Analysis Tool for Impact of Modifiers on Production

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PROBLEM

Starbucks projects **75%** of beverages will include modifiers (added syrups, milks, etc.) in Fiscal Year (FY) '22.

With this increased demand for modified drinks, the labor that is scheduled by the current labor model is **inaccurate**. It does **not** take modifiers into account, underestimating the total production time used in the labor model. With this inaccuracy of scheduled labor, partner and customer experience is negatively impacted.

With an average number of modifiers around 1,206 per day, how much production time from modifiers are not taken into account in the current Starbucks labor model?

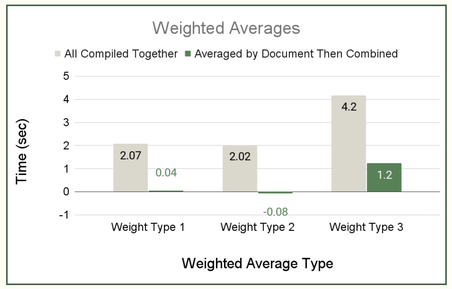
OBJECTIVES

To understand the extent of increased production demand and impact arising from no account of modifiers in the labor model.

DESIGN

1 Data Analysis

Analyses were completed using data from a previous Starbucks experiment to determine modifier production time. Six different weighted average times were calculated, and a modifier time of 2.02 seconds was selected as it best represented a long-term store scenario.



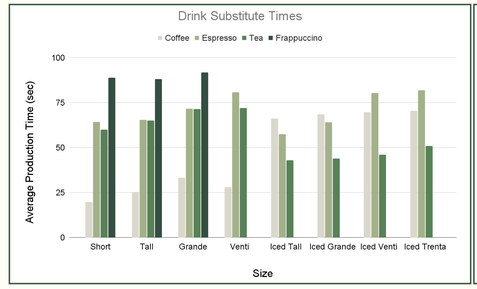
3 Data Visualization

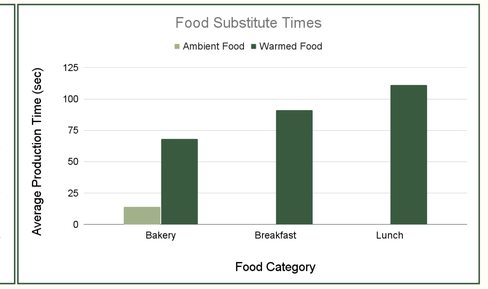
The output of the code was input into a Tableau dashboard* to give better visualization of trends and facilitate data validation.

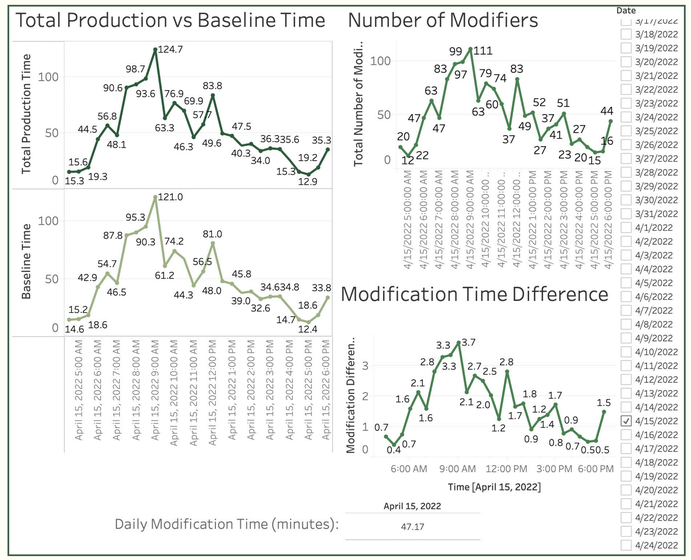
Users are able to select between different dates and months to better analyze trends and obtain statistics on modifiers.

*All times are shown in minutes.

Substitute production times were created for new items that have not been measured in the Time and Motion Studies (TAMS) database. These times were created by averaging the products currently in the TAMS database by category and size where applicable.







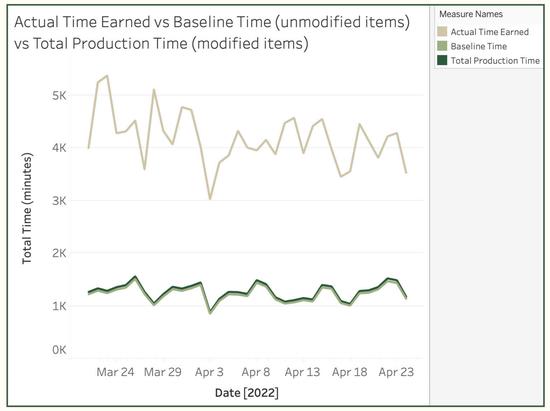
2 Code

A Python code was created to process a Point of Sale (POS) script which then matches items sold to their corresponding TAMS production time, counts the number of modifiers, and calculates the modifier production time. Based on this data, the following output is identified for every half hour:

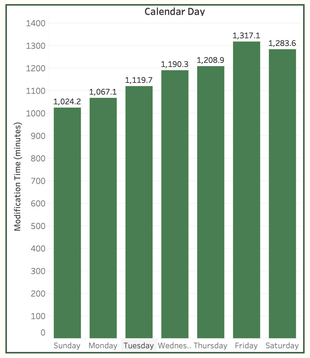
- **Date:** 2022-04-15
- **Time:** 7:00:00
- **Total Production Time:** 49.4 min
- **Baseline Time:** 47.8 min
- **Modification Time:** 1.6 min
- **Total Number of Modifications:** 47

4 Data Comparison

When comparing the output of the Python code (production time) with actual labor times (production time + non-production time + training time) assigned by the current labor model, similar trends were seen.



RESULTS



Analyzed the total modification time per month. Identified an average total modification time of 1,200.6 minutes per month.*

Total Modification Time (minutes)

Month of Date + Time	October 2021	November 2021	December 2021	January 2022	February 2022	March 2022	April 2022
	1,143.6	1,163.7	1,178.9	1,232.4	1,161.4	1,323.6	1,007.4

Analyzed the modification percentage change per month. Identified an average increase in production time of 3.4%.*

Percentage of Modification Time on Baseline Time

Month of Date + Time	October 2021	November 2021	December 2021	January 2022	February 2022	March 2022	April 2022
	3.545%	3.379%	3.311%	3.362%	3.443%	3.426%	3.463%

Analyzed the number of modifiers and production time of modifiers per day of the week. Identified a peak, with a total number of 39,065 modifiers and a total modification time of 1,317.1 minutes on Fridays within a 6-month period.

*Data from incomplete months/quarters were excluded.

CONCLUSION

Current labor model accounts for 0 modifiers and 0 minutes of modification time. However, after analyzing the modifiers of a 6-month POS script, we discovered the following:

- Average Total Modification Time per Day: **40.7 minutes**
- Average Total Modification Time per Month: **1,200.6 minutes**
- Average Total Modification Time per Quarter: **3,601.5 minutes**
- Average Increase in Production Time with Modifications: **3.4%**

These statistics show how much production time is currently unaccounted for. The total modification time represents **25% and 12.5%** of the amount of time a part-time and full-time partner*, respectively, works per month. We conclude that modifiers have a **significant impact** on total production time, resulting in an underrepresentation of total labor time. With this information, Starbucks can schedule labor more accurately, improving partner and customer experience while facilitating business.

*Assuming a part-time and full-time partner works 20 and 40 hours/week, respectively.

RECOMMENDATIONS

Use the analysis tool to futher understand and analyze the impact of modifiers. Using this information, improve the current labor model to take those modifiers into consideration in order to support the current customer demand.

Use Tableau to analyze business trends across hours, days, and/or months in order to support and implement marketing tactics that drive business.

Interview customers and partners on the usage and impact of modifiers on their day to day lives at Starbucks, to improve customer and partner experience.

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