Data for Energy Skills Accelerator

Capstone Project Briefs

1. Propelling Euro Truck's Decarbonisation

Context

Propel Forward Petro Fuels sells lubricants, conventional fuel products, and low carbon premium fuel products to customers like Motility and Heavy-duty Road Transport. Their key strategic goal is to sell more premium high-quality products while reducing the volumes of conventional products over time, thus reducing its overall carbon footprint.

One of Propel Forward's major customers is Euro Truck. The account manager for Euro Truck was asked to propose a new deal highlighting the financial, operational, and sustainability benefits of high grading their energy portfolio. High grading refers to including more of Propel Forward's premium products in the portfolio.

The value proposition for Euro Truck to buy higher quality premium lubricant products is that it would reduce the frequency with which they need to change oil. (i.e. every 7000 miles instead of every 4000 miles) and offer better fuel efficiency (e.g. 3% less fuel used per 100 miles). Use of premium fuel products would support Euro Truck achieve its ambition of reducing its CO_2 emissions by 40% over the next five years.

The advantages for Euro Truck would be reduced downtime of their vehicles, longer engine life, and decrease in the total volume and cost of lubricants and fuel products while reducing overall CO_2 emissions.

Your task

You're given the task to present the proposal to Euro Truck in a commercially appealing way such that you get their buy-in for the plan.

i. Use the data available to calculate the total sales revenue, sales margin, and total carbon emissions; and populate it in the sales transactions table. Then, create a profile of Euro Truck where you visually present its 2022 product volumes and sales per country, and its overall emissions.
ii. Calculate and present the overall financial, operational, and sustainability benefits of high grading the portfolio of lubricants products for Euro Truck.
Hint: Exploring different combinations will help you find the optimum point.
iii. As part of your value proposition, propose and present a 5-year plan where you present potential options to help Euro Truck on their decarbonisation journey.
Note: Use reports where possible to create a compelling narrative around the results of your analysis at each step and to clearly communicate the benefits of your 5-year plan.

Data provided

- In the dataset provided, you'll see the fuel and lubricant sales to Euro Truck in 2022 for their locations across Europe.
- There is also a supporting product table showing price per litre, oil drainage interval (how often to change oil), CO_2 emissions per litre and fuel efficiency gain for both conventional and premium lubricant products.
- There is also a complementary product table showing the price and CO_2 emissions per litre of conventional and sustainable biofuels.

2. Unravelling the stocking puzzle

Context

Best Cart Mini Marts have convenience retails stores in most gas stations in Great Britain. They sell a vast range of products at their stores. By nature, all their retail stores are relatively compact, and therefore, are limited in terms of how much stock they can carry. Additionally, overstocking and waste increase greenhouse gas emissions because more goods are produced, transported, and disposed of than necessary. This increases the carbon footprint of the store. Therefore, identifying the right stocking mix throughout the year is a key driver of success for Best Cart Mini Marts.

As an external data consultant hired for the convenience retail business, you have been provided with last year's sales data to enable you to provide data-driven recommendations on the right stocking mix throughout the year ahead.

The sales manager for Best Cart also sent you a note to let you know that not every product sells consistently at the same volume throughout the year, and some go through significant fluctuation over the year. Therefore, it is key that you keep practical considerations in mind while doing your analysis; considerations such as product positioning (premium or budget), seasonality, alliances with specific brands to name just a few examples.

Another suggestion from the Best Cart team was to look very closely at data for quality issues. He mentioned some common data entry errors included spelling mistakes, missing fields, same products being listed as different products due to inconsistent naming, and incorrect categorisation of products. He also mentioned that recently, a system misconfiguration resulted in the country code being updated as "UK" instead of the designated "GB".

Your task

You're tasked to clean and explore the data and suggest the optimal stocking strategy over the next 12 months to ensure great commercial performance for the Best Cart team. The Best Cart leadership team looks forward to hearing your recommendation.

i. Identify and fix the quality issues in the dataset.
ii. Use the sales data to view the share of each category and product in the overall sales. You can create charts, work out percentages and outline trends for last year.
iii. Look at the seasonality – if any – of the products. Choose an appropriate way to visualise it, given the information provided.
iv. Create new columns to flag Seasonal Products or Premium/Budget products.
v. Assess which product has drastic peaks and try to figure out why, looking at data available on the internet, such as holidays, weather conditions, etc.
vi. Propose a strategy to be able to best serve customers and reduce wastage of stock. Which product should Best Cart ensure they have stock of in specific periods? Is there any manufacturer they should want to work more with? Be creative here, the sky is the limit!

Data provided

You are provided with two sets of data; one is the aggregated product sales data, and the other is product master details data.

3. Optimising the EVolution

Context

As the world moves towards a greener future, transport lies at the heart of that journey. The rise in electric vehicle production has led to an increased presence of electric vehicles (EVs) on our roads. The success of EVs hinges on the ability to charge them conveniently, making the location of charging stations crucial.

PikaSpark Energy Solutions has earmarked £2 million for the establishment of an EV Hub, a dedicated forecourt for electric vehicles. The forecourt is to be strategically situated either at a bustling holiday hotspot or a busy motorway. The challenge is twofold: determining the ideal location for this forecourt and ensuring the appropriate number of EV chargers are installed to meet the anticipated customer volume at the selected location.

The CEO of PikaSpark is keen on a swift return on investment. Hence, alongside long-term profitability, the duration to recoup the invested £2 million will significantly influence the choice of the optimal location.

Your task

As a data analyst at PikaSpark, you are expected to make a compelling suggestion for the location of forecourt and the number of EV chargers to be installed.

i. Use the demand data to demonstrate why investing in EV hubs is a good idea. You can create charts, work out percentage increases, forecast future demand etc.
ii. Holiday destinations can expect 0.01% of cars on the road to use the EV hubs and Motorway can expect 0.008% of cars on the road to use the EV hubs. Analyse the traffic data to calculate the expected daily customers and shortlist the best locations.
iii. Based on the cost data, decide the optimal number of EV chargers needed at the forecourt for the shortlisted locations. Consider that, on an average, each visiting customer spends one hour to charge their vehicle and the forecourt remains open for 12 hours a day.
Note: *You want to have enough capacity to service the demand, but you don't want your capacity to go to waste either.*
iv. Using the profits estimate data and the cost for your proposed forecourt, establish how long it will take to recover the initial investment.
v. Use all the information you have worked out above to provide a data driven recommendation on the optimal holiday destination and the optimal motorway destination. While the PikaSpark CEO will take the final call on which of the two to choose, present your case as to why one option holds merit over the other. Leverage the results of your data analysis to justify that your suggestion is the optimal solution!
Hint: Find the daily average of all major components like expected customers, costs, income etc. to make your calculations simpler.

Data provided

- Historical demand data for EVs.
- Traffic data on holiday destinations and motorways.
- Data on the costs to build the forecourt, expected charging costs and sales, and additional income streams.