

# Keki's Bakery Report

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You are the manager of a very successful bakery chain. Every few months, new items are introduced to the menu. In the past, the bakery chose to add items that could be made with whatever ingredients were leftover in the kitchen. However, you think this process could be improved upon. You recently got a hold of a dataset that shows sales records from the past few months at Keki's bakery.

Questions:

- Overview of all pastry sales at all locations:
  - What are the best and worst selling pastries at all bakeries combined?
  - Do baked goods sales depend on the season? The month? The day of the week? The time of day?
  - Do the number of sales directly relate to total revenue?
- Specific bakeries
  - What are the most and least successful bakery locations in terms of sales numbers?
  - What are the best and worst selling pastries at individual bakeries?
  - Do the items bakeries sell different substantially from each other?

Information:

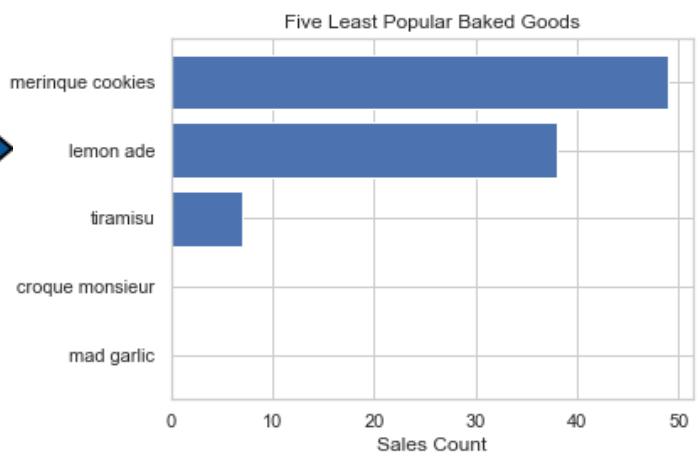
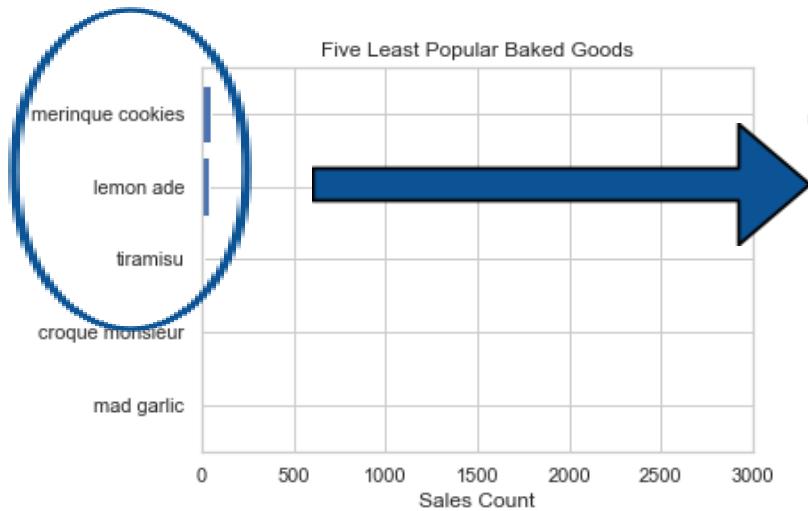
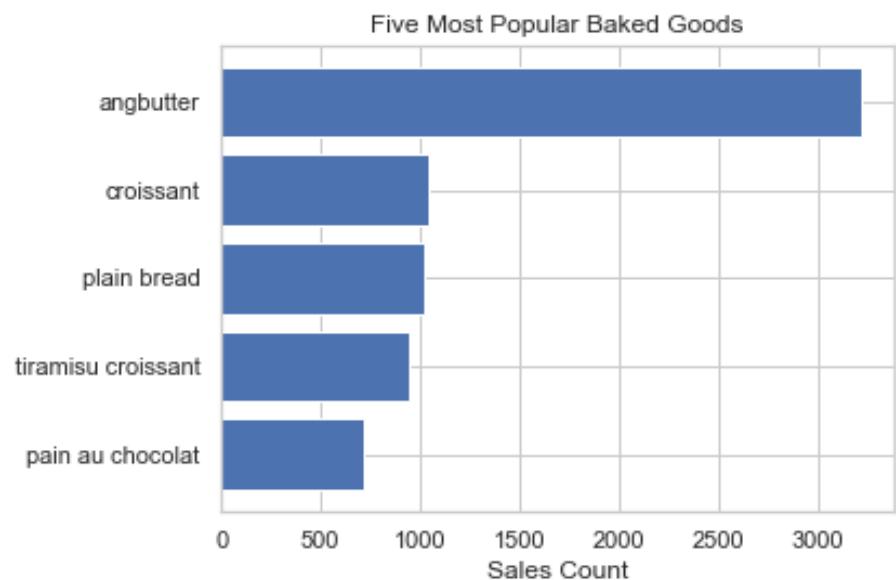
- Date range of data: 7/11/2019 - 5/2/2020
- Total sales within date range: 10,837 items sold
- 23 items on menu

## Overview of all pastry sales at all locations

**What are the best and worst selling pastries at all bakeries combined?**

- Best selling = Angbutter (3228 sold, 29.78% of goods sold)
- Worst selling = Mad Garlic & Croque Monsieur (0 sold, 0% of sales)

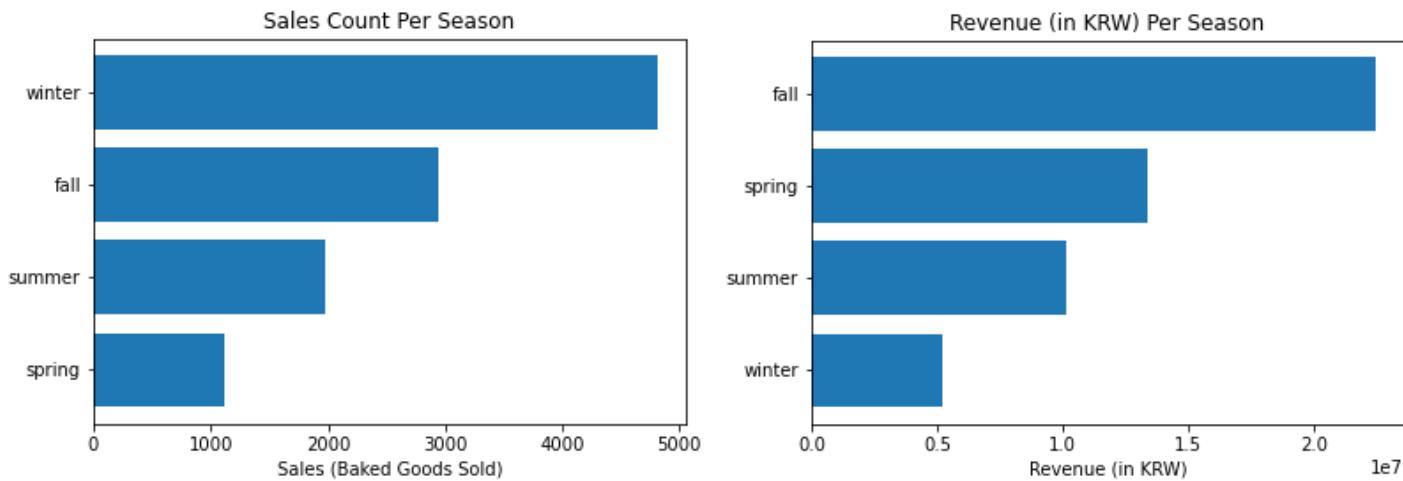
Top Five and Bottom Five Products Sold



Product sales, ordered from highest to lowest sales

Item	% of Total Sales Count	Sales Count (# of Items Sold)
angbutter	29.7	3228
croissant	9.7	1049
plain bread	9.5	1028
tiramisu croissant	8.7	944
pain au chocolat	6.7	726
orange pound	5.2	566
americano	4.7	513
wiener	4.4	476
pandoro	3.6	393
cacao deep	3.3	364
jam	2.3	249
vanila latte	2.2	241
almond croissant	2.2	235
caffé latte	1.9	214
gateau chocolat	1.9	210
milk tea	1.5	160
cheese cake	0.8	92
berry ade	0.5	55
merinque cookies	0.4	49
lemon ade	0.3	38
tiramisu	0.06	7
croque monsieur	0.0	0
mad garlic	0.0	0

## Do baked goods sales depend on the season?



Seasonal Product Sales, ordered from highest to lowest sales

Season	% of Total Sales Count	Sales Count (# of items sold)
Winter	44.4%	4812
Fall	27.1%	2937
Summer	18.2%	1973
Spring	10.3%	1115

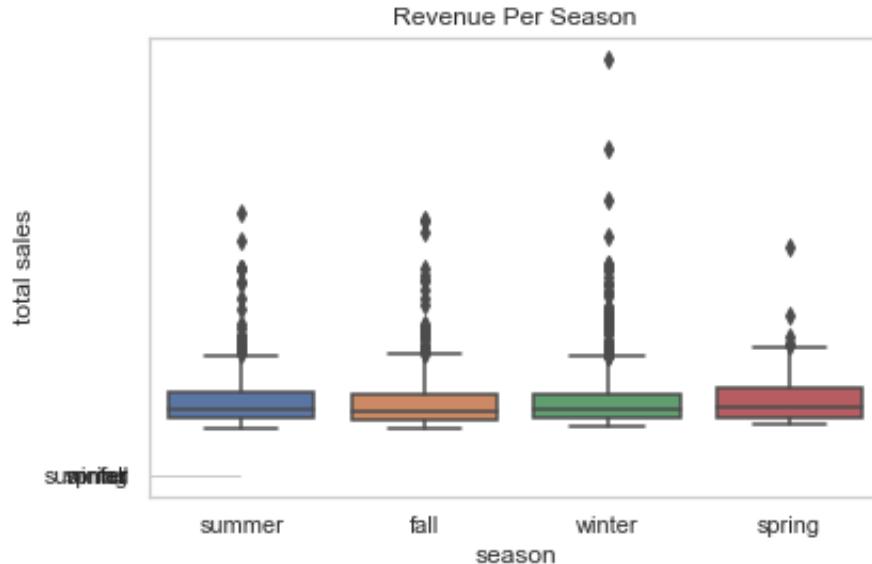
Seasonal Revenue, ordered from highest to lowest sales

Season	% of Total Revenue	Revenue (in KRW)
Winter	43.8%	22460800
Fall	26.2%	13397600
Summer	19.8%	10161200
Spring	10.2%	5202100

It looks like the highest selling and the highest earning season is the **winter**. Based on that, I predict some of the highest selling months should be in the winter. We unfortunately can't say much about spring sales or earnings, since essentially no data was collected in May (data collection was cut on May 2, 2020). However, I'm curious if the pandemic also affected spring sales, and is at all partially responsible for the decline in spring sales. To better represent spring sales, I should probably just limit what is "spring" up to May 1st. Let me try and see if that does anything. I should also probably

take the average sales for any single given month in that season, in order to not be biased.

Descriptive Statistics of Revenue Per Season



season	count	mean	std	min	25%	50%	75%	max
fall	658.0	20361.1	7484.7	12800.0	15500.0	18000.0	22800.0	71800.0
spring	251.0	20725.5	6356.9	14000.0	16100.0	18800.0	24100.0	64000.0
summer	427.0	20768.6	7977.1	13100.0	15800.0	18300.0	23050.0	73200.0
winter	1082.0	20758.6	8090.9	13600.0	15800.0	18600.0	22800.0	116500.0

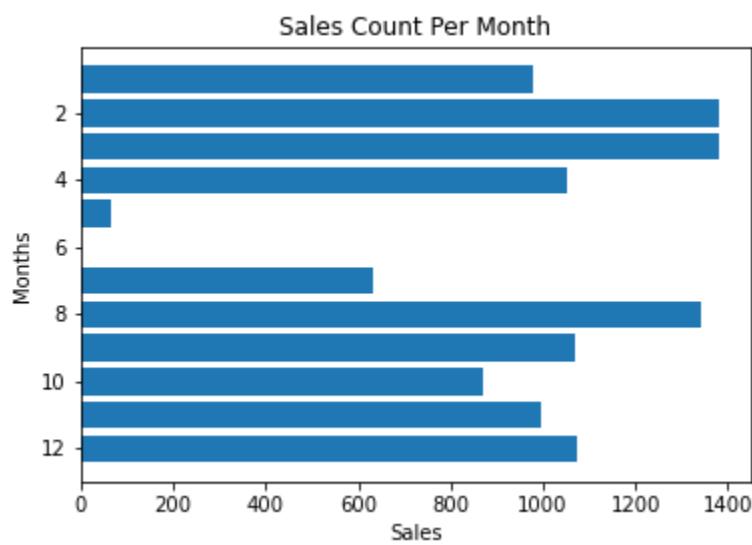
season	Count	Mean	Std	Min	25%	50%	75%	Max
Fall	658.0	20361.1	7484.7	12800.0	15500.0	18000.0	22800.0	71800.0
Spring	251.0	20725.5	6356.9	14000.0	16100.0	18800.0	24100.0	64000.0
Summer	427.0	20768.6	7977.1	13100.0	15800.0	18300.0	23050.0	23050.0
Winter	1082.0	20768.6	8090.9	13600.0	15800.0	18600.0	22800.0	22800.0

Looking at the descriptive statistics using box plots, it seems like all seasons have similar medians and data ranges. The main difference is that the winter has extreme outliers pushing the total sales higher. The reason why spring seems less profitable in the previous graph is only because it has fewer extreme outliers, perhaps only due to a hole in the data around May 2020. We can also see that total revenue is really spread out, with standard deviations being extremely high.

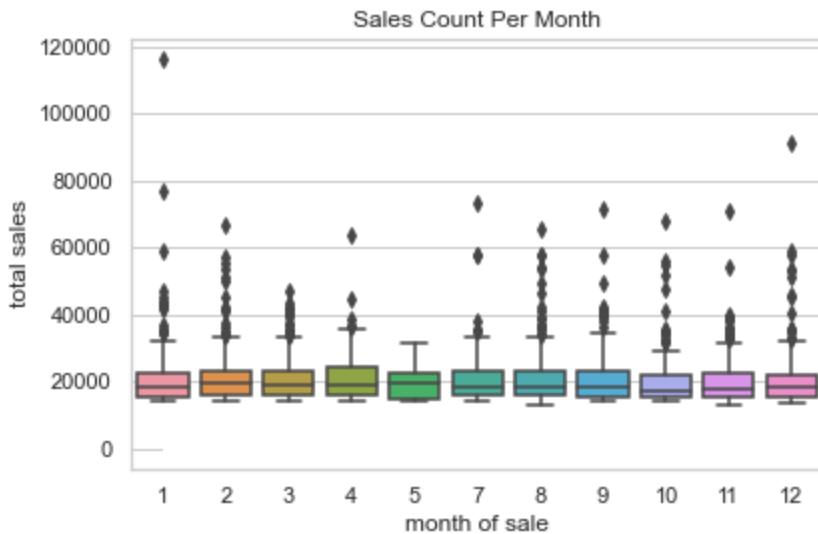
**Do baked goods sales depend on the month? What are the best and worst performing months?**

Monthly Product Sales, ordered from highest to lowest sales

Month	Total Sales
2	1380
3	1379
8	1340
12	1074
9	1071
4	1050
11	994
1	979
10	872
7	633
5	65
6	0



It seems like the two highest selling months, February and March, are in the winter. This makes sense with our previous seasonal sales analysis.

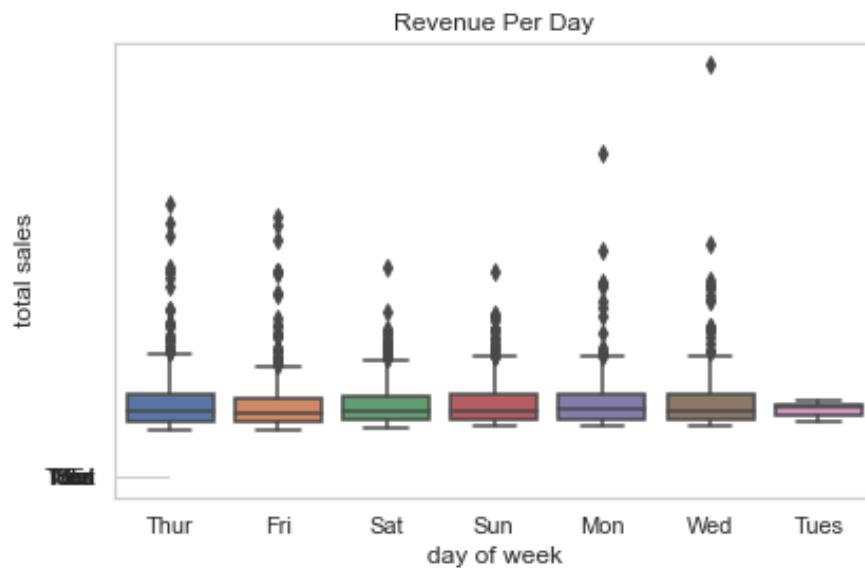
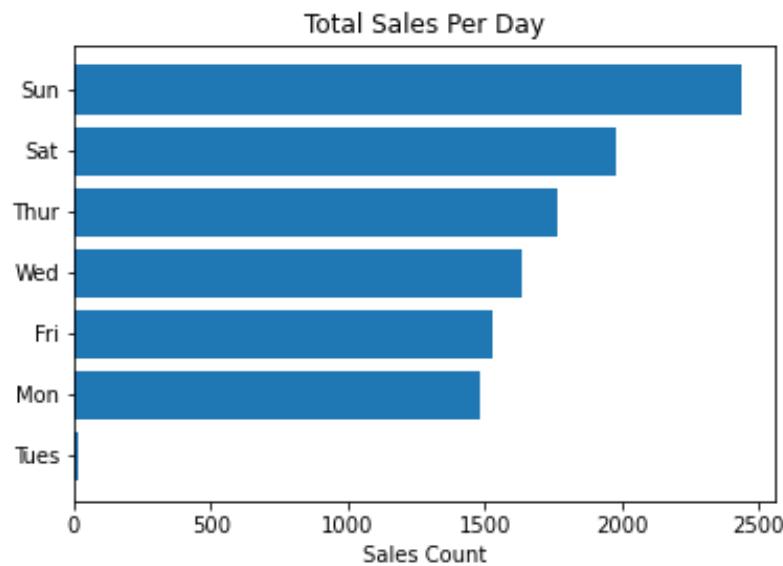


Looking at the box plot, it seems like most months (except July) have a similar median revenue per month and there was quite a spread in revenue within the third quartile. The data also seemed very top heavy, meaning that many of the months had outliers above the fourth quartile of data.

**Do baked goods sales depend on the day of the week? What are the best and worst performing days of the week?**

Daily Product Sales, ordered from highest to lowest sales

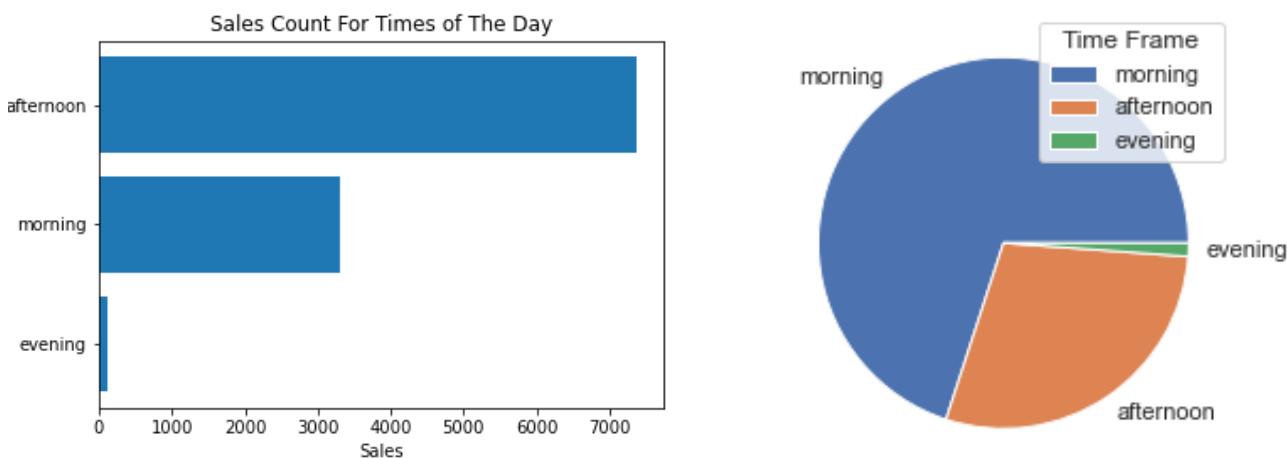
Day of Week	Total Sales
Sunday	2437
Saturday	1979
Thursday	1764
Wednesday	1633
Friday	1528
Monday	1484
Tuesday	12



**Do baked goods sales depend on the time of day? What are the best and worst performing times of the day?**

Product Sales over different times of the day, ordered from highest to lowest sales

Time of Day	Total Sales
Afternoon	7368
Morning	3314



### Background information about the data

- The data was collected from 7/11/19 to 5/2/20, about a 10 month period of data which excludes much of spring. Therefore, any conclusions about spring sales may not be accurate.
- This data was partially collected during the pandemic, which may have had unusual effects on sales.
- There are a total of 19 bakeries owned by Keki's bakery, which is most likely a South Korean bakery based on its individual bakery names.
- The currency of South Korea is the Won. 1 KRW = 0.00079 USD.
- 23 items on menu
- 10,837 items were sold from 7/11/19 to 5/2/20 in the 19 bakeries combined
- 51221700 won total in profit from 7/11/19 to 5/2/20 in the 19 bakeries combined

### Final Conclusion based on Analysis of Pastry Sales at all Locations:

- Angbutter is by far the most popular item, constituting almost 30% of sales. This is three times greater than the second most popular item, the croissant, which constitutes almost 10% of sales.
- Mad garlic and croque monsieur were never sold at any of the bakery locations.
- It looks like the highest selling and the highest earning season is the **winter**. Based on that, I predict some of the highest selling months should be in the winter. We unfortunately can't say much about spring sales or earnings, since essentially no data was collected in May (data collection was cut on May 2, 2020). However, I'm curious if the pandemic also affected spring sales, and is at all partially responsible for the decline in spring sales.
- Understandably, the greatest number of baked goods sold and the highest earning month was in winter. 1380 items were sold in February of 2020.
- It looks like the best performing days and times are weekend afternoons, specifically Sunday afternoons.

## **Overview of all pastry sales at individual locations**

There are a total of 19 bakeries owned by Keki's bakery. These locations include:

'효자 3동' '후평 1동' '후평 2동' '석사동' '소양동' '퇴계동' '동면' '후평 3동' '신사우동'  
'강남동' '효자 1동' '조운동' '교동' '효자 2동' '약사명동' '근화동' '동내면' '교동'  
'신동면'

### **What are the most and least successful bakery locations in terms of sales numbers?**

The highest performing bakery is: 동면, which makes about 17% of the Keki's revenue. The next highest performing location, in terms of revenue, is 후평 2동 which makes about 9.8% of Keki's revenue.

#### **Questions for later:**

- **What are the best and worst selling pastries at individual bakeries?**
- **Do the items bakeries sell different substantially from each other?**