The client, Central Perk, a boutique coffee shop located in New York City, wants to explore transaction data collected over a time period of 2 years and gain insights about their business. According to the hypothesis stated, they believe that the current customer base is fairly loyal and business is consistent year over year which needs to be validated and based on the findings, recommendations can be made that can help the business thrive during low demand hours. This can further help the business optimize staffing and lead to greater monetary benefits.

To gain an understanding of the business, we first look at the distribution of transactions across different levels of time - hourly, weekly and yearly. Transactions across the years dip during the winters and are consistently high during the other seasons. The transactions are as expected, higher during the weekends as compared to weekdays, and tend to peak during two-time frames - **8 am to 11 am, and 11 am to 4 pm.**
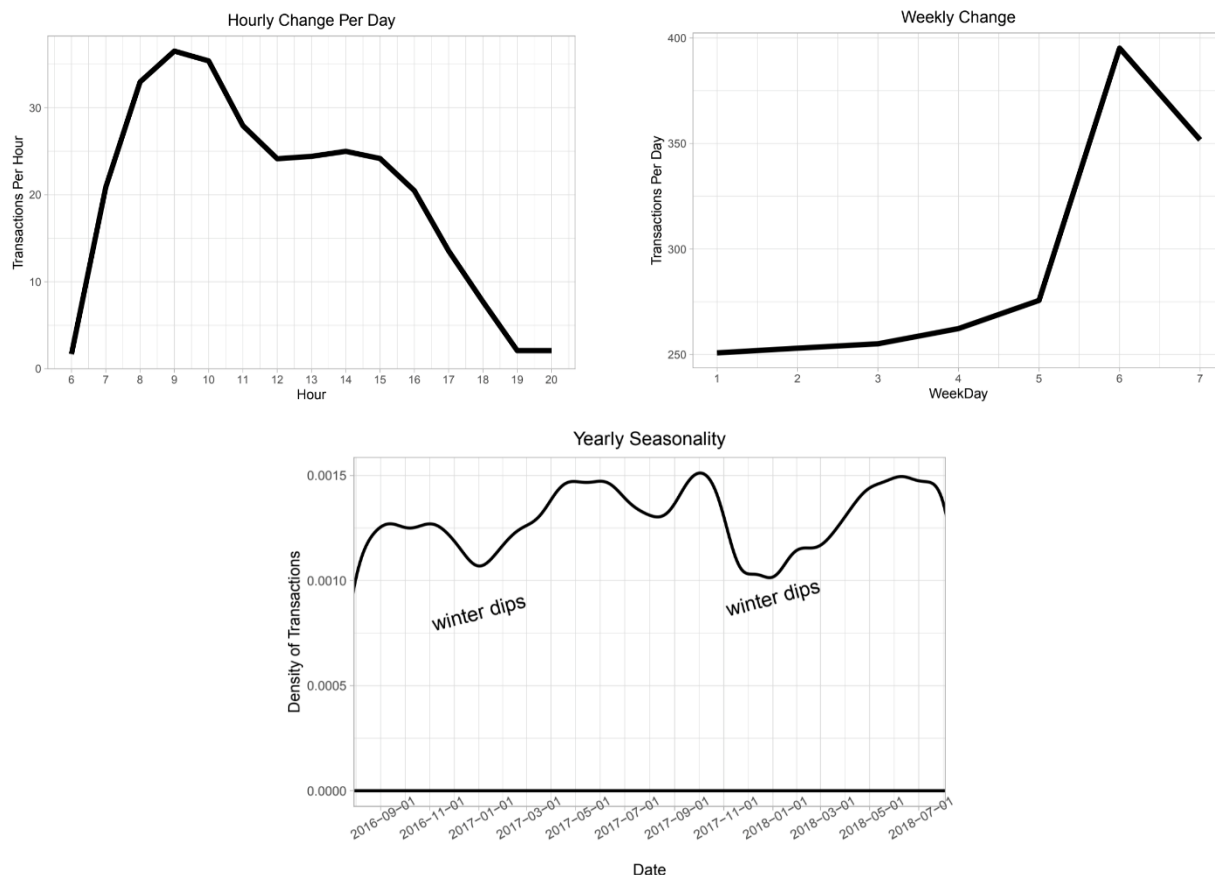
We also check which items are most and least popular among our customers based on the quantity sold. The results signify that coffee products such as drip and latte, food items like donuts and croissants, and ice are the most popular items. On the other hand, products like beer and coffee beans are the least bought items from Central Perk.

We then see the trend in the transactions made across a different set of customers. The customers are divided into enrolled and unenrolled customers based on the availability of customer ID. Comparing the transactions made, enrolled customers contribute to **> 60% of total net sales** for Central Perk.

Transactions/Sales by Customer ID Status
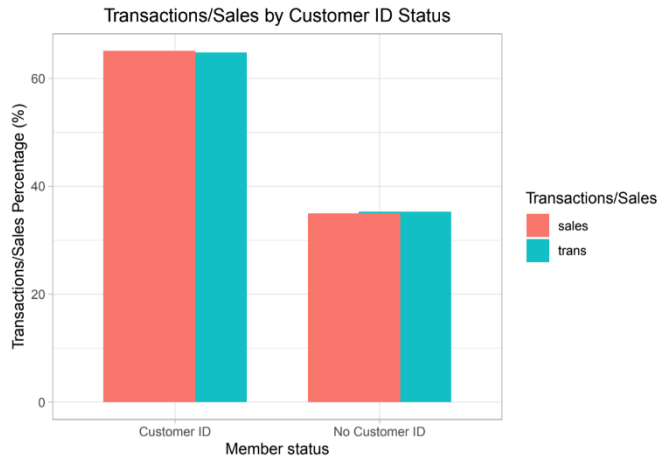
It is evident that the majority of our sales come from enrolled customers, but are they truly loyal?
To answer this question, we dive deep into verifying the belief that the customer base is fairly loyal. We trifurcated enrolled customers based on the number of days they visited the coffee shop and made at least 1 transaction. We see that 95% of these customers have visited Central Perk less than 6 times across the entire time frame of 770 days. Interestingly, of the total transactions contributed by the enrolled customers, this cohort contributes to 54% of the transactions. The other **5% of the enrolled customers (1,700 enrolled customers) contribute to 46% of the net sales**. These are the enrolled customers that have visited Central Perk for more than 6 days across the time frame.

This leads us to believe that the entire enrolled customer base is not loyal - only 5% visit Central Perk consistently and contribute to 27.6% of the entire net sales. These are our core loyal customers.

Post testing the hypothesis, we focus our recommendations based on the findings, and how it can help us connect the two to help grow the business. Looking at year-on-year performance based on net sales, we see that there was a growth from 2016-17, but it remained fairly flat from 2017-18. To understand this trend, we take a closer look at the enrolled customers and bucket them into customers having 1-3, 4-6 and > 6 visits in the time period.

We compare the net sales contributed by these bucketed customers and see the growth across the years.

Growth of Segments Across Years

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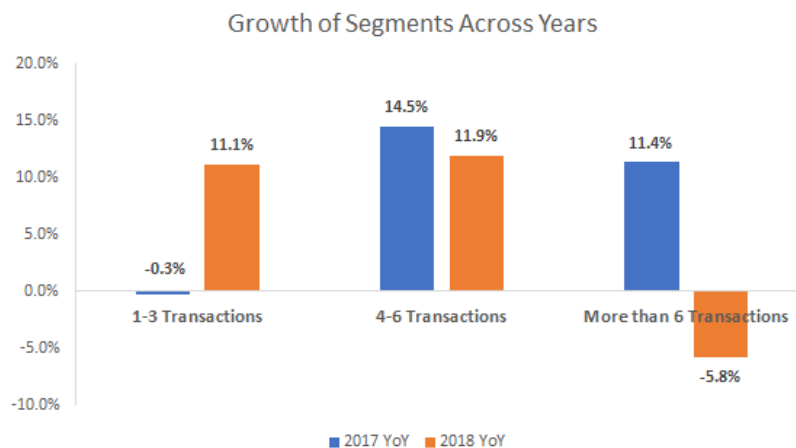
Customers with (>6 transactions) are termed as core loyal customers as they contribute 46% of the net sales for the enrolled customers. The transactional value contributed by our core loyal customers (> 6 transactions) decreased significantly from 2017-18. Even though the other buckets have increased contribution (1-3 and 4-6), the decrease due to core loyal customers shadows them. This again signifies how important core loyal members are to the overall net sales for Central Perk.

We move our attention to boosting sales for these core loyal customers. They tend to spend more during morning hours, and less during the second half of the day, whereas unenrolled customers spending follows a more regular pattern.

To increase sales for loyal customers in the second half of the day, we look at what items are being sold together frequently across our entire customer base. Looking at the above graph, we focus our attention on 2-time frames - 11:00 to 14:00 and 16:00 to 19:00. The results show us that **Cappuccino-Croissant, Croissant-Latte, and Lenka Bar-Latte** in the first time period and **Cappuccino-Financier and Lenka Bar-Cappuccino** in the second time period are the most promising product bundles. Buying the items mentioned on the left-hand side of the pairs increases the chances of buying the second item in the same pair.

As they are enrolled customers, we assume that we have more details regarding the customers (email, cell phone number, address). The offers based on the bundles can be communicated to our loyal customers via email/text messages. By offering these bundles only to loyal customers, we are looking at the long-term benefits for Central Perk. With bundling, we will be able to boost sales in the afternoon up to where they are in the morning and increase the sales volume in the evening to a position similar to that in the afternoon. With demand smoothing, we could optimize our staff allocation and reduce wasted costs.

Based on the analysis, we come up with the following takeaways and recommendations:
- Enrolled customers are not necessarily loyal to Central Perk; only 5% of our enrolled customers visit frequently. This 5% of loyal customers contribute to 46% of the overall sales. Their contribution greatly affects YoY growth as proved by the analysis
- Net sales have not been consistent over the years; on comparing the YoY growth, we see a growth from 2016 to 17, but an overall decrease from 2017 to 18
- Cappuccino-Croissant, Croissant-Latte and Lenka Bar-Latte are the most promising bundles from 11:00 to 14:00
- Cappuccino-Financier and Lenka Bar-Cappuccino are the most promising bundles from 16:00 to 19:00
- The shop should offer those loyal customers incentives, i.e. bundling, to motivate them to come more frequently in the afternoon and evening

The aforementioned takeaways and recommendations are made based on several assumptions:
- Transactions with a Customer ID are made by enrolled customers
- As the enrolled customers contribute more towards the overall business, and also we do not have any customer level information for the unenrolled customers, i.e. transaction with NA customer ID, we are only taking enrolled customers into consideration for providing the recommendations to achieve demand smoothing.
- We assume that the core loyal customers (> 6 visits) live/work near Central Perk, based on which we expect them to visit during the off hours
- We assume those loyal customers had a better understanding of the products and already developed a preference for the coffee shop
- We assume the shop has more personal information about those customers so that they could be accessed much easier compared to other customers