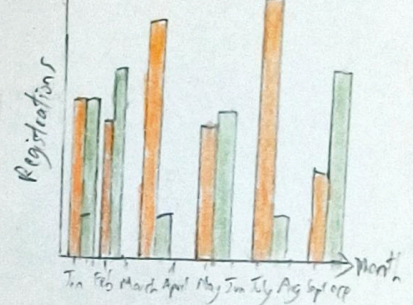


## 2. Filter

There are no duplicates
All of the charts look suitable with sufficient data
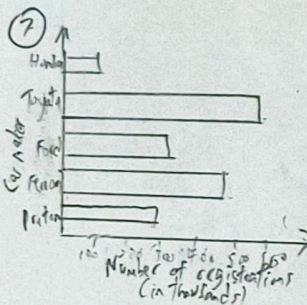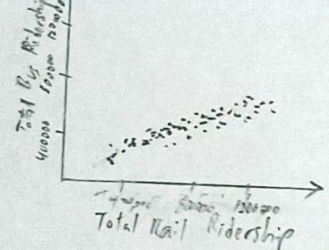
## 3. Categorise

| Historical trend | Maps | Relationship | Cars |
|---|---|---|---|
| ② Multiline chart | ① Choropleth Map | ⑧ scatter plot | ⑤ Pie chart |
| ③ Stacked Area chart | ④ Flow Map | | ⑥ Bar chart |
| ⑥ Stacked bar chart | | | |

## 4. Combine and Refine

- No two graphs are suitable to be combined and are separate from one another

- For refining, The ridership data with bus ridership against rail ridership can be visualised together with a regression line. Enabling correlation analysis between two transport mode

Bus Ridership

Rail Ridership



## 5. Questions

- Are they feasible given available data

- Are the visualisation possible without alteration, or do we need to transform/clean the data

- Do the visualisations help and give valuable insights?

- Can these charts be made with Vega-Lite?

- How do we use CSS and Javascript to fit it properly?
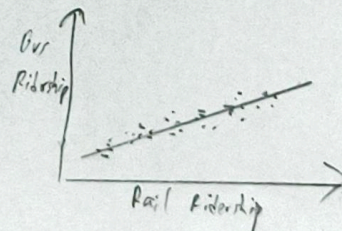
Author: Harvey Kooy Wern Shern
Date: 14/10/2025
Sheet: 1
Task: 5 Design sheet (Brainstorm-1)
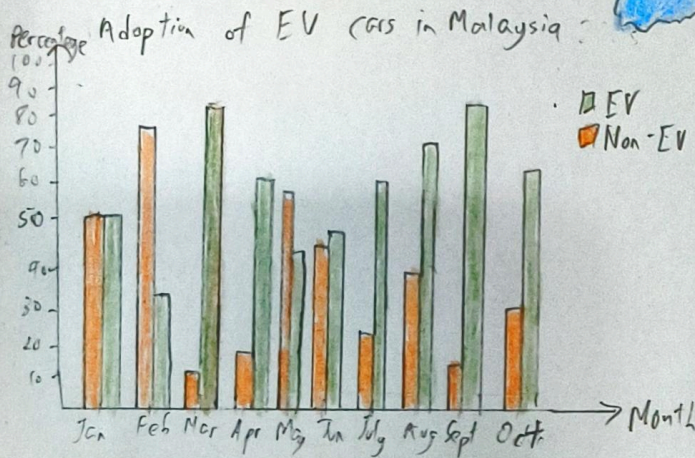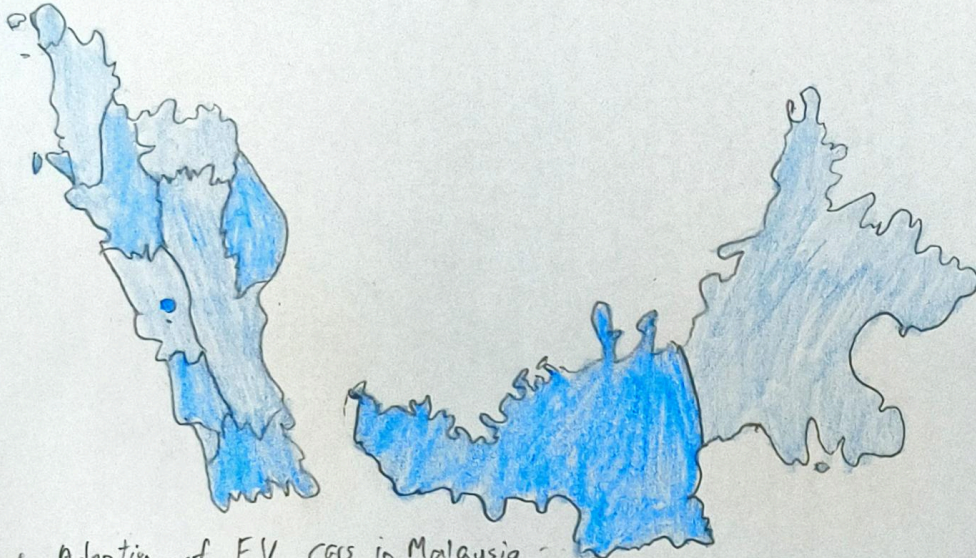
Author: Harvey Koay Wern Shern
Date: 14/10/2025
Sheet: 2
Task: 5 Design Sheet (Initial Design-2)

## Layout

### Vehicle Registration by State (Malaysia)



### Adoption of EV cars in Malaysia



□ EV
□ Non-EV

Percentage axis: 100, 90, 80, 70, 60, 50, 40, 30, 20, 10
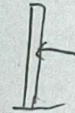Month axis: Jan, Feb, Mar, Apr, May, Jun, July, Aug, Sept, Oct

## Focus

→ Tell story on which state bought the most cars normalised

→ Emphasis on EV cars for the future due to Environmental goals set

① 
State: Sarawak
Total Registrations: 6709
Population: 2529800
Registration per 1,000 : 2.6520

② On hover

Type = Non-EV
Total Sold: 52379
Percentage: 70%
Petrol: 21256
Diesel: 17095
Hybrid: 21898

## Operations

1. The cars data only include the year 2025 so no slider is included in this case

2. Hovering over each of states in the chrolopleth map allows us to see details on the total population on each region with the registration followed by the normalised values

3. Hovering over each bar in the bar plot will give us the type where if it is hover it will show the different genres which contribute to the value respectively like petrol, diesel, hybrid followed by the total sold and percentage

## Discussion

### ☺ Pros

- Clear visual representation where the chloropleth map visualises the distribution, making it easy to understand regional trends at a glance

- The bar chart detailing the adoption of EVs provides useful insights into the shift towards electric vehicles in Malaysia

### ☹ Cons

→ Limited Time frame where both datasets are limited to only vehicle registrations from year 2005, limiting the scope to more up-to-date insights

→ The map and chart don't explain factors that may influence of the behaviours such as government incentives, infrastructure or regional preference for vehicle types

→ No comparison to previous years which can help understand long-term trends

## Layout

KTMB Origin Destination Ridership



### Ridership by Mode



Total Ridership

Legend:
- rail-ets
- bus-rkbk
- rail-intercity
- lrt-ampang
- mrt-kajang

Jan Feb Mar Apr May Jun July Aug Sep Oct Nov Dec
Month

### Bus ridership against rail ridership

Author: Harvey Koay Wern Shern
Date: 15/10/2025
Sheet: 3
Task: 5 Design Sheet (Initial Design-3)

## Focus

→ Tell story on the flow between states using ets rider

→ Able to determine relationship between bus and rail ridership and compare them individually

→ ①
  Mode: rail_lrt-ampang
  Ridership: 5,757,222
  Month: July 2019
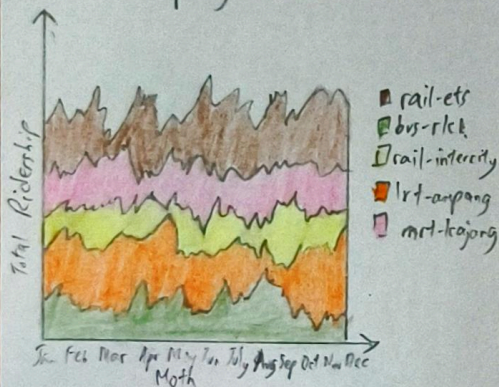
Slider for years
2019 2020 2021 2022 2023

→ ②
  Origin : Selangor
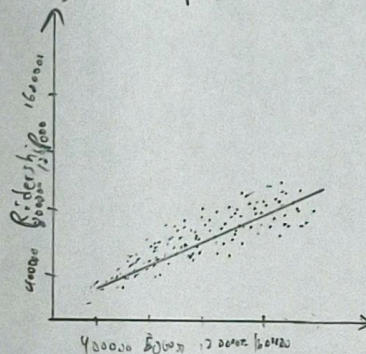  Destination : Pahang
  Total Passenger: 1,210,319

→ Q
  Date: May 2022
  Rail: 703684
  Bus: 297379

## Operations

1. Hovering over the specific area in the ridership by mode dataset can enable us to see the mode, ridership in the specific month.

2. There is also a slider included in the stack area chart to include the past years to be able to compare ridership across different years to observe trends and fluctuations.

3. Hovering over the scatter plot and the flow arrow between states in both graph provides additional data, like the origin-destination ridership value, allowing user to see detailed information for each data point
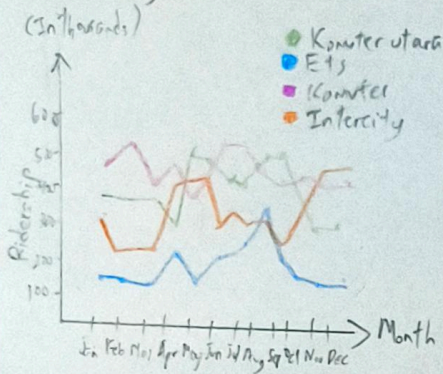
## Discussion

### ① Pros

→ Combining multiple visuals - flow map, stacked area chart, and scatter plot helps present a thorough picture of KTMB ridership trends.

→ Map and bar chart allows user to identify key regions with high or low ridership, which can help make informed decisions to improve infrastructure.
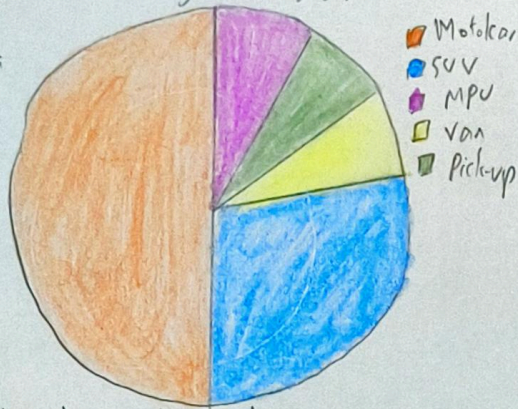
### ① Cons

→ The cognitive load is considerably high with flow map if every state include inflow and outflow with too many flows in the diagram. It won't be very understandable unless there is a highlight on important ones

→ Potentially too many modes in the dataset which needs to be decreased or the stacked area chart will be too large and affect the cognitive load
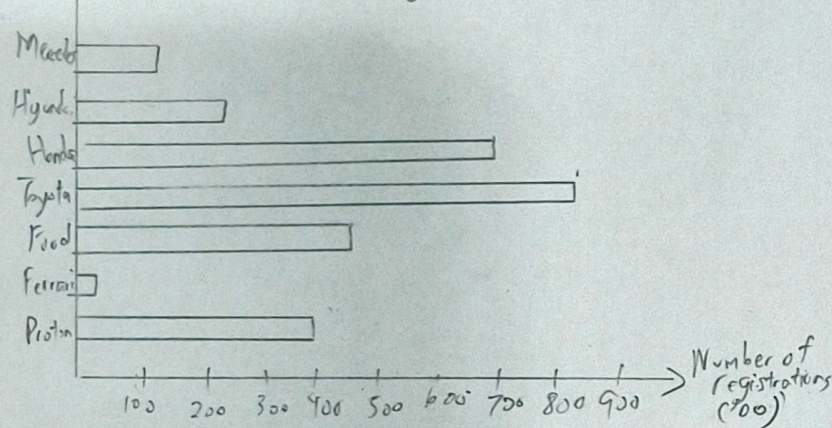
# Layout

## Monthly KTMB Ridership
(In thousands)



Legend:
- ● Komuter utara
- ● Ets
- ● Komuter
- ● Intercity

Ridership axis: 100, 200, 300, 400, 500, 600
Month axis: Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec

## Vehicle Registration by type



Legend:
- ■ Motokar
- ■ SUV
- ■ MPV
- ■ Van
- ■ Pick-up

## Top registered car brands

Car maker (y-axis): Mercs, Hyundai, Honda, Toyota, Ford, Ferrari, Proton

Number of registrations ('00): 100, 200, 300, 400, 500, 600, 700, 800, 900

Author: Harvey Kooy Wern Shern
Date: 15/10/2023
Sheet: 4
Task: 5 Design Sheet (Initial Design-4)

# Focus

→ Focus on industry for the cars and relational structure between the KTMB services

1. Ridership service: Which service has the highest ridership and why? How do we replicate the same levels of ridership?

2. What vehicles are the most bought and why? Which vehicles are most suitable on Malaysian roads?

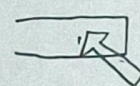3. Brands: Which brands has the most loyal customers? What brands are more reliable than others
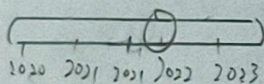
# Operations

Date: May 2022
Service: Intercity
Ridership: 89273

Type: Motocar
Percentage: 50%
Total Registered: 29370

Brand: Mercedes
Total Sales: 2134

Slider: 2020 2021 2021 2022 2023 — Slider to choose which year to display
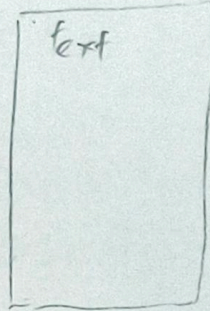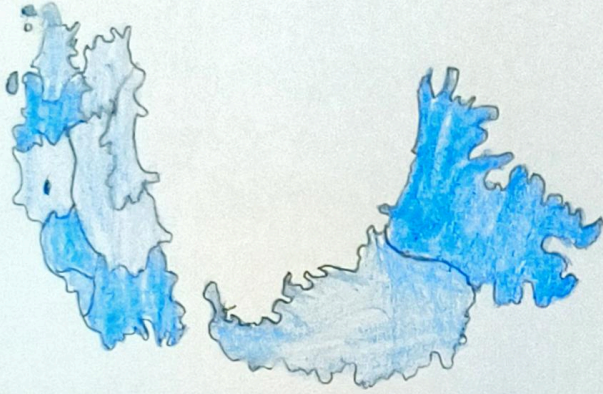
# Discussion

## Pros 😊

→ The correlation between vehicle registration type and brand preference would provide useful insights for transportation policy.

→ Focus on essential variables like vehicle types, registration trends, top car brands, which are likely to have an impact

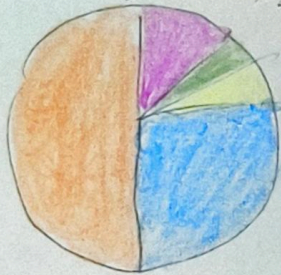→ Combining different data adds depth to the analysis.

## Cons ☹

→ Potential Data inconsistencies can occur when data is not updated properly, leading to misleading conclusions

→ There is an overemphasis on variables such as the registrations by type, top registered car brands while other factors may not be included like socio-economic factors affecting which brand people buy.

# Layout

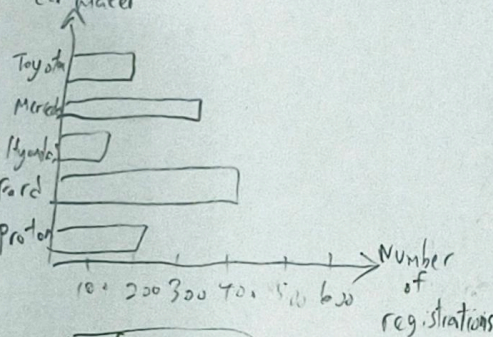## Transportation Analysis in Malaysia



Text

### Vehicle Registration by Type



- Metalic
- SUV
- MPV
- Van
- Pick-up

text

### Top registered car brands

Car maker
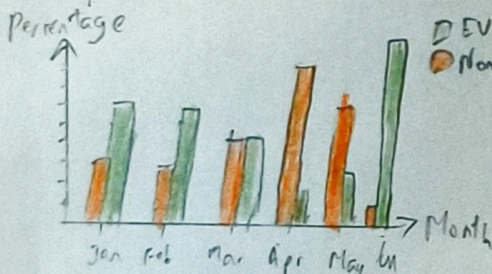
Toyota
Mercedes
Hyundai
Ford
Proton

100 200 300 400 500 600 → Number of registrations

Text

### Adoption of EV cars in Malaysia
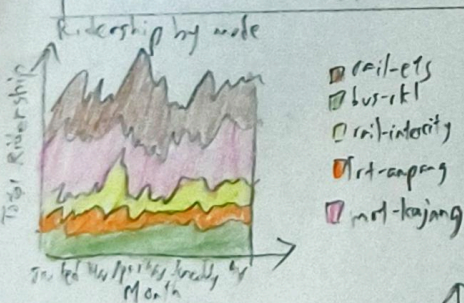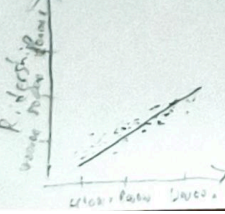
Percentage



- EV
- Non-EV

text

Jan Feb Mar Apr May Jun → Month

Text

### Ridership by mode



- rail-ets
- bus-rkl
- rail-intercity
- lrt-ampang
- mrt-kajang

text

Total Ridership

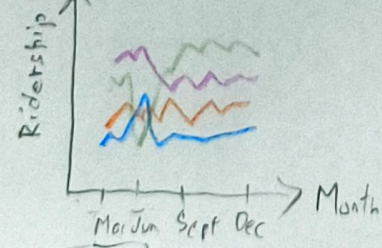Jan Feb Mar Apr May Jun → Month

Text

### Bus ridership against rail ridership

Ridership

text

### Monthly KTMB Ridership



Ridership

Mar Jun Sept Dec → Month

Text

---

## Focus

- This Final design sheet combines the strongest elements from the earlier sheets to tell a comprehensive story from the transportation in Malaysia. It highlights:

1. Historical change (change in EV popularity + seasonal trends of service ridership)
2. Industry Perspective (Top registered car brands)
3. Comparison (correlation between ridership service (Bus ridership against rail))

## Operations

Years Slider — Controlling the year to be shown

2022

→ Tooltips to see when hovering over all the charts

## Detail

↳ Algorithm used:
- Data pivoting (long → wide and vice versa) for different charts

↳ Dependencies:
- Vega-lite used to create, design chart
- Python to clean data and format
- Dashboard saved locally and publish using Github Pages

Estimated Time:
- Charts: 4 days
- Dashboard: 2 days

↳ Requirements:
- No specific requirements