

Verde Brewing Co. Analysis

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Introduction

Verde Brewing Company is a brewing company located in Camp Verde, AZ, right off the exit of Highway I-17. Led by Steve Goetting, with beer brewed by his son, they've been successful operating since ___. In addition to beer on tap, Verde Brewing offers a variety of canned beer and food. Recently, Verde Brewing has re-opened on Monday and Tuesday, bringing their business up to operation 7 days a week.

Problem Statement

The company encountered several data-related challenges. This included difficulties in linking marketing efforts, such as Facebook promotions, directly to sales performance. Furthermore, the frequent use of cash transactions resulted in a need for more detailed customer demographic data, while seasonal fluctuations in sales were heavily influenced by weather and tourism patterns. Operational inefficiencies, particularly inconsistent supply chains, and limited brewing capacity, further complicated the company's ability to meet demand efficiently. Moreover, in terms of distribution, Verde is facing some limitations. Their cans are only available in selected stores which brings in low profit margins due to wholesale pricing. They're also competing with both local and distant breweries for market share.

Finally, Verde Brewing is grappling with resource and supply chain constraints, including equipment limitations and inconsistent brewing material supplies. They want to scale operations but are cautious about over-investing in facilities or equipment. On the branding side, while they aim to grow as a tourist destination, they face tough decisions about expanding without jeopardizing their current operations.

Data Sources

The data used in this project was collected primarily from Square, the Point-of-Sale system used by Verde Brewing. The data exported from this site was from the sales tab, and included all the sales from the past two years. The sales data included the date and time of the sale, the item purchased, the price of the item, and the quantity. Once this data was exported to an Excel sheet, it was cleaned to reflect the actual offerings of Verde Brewing. For example, items listed as "chile cup" were changed to "chili cup," and "bb sour," "blackberry sour," and "Blackberry Sour," were all changed to "blackberry sour" to make analysis easier.

We also hand-collected data through the Verde Brewing Facebook page. The date of the post was recorded, along with the item featured in the post. This data was recorded in a spreadsheet and was later used in conjunction with the sales data to analyze how the mention of an item in a post affected the sales for that item in the coming weeks.

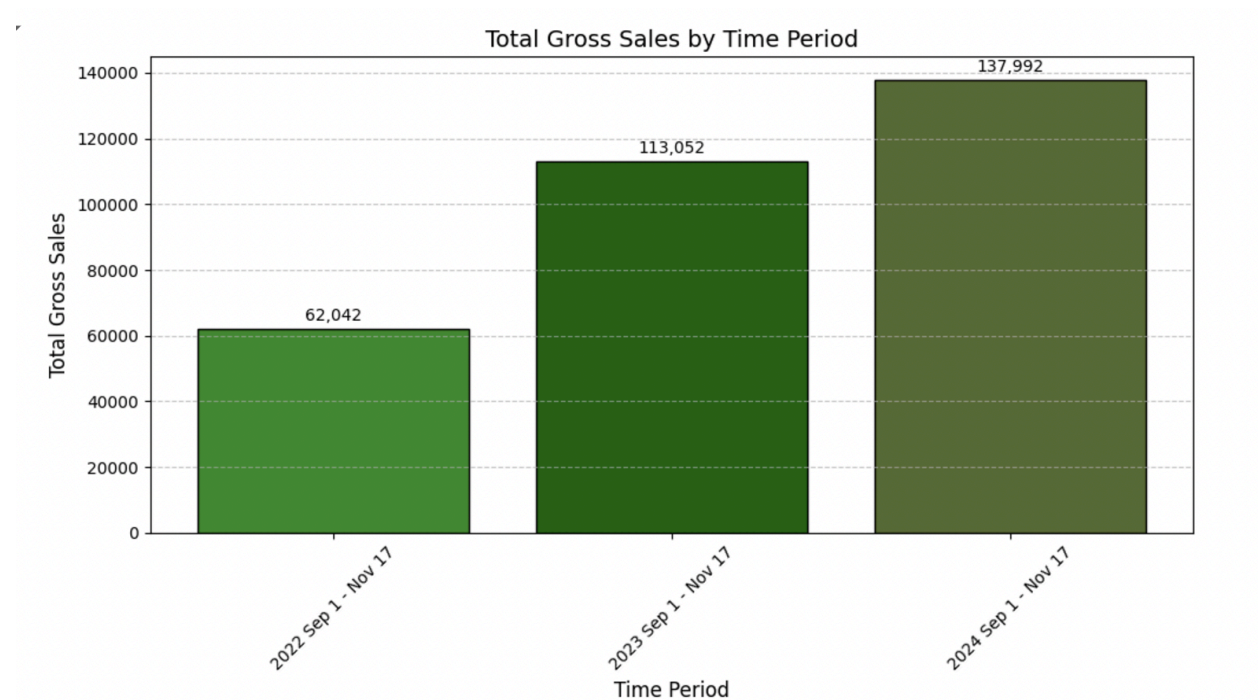
Analytical Techniques

We started with an overview of sales of Verde Brewing, using visualization tools. This allowed us to see what items were performing well, and which items we should take a closer look at.

Open 7 Days a Week

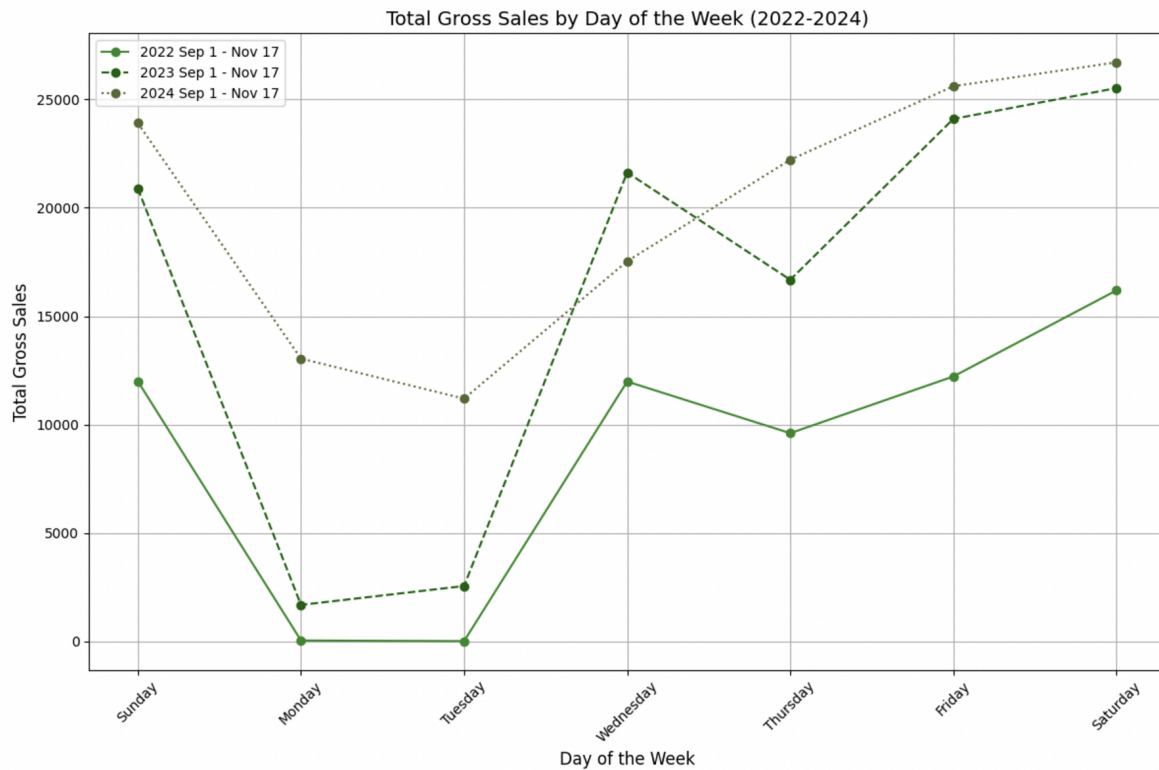
Since Verde Brewing decided to open 7 days a week, we wanted to see the impact so far of the additional days of operation. Starting on September 2, 2024, two additional days, Monday and Tuesday, were added. To see the impact, we selected a testing period of nearly three months, from September 1st to November 17th for 2022, 2023, 2024. This was done to maintain consistency and avoid biases from holidays or significant events that could skew the results if random dates were chosen.

To display the results we started with a bar chart comparing total gross sales for the same date range in 2022, 2023, and 2024.

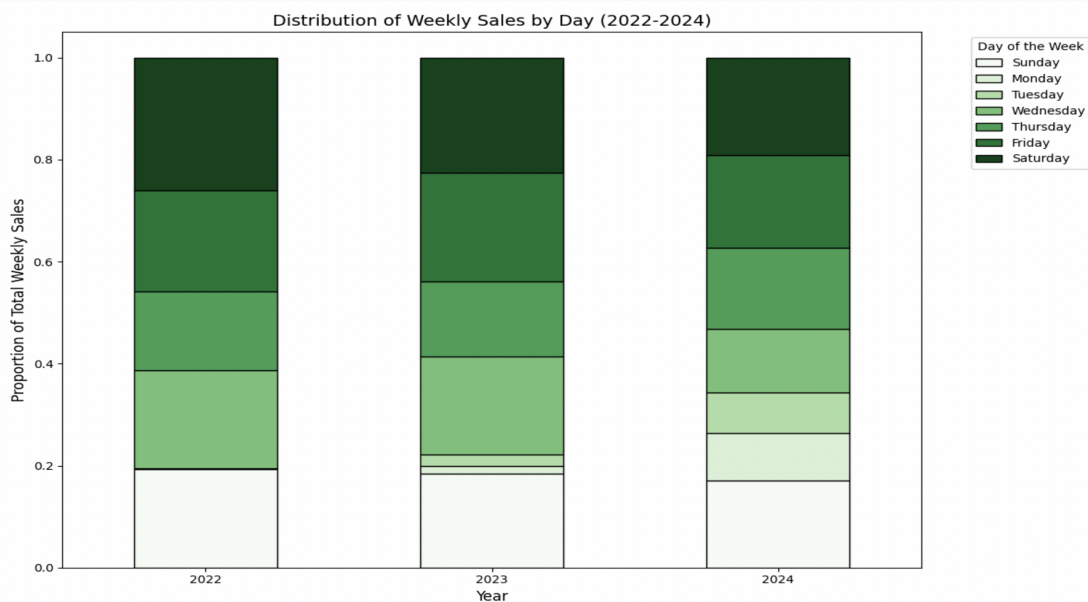


The results show that 2024 recorded the highest total gross sales. This increase highlights the positive impact of extending operational days, and the additional days contribute to overall a higher performance.

In a similar manner, we designed a line graph which showed that 2024 consistently outperformed the previous years in gross sales. Yet in this display you can see how the pattern of Monday and Tuesday being the lowest days of the week remains the same for all the years. Overall, gross sales have grown with the addition of 2 days of operation.



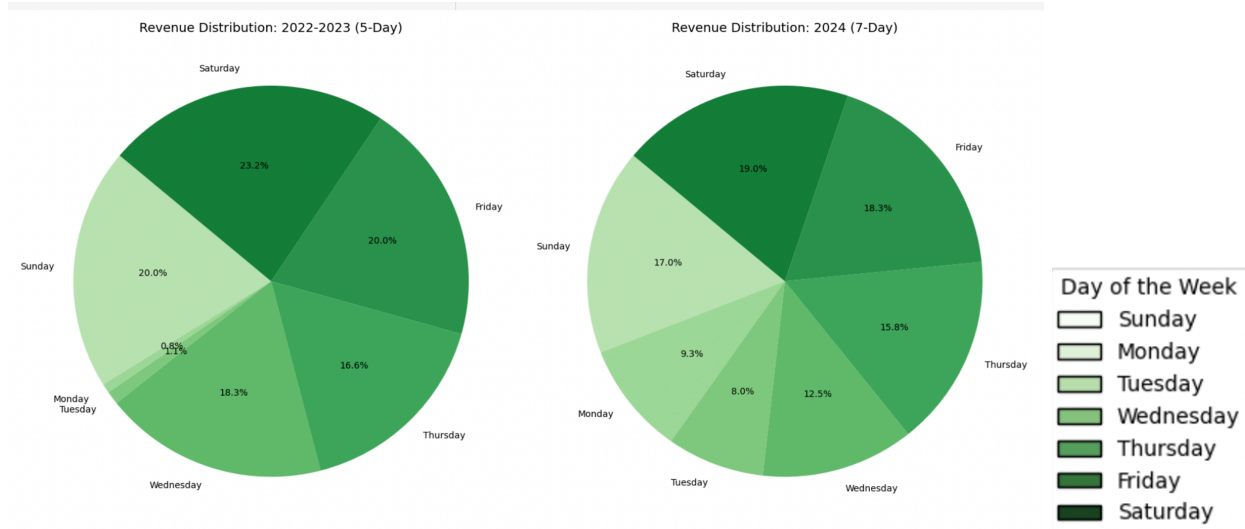
While the results suggest higher overall performance, we wanted to check how efficient it was to add the extra operational days. We created a stacked bar chart to see how total sales were distributed throughout the week and to determine if the extra days added new revenue or simply redistributed existing sales.



The chart revealed that sales on Monday and Tuesday in 2024 were significantly larger due to the newly added operational days. But the data suggested that prior popular days like

Friday and Saturday experienced a slight reduction in sales proportion, indicating a potential redistribution of customer traffic.

Another way to view this was through pie charts and how revenue was affected. A pie chart provided further insight into the impact on revenue of adding Monday and Tuesday.



As a result, these two additional days accounted for 17.3% of the revenue during the testing period, making them the third-highest contributors to sales for the week. This visual also displays that a redistribution of sales may be occurring, as the percentage contributions from Saturday and Sunday decreased compared to the previous five-day operational weeks.

While overall performance was positive, to further see the impact of the additional days, we would like to see factors such as the additional labor costs, utilities, and inventory for the extra days to assess whether the additional days are truly profitable.

Market Basket Analysis

After discussions with Steve and the team, we moved on to running a market basket analysis on the different foods and beverages sold at Verde Brewing. This resulted in finding strong connections between Soda and Nacho purchases, Gold Buckle Beer and Nacho purchases, and Gold Buckle and BBQ Pork purchases.

We took a deep dive into the Soda and Nacho purchases. Verde Brewing serves a wide variety of customers, but given that their main emphasis is on beer, the combination of a non-alcoholic beverage and nachos indicates the presence of children.

From here, we uploaded the vb_sales excel sheet into Google Colab. Then, grouped each sale into transactions based on the date and time, and filtered them to look at transactions which only included both soda and nachos. The peak times for these transactions were around lunch (12-1pm), with a smaller peak at 6pm for dinner. Saturday and Sunday were the most popular days.

This insight can be used for Verde to offer or edit their current promotion to attract more kids. “Half off Nachos” could be used to advertise to this market group. There could also be a

special meal deal. For example, nachos bought between the hours of 11-1 on weekends could come with two free fountain drinks. To bring children in at a time in which they are currently not frequenting Verde Brewing, Verde could offer an “after school special” at 3-4pm on weekdays.

Growlers and Cans

Growlers are 64-ounce glass containers that can be filled with any beer on tap with Verde Brewing. Verde Brewing also offers some of their beers to-go in cans; however, canning a beer is a larger commitment, as it requires a minimum of one year of production of the canned beer, as well as costs to design the label for the beer. Looking at the sales of growlers, we identified an opportunity for Verde Brewing to expand their canned collection.

To do this, we used frequency analysis, which involved first filtering and cleaning the sales data to only look at growlers and cans sold. We then used the count function to look at how many growlers and cans were purchased by beer over the past few years.

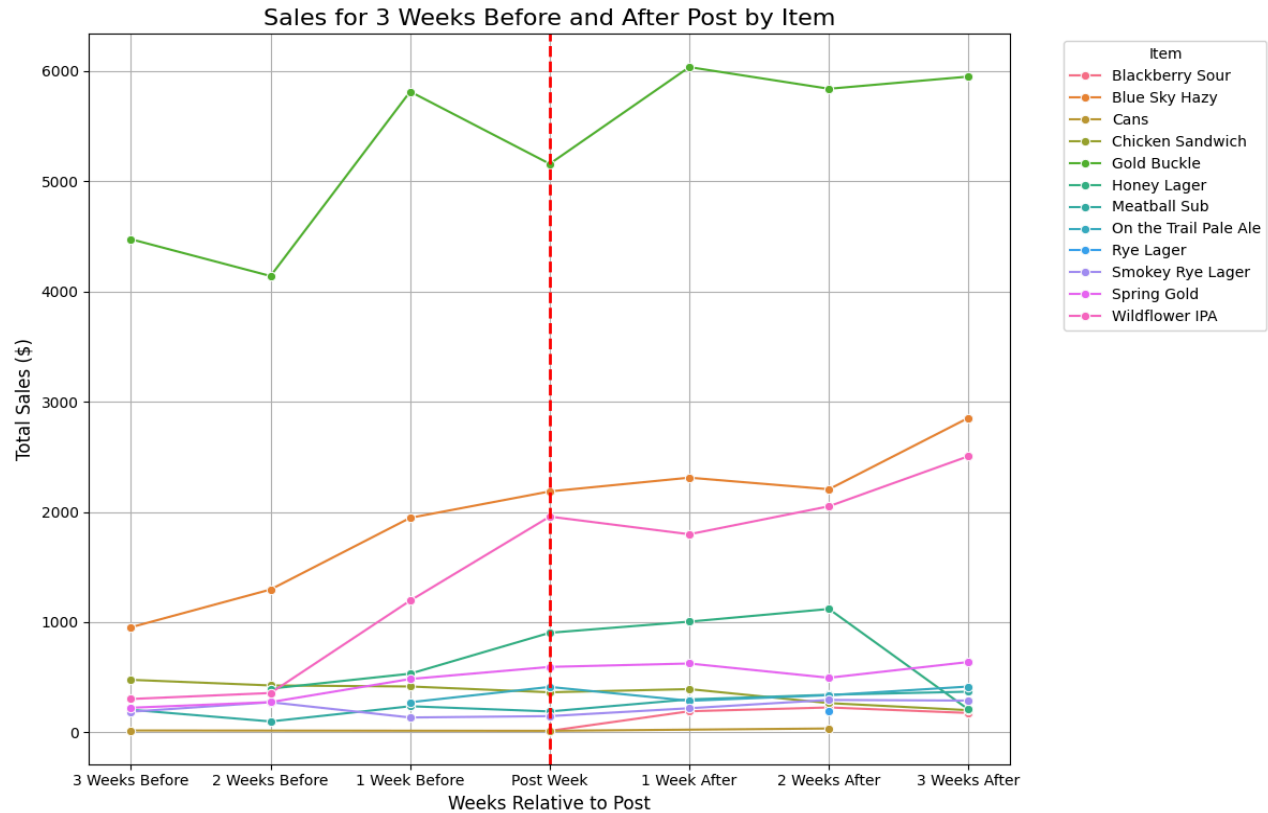
After looking at this data, we saw that while the third most popular beer sold in growlers is the Bullpen Stout, that beer is not offered in a canned format. This data indicates that people do want to take the Bullpen Stout home, and Verde could capitalize on this by canning the Bullpen Stout. On the other hand, the Redneck Stout has a strong performance in growlers, but a lower amount of sales in cans. This could indicate that advertising for the Redneck Stout should be increased, or that Verde should reconsider their decision to offer this beer in a can.

Marketing Impacts

After receiving the data for Verde Brewings Facebook advertising we were able to analyze the effectiveness of social media posts on sales. It was clear that this advertising had some impact on customer behavior. Items such as Gold Buckle, Blue Sky Hazy, and Wildflower IPA showed a distinct increase in sales in the weeks following promotional posts. By continuing to advertise for Gold Buckle and a slight increase in advertising for Blue Sky Hazy and Wildflower IPA, Verde Brewing can further increase the popularity of these beers.

For underperforming items like Honey Lager or Spring Gold, more creative advertising could help, like pairing suggestions or limited-time offers to gain interest. Focusing on these items could help drive sales and Verde would have another hit beer like Gold Buckle.

Timing and frequency of social media posts is also key to the advertising campaigns. Most posts are on Tuesdays which used to be the start of Verde’s week, these posts were good for the few days proceeding after and then sales started to go back to normal. But now that Verde is open for 7 days a week, they can start to post more frequently and not just to raise sales for the beginning of the week.



This graph represents the items that were previously talked about, Gold Buckle, Blue Sky Hazy, and Wildflower IPA are the top three lines. The graph represents sales after an item was advertised on Facebook.

Sales Prediction

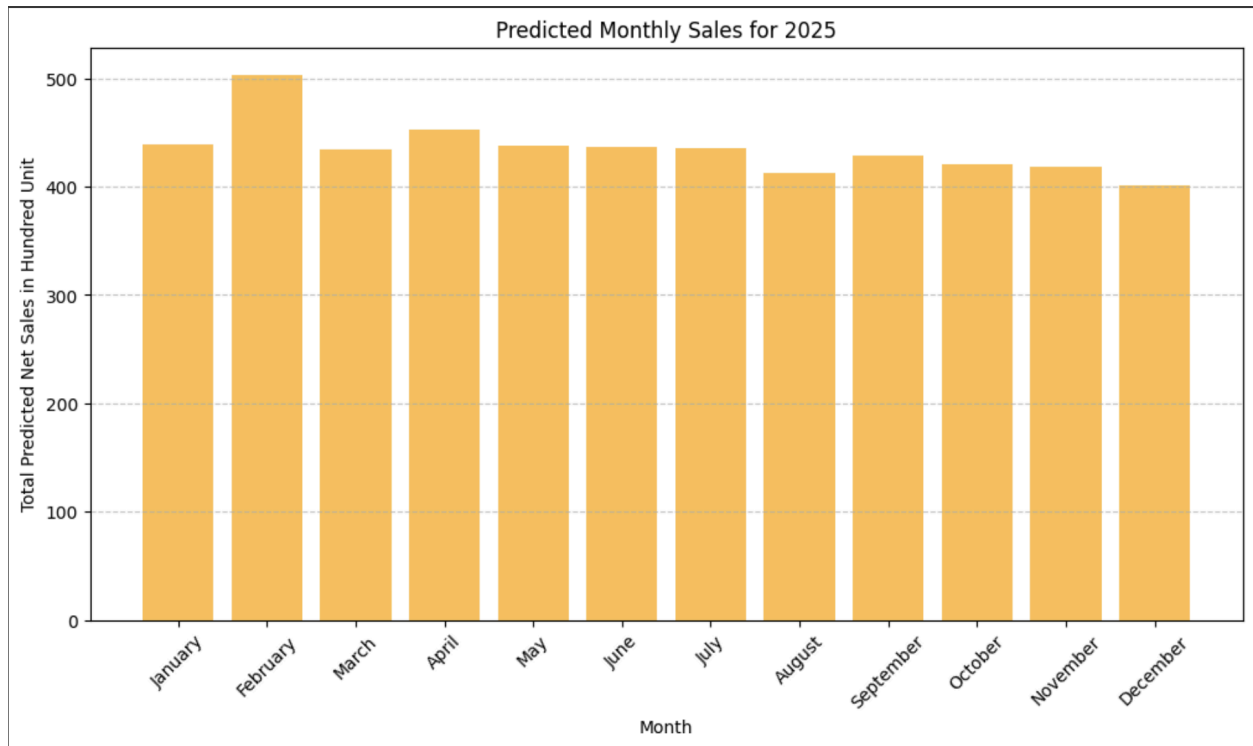
Based on the sales file that we generated from Verde's POS on Square, we were curious to explore what sales might look like in the upcoming year (2025). To address this, we employed the Random Forest Regression model to predict it. The process involved identifying essential variables such as quantities sold, discounts, and time-based elements like the day of the week and the month. While these variables provided a baseline for the model, the predictive performance was limited. The Mean Squared Error (MSE) stood at 12.71, with a cross-validation MSE of 14.56, and the R^2 value was only 0.16, indicating that the model captured only a small fraction of the variance in the sales data.

To improve the model's precision, we introduced additional features: the Discount Effect (measuring the influence of discounts on gross sales), Category Average Sales (representing the average net sales for each product category), and Day of Week Average Sales (highlighting sales patterns across the week). These enhancements allowed the model to understand better the factors driving sales performance. Incorporating these features significantly enhanced the model's performance, reducing the Mean Squared Error (MSE) to 6.32 and the cross-validation MSE to 6.89. Additionally, the R^2 value increased to 0.60, demonstrating that the enhanced

model could explain over 60% of the variance in sales, a substantial improvement from the baseline.

The analysis highlighted February as the month with the highest projected sales, offering a prime opportunity for focused marketing efforts or special promotions to maximize revenue. The forecast also indicated a stable sales trend throughout the rest of the year, reflecting consistent customer demand. Verde Brewing can use these insights to strategically plan promotions for peak periods while streamlining inventory and supply chain management operations to ensure efficiency year-round.

Based on our analysis, we recommend that Verde Brewing consider expanding its brand or business operations during August. With slightly lower predicted sales compared to other months, August presents an ideal opportunity to allocate resources and focus on expansion without risking disruptions to current operations. This period allows Verde to solve the initial challenge of business expanding with maintaining business stability while minimizing the impact on the brewery's regular sales performance.



Links to Analysis Files

Kids:

<https://colab.research.google.com/drive/1epAQqwI0R94i5iEbCafvcgtf6ZHWBgqb?usp=sharing>

Growlers:

https://colab.research.google.com/drive/1CX7rvI6UwH8nItCmLaJf_sFpneyItoVK?usp=sharing

Open 7 Days a Week

<https://colab.research.google.com/drive/1PuTi7mo5IzRt675ZJy2hxQI5NgSDS7aA>

Sales Prediction for Next Year

<https://colab.research.google.com/drive/1rKMfyKyV0CORIO39VVcKJWYpWiFqpGUb>

Weekly Post Analysis

https://colab.research.google.com/drive/1WhJthb4rM_wz3OhlpLQaMpZKhmEus157