# Results

In the field of hospitality and food service, there are two ways to approach preparing customer orders. One option is to make items to-order, meaning that they aren't created until a customer places an order. Alternatively, preparing items ahead of time allows an order to be instantly fulfilled leaving customers satisfied. However, this introduces the possibility of food waste. When an item is made, it can only be held on to for as long as its shelf life allows. If a pastry is created and no customer orders it, the pastry will expire. This is undesirable for business as it wastes not only the potential sale of the item, but the waste extends to the value of its ingredients and the employee labor spent to create it.

Since baked items take a long time to create, baking a cake to-order would be unreasonable. However, baking the cake ahead of time introduces the possibility of it expiring on the shelf. Creating a model of customer behavior allows employees to identify trends and predict when items will be sold. Analyzing sales data is an extremely important resource in creating these models of consumer behavior. Popular items are allowed to be prepared freely while less popular items can be made less frequently, minimizing the risk of waste.

Item sales can be divided by time of day, days of the week, by month, and more. Each category offers unique insight into customer behavior that can be tapped by businesses.

For example: Item sales can be divided by the time of day the sale took place in. With this information, we can see that 97.4% of all transactions occurred in the morning and evening. According to the second figure, after 4pm sales take a sharp decline. Realizing this, a business can determine that it would not be economically viable to stay open past then.

Percentage of Transactions on Different Dayparts

Number of Transactions on each Hour
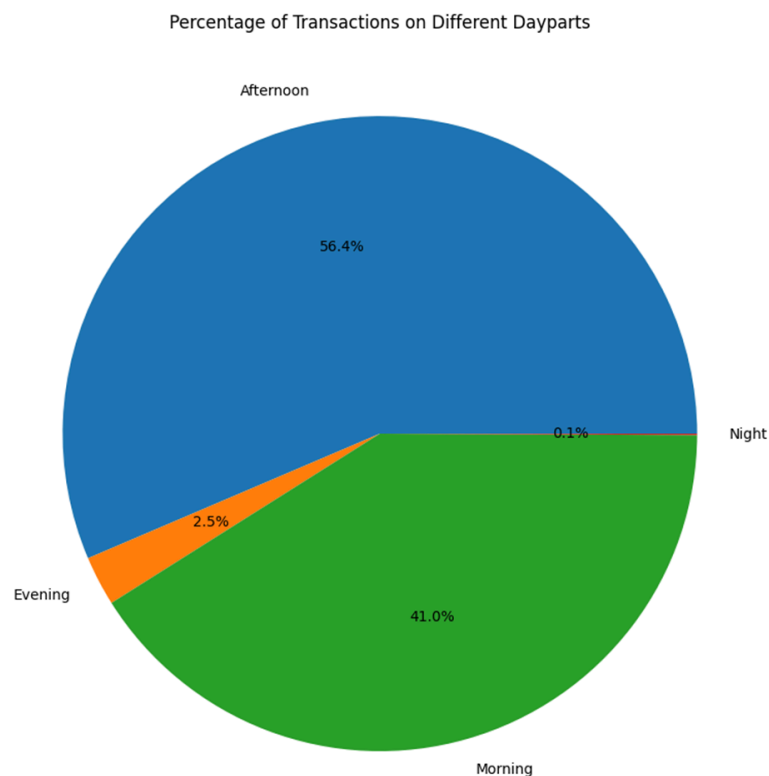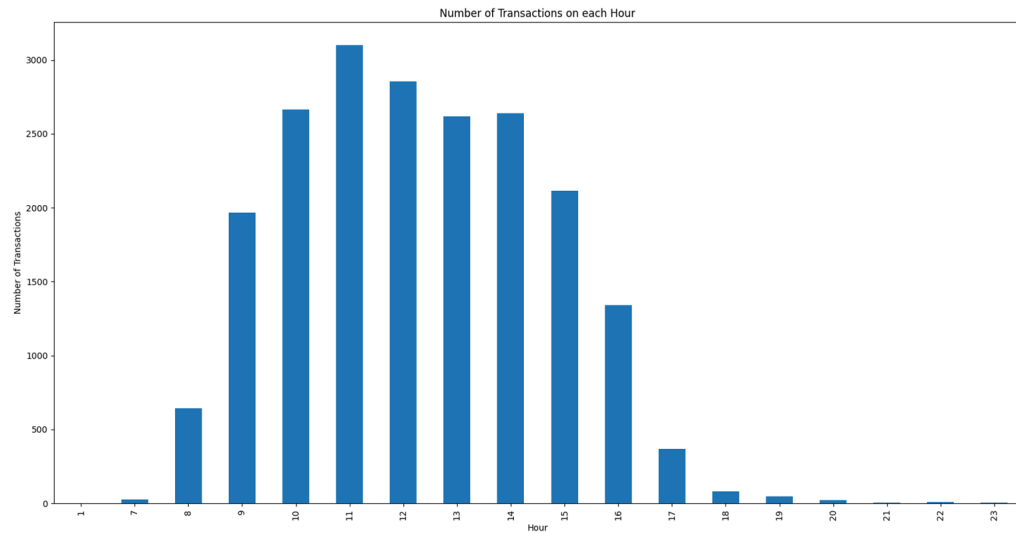
Going further, transactions can be further analyzed by looking at the sales data of each individual item by daypart.

Number of Transactions for each Item on Different Dayparts
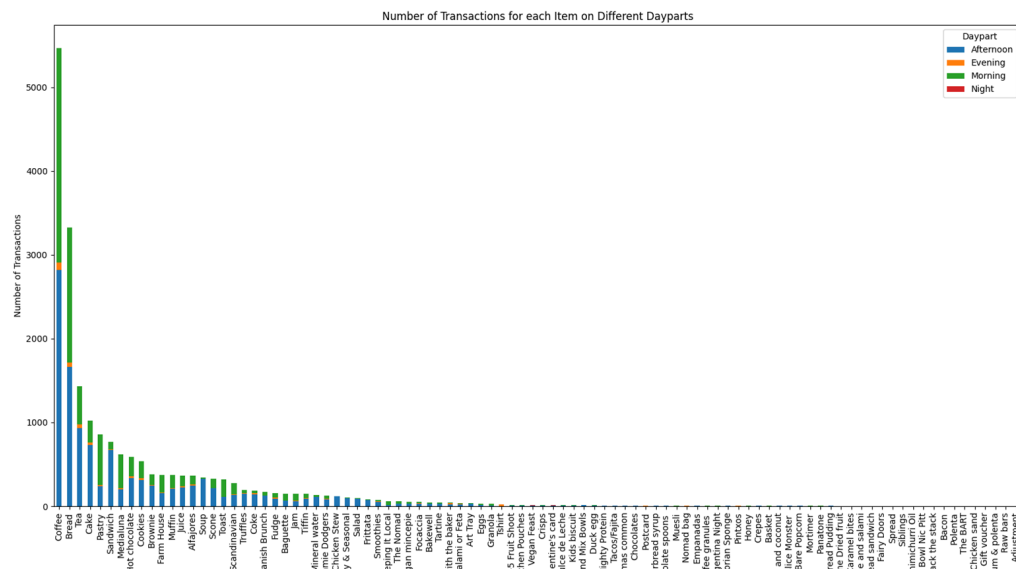
While sales data alone would tell you that cake is a more popular item than pastries, when noting the time of each transaction it is revealed that there is more information to be gleaned. Cake sells overwhelmingly more in the afternoon compared to the morning, while

pastries are the inverse. This added specificity allows us to model consumers even more accurately, allowing the correct amount of items to be prepared without wasting cakes in the morning and pastries in the evening, for example.

Analysis of sales data is especially important in a bakery setting, since expirable items such as pastries and bread items are often sold in combination with other items. If a business realizes that two items are often sold together, they can incentivize customers to purchase multiple items by marketing deals on popular item combinations.
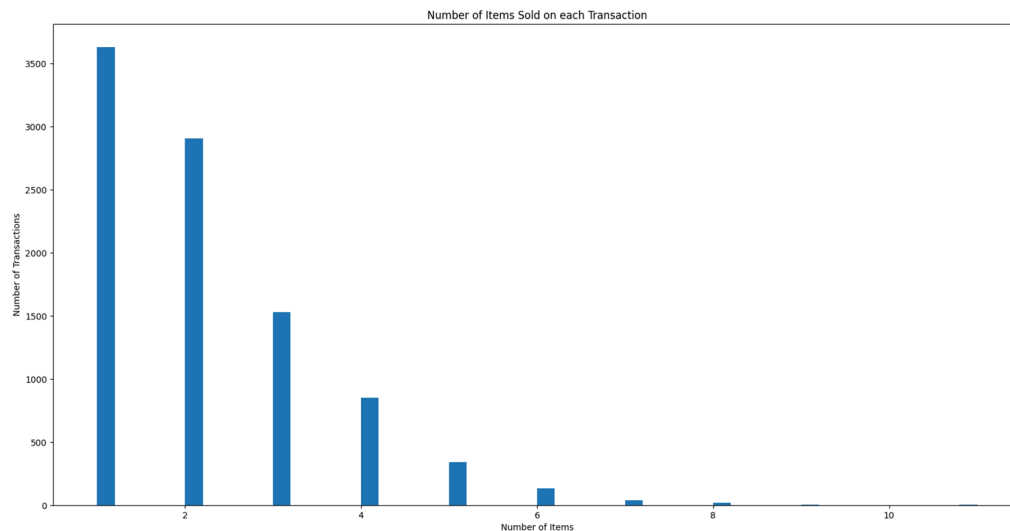
While the plurality of transactions are for individual items, the majority of transactions include more than one item

On an individual business sale, sales analysis reduces waste and ensures a smooth functioning environment. On a larger corporate scale, trends in sales throughout the year can inform staffing decisions as well. As illustrated in the chart below, sales are much higher in the winter months.
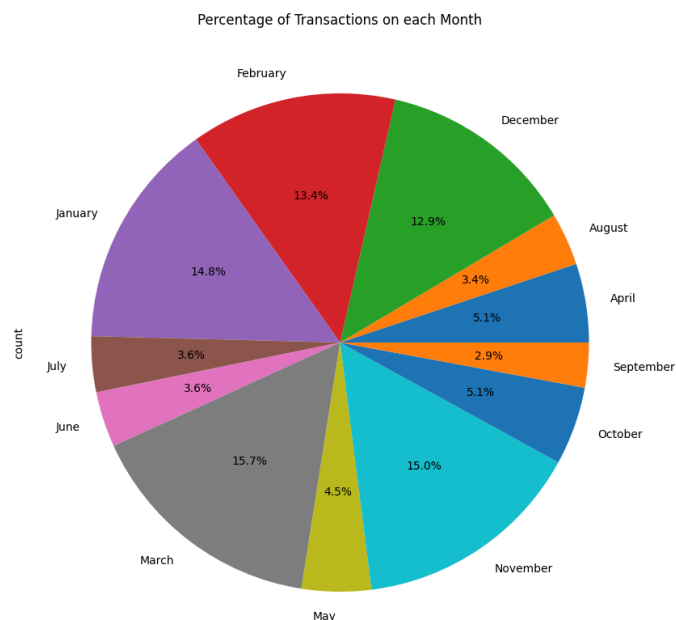
Staffing must be higher to accommodate the high volume of customers from November through March, while retaining that many employees could be needlessly expensive in the summer. Many businesses employ seasonal employees for only a few months out of the year, taking on extra hands when they're needed and parting ways once the high-demand months are over.