Case Study Report on

Comparison Between Charcoal Grills and Propane Grills

Prepared
for
Lodestone CO. Case Test

Written
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Executive Summary

This case study aims at comparing the value between charcoal grills and propane grills. Based on the data provided, practical values for both grills are visualized and it comes to conclusion that the decision should mainly based on the frequency of usage per year. This report focus on showing visualized result and explanation for primary concerns and suggestions of changes in dataset are provided for future study.

1 Dataset

Three datasets were provided regarding different aspect of the experiment:

- SheetA: Records general information regarding both grills. Including pre-heating time, fuel cost and initial price etc.
- SheetB: Records experiment information regarding the quality for four different ingredients. Including item material, grill type, usersatis faction and fuel cost.
- SheetC: Records experiment result collected from 90 test takers. Variables includes details of the food and the prediction from test takers with their scores for the food.

Note here I made slight changes to the original dataset: the initial price in sheet A was not detailed enough for further analysis, so I break the initial price into fuel cost and equipment cost.

2 Grill Comparison

This sections aims at comparing two grills by different aspects, including fuel efficient, market share, fuel cost and easiness of use etc. Detailed visualization and explanations are provided and the plots are generated in Python. Scripts and plots will be provided in attached files.

2.1 Fuel Efficiency

Fuel Efficiency is one of the major concerns, perhaps the primary concern, when comparing both grills. Knowing the price for both charcoal and propane are the same, we could compare the fuel efficiency by comparing the fuel cost per meal. Intuitively, the less fuel cost per meal, the long-last such fuel would be and that would lead to higher fuel efficiency. In this case, I generated bar plot for comparison, which clearly shows that propane fuel is more efficient.

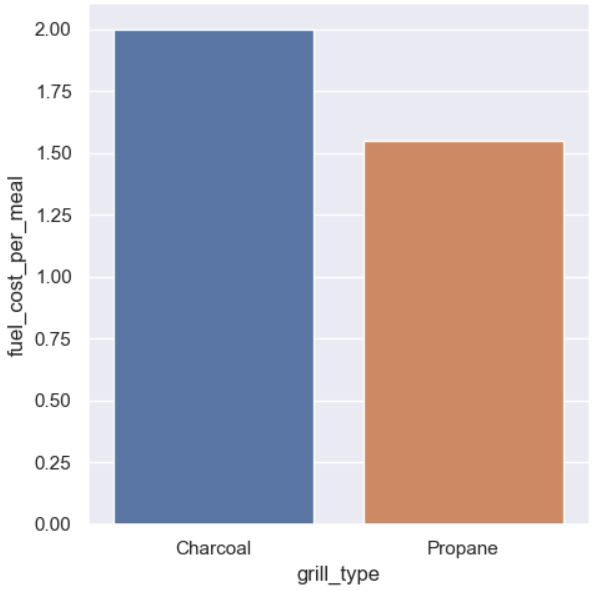

Figure 2.1: Fuel Efficiency Comparison

2.2 Market Share

Although it is widely believe that charcoal grills are more antique than propane grill, they are surprisingly invented at about the similar time. However, the market share could be vastly different with the wide-believed opinion. In this section, market shares are compared for both grills via bar plot. It is not surprising that propane grills have larger market share:

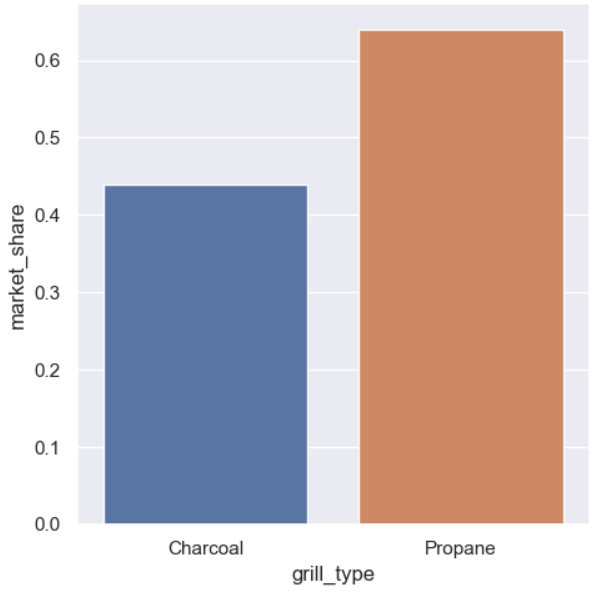

Figure 2.2: Market Share Comparison

2.3 Fuel Cost

In the sections above we compared fuel efficiency for both grills. However, in the long run, it might be a different story. Considering that the average American grill owner buys a new grill every three years, it would be necessary to consider the fuel cost within that period of time.

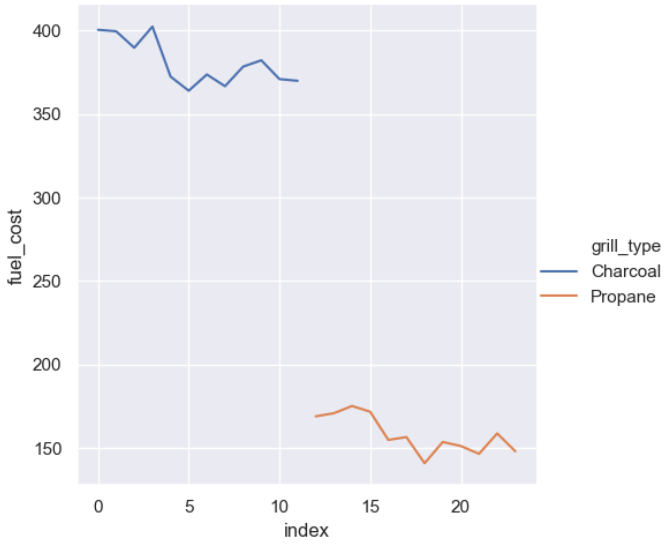

Figure 2.3: Fuel Cost Direct Comparison

Intuitively, we could plot the fuel cost straight for comparison as shown below. It is obvious that the fuel cost for charcoal is strictly higher than that of propane fuel. However, it is necessary to obtain a more easy-understood plot as the bar plot shown below. By aggregating the category and plotting, it is numerically clear that the fuel cost for charcoal grill is almost twice as much as that of propane grill.

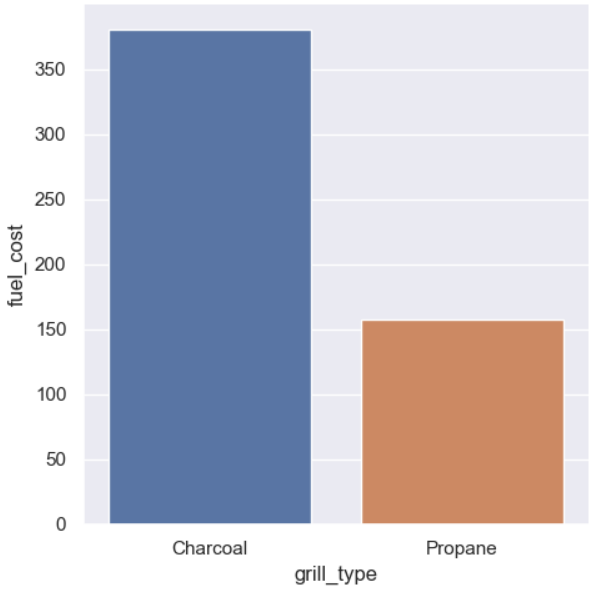

Figure 2.4: Fuel Cost Numerical Comparison

In a long run, I generated new dataset to simulate the cost of fuel in a three-year time. The following linear plot shows that the fuel cost for propane are higher than that of propane grill. However, since the fuel efficiency for propane grill is higher than that of charcoal grill, the more the user uses the propane gas, the less cost he or she will be paying. Notice here I adjust the initial price by lowering 20 since it makes more sense.

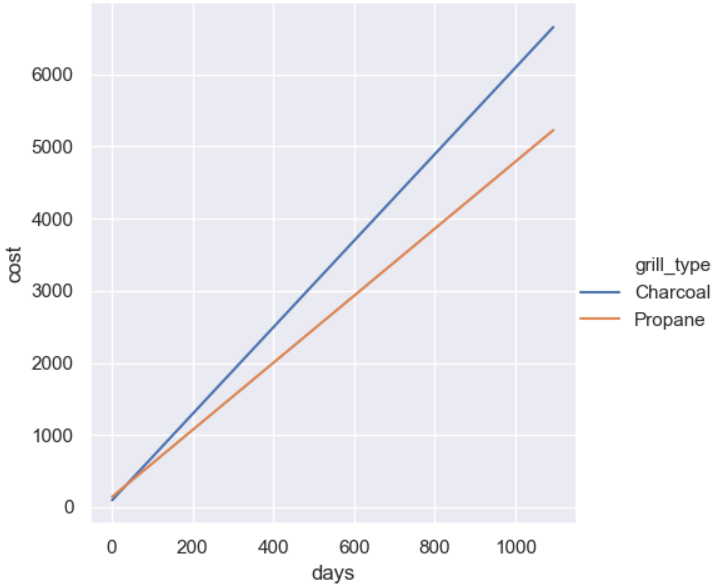

Figure 2.5: Fuel Cost Long Run Comparison

In order to make clear about the intersection point, the following plot was generated with

Tableau and we can have a clear understanding of when the fuel cost for both grills are set even. In this case, users will have to grill more than 134 times in three years to even the fuel cost.

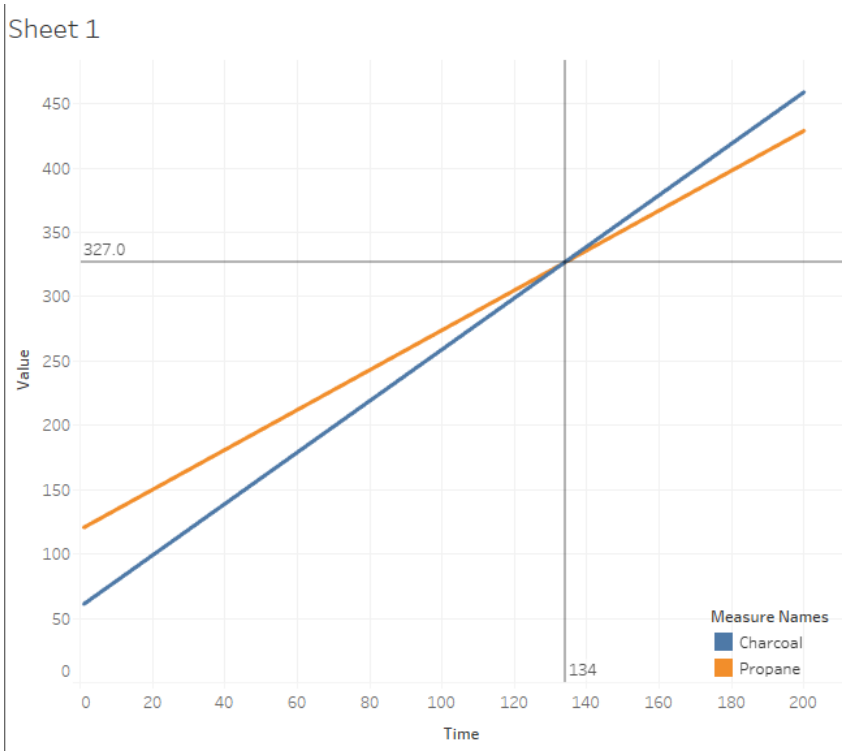

Figure 2.6: Easiness of Use Comparison

2.4 Easiness of Use

Practical experience is also a vital aspect to be considered when making decisions. User experience reflects the easiness of use. In the dataset, it could be measured by user satisfaction score. Similarly, the result shown by bar plot is very straight forward and it shows that the user satisfaction for charcoal grill is below zero. It might be cased by the mess of dust, longer time of pre-heat or other factors that cause of such consequences. In this case, propane grills are preferred.

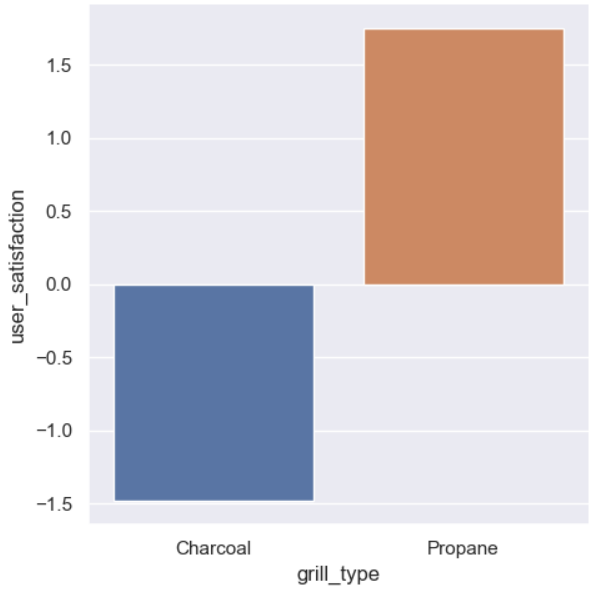

Figure 2.7: Easiness of Use Comparison

3 Conclusion

In general, multiple factors are compared between both grills and we concluded with a new-generated table.

grill_type	more_efficent	more_fuel_long_run	more_cost	more_easier	more_preferred
Charcoal	no	yes	yes	no	no
Propane	yes	no	no	yes	yes

Figure 3.1: Easiness of Use Comparison

User should make decisions based on their primary consideration: either practically easy to use or financially cost efficient.

On the stand of manufacturer, it could be a different story. As mentioned in the above section, users have to grill more than 134 times in three years, which evens to around 45 times a year to make the fuel cost even. It means users almost have to grill every weekend in summer every year to make this number, which is highly unlikely. In this case, it is financially suggested that the manufacturers could consider lower the price for propane grills to make up the cost disadvantages and the users would start considering buying propane grills under any circumstances.

4 Future Improvements

With the ending of the case study, there are few suggestions that would make the experiment more convincing.

- Initial cost in the original dataset included the cost for the first bag/tank of fuel. It is better to separate it into device price and fuel price for calculating the costs of fuel when initial prices are taken into consideration.
- Units always matter. In the original dataset, the fuel cost was not labeled to any unit, which could cause further confusion if background video were not provided. It could be either dollar or bags/tanks and there should be a note for that.
- Increase the size of testers and make sure of randomization. It could lower the chance of biased data and make it more convincing in further study if data analysis or machine learning models are performed.

Please feel free to contact me at duanxu1996@gmail.com with any questions regarding the report.