

# Business Report MCD

—Siyu Deng

## Overview

In OCT 2018, our company's biggest competitor Burger King released its new product--Impossible Burger (veggie burger) to the market, which may have generated huge impact to the market.

Currently, by analyzing our sales data from Jan 2016 to Sep 2019, we the Data Science Team of McDonald's come to a conclusion that the veggie burger not only having significant short-term impact, but also do have a long-term harm and threat to our company if we do not response to it. Our team suggestions are listed below.

1. Our company should engage into the new veggie meat field by inventing our own veggie burger, veggie-chicken fillets and veggie-fish fillets.
2. If the new products are invented, the best time for our company to release them is on October.
3. North East America is relevantly our more impact market. Thus, it is also our relevantly better test market for the new product. However, the geography does not significant affect our sales, so as long as our test market receive good results, our company should propagate all new products all over the state.

## Analysis

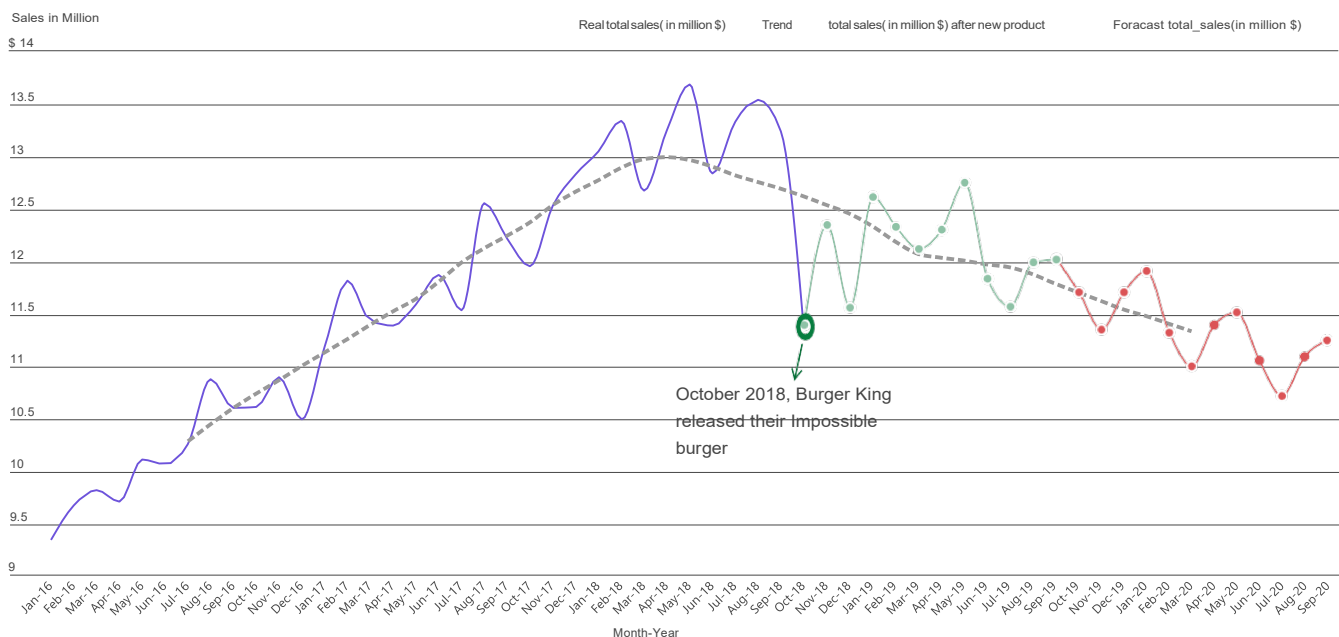
### Impact

Our team analyze the total sales data to relatively observe the Impossible burger's impact to the market. We chose python jupyter notebook as our data exploration environment. We use the partial auto-correlation function find the periodicity for our sales data is 4. Therefore, we chose Time Series model SRIMAX to fit our data and forecast the monthly sales for the future 12 months.

The graph below shows the result.

The interpretation of the graph is attached at the bottom of the graph.

### Total Sales from 2016 to 2020





**description:** The purple line represents our company total sales before Burger King new products released. We can see that the significant drop down is on the month when Impossible burger get released, which should be concluded as the effect of Impossible burger.

Moreover, our sales on October revived from the September's great recession. It swayed back and force between 11.5 million dollars and 12.7 million dollars till September 2019, represented in green.

However, the long-term forecast (12 months) in red do imply further recession and shows a general trend in gray of decreasing in total sales. We conclude such impact is relate to the Impossible burger. Therefore, we should act.

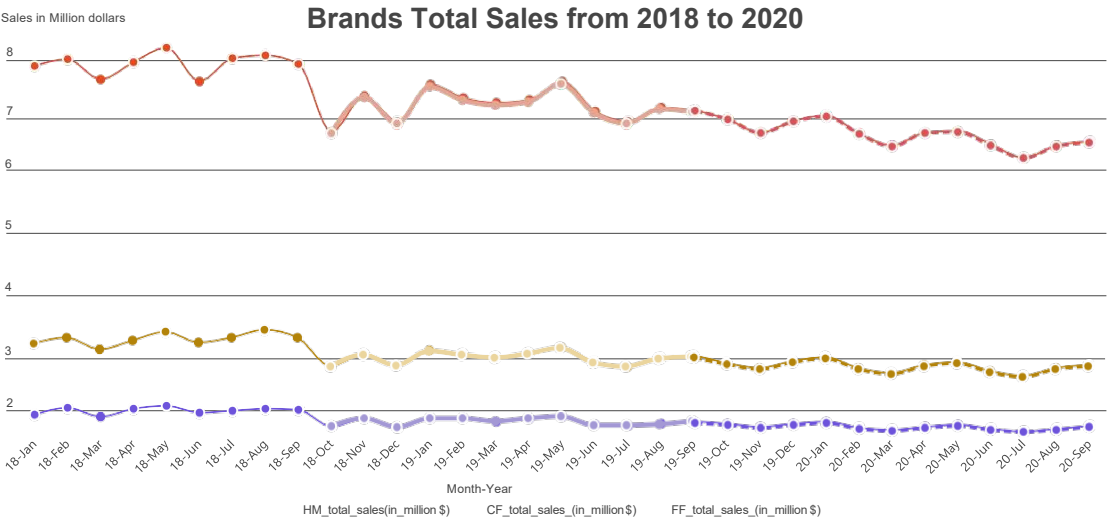
Suggested Solution

1. Grouped the data by food brands--HM(stands for hamburger), CF(chicken fillets) and FF(fish fillets), we found HM provides the major sales to the total sales. We find every brand follows the periodicity of 4, and according to the 12-month forecast by using SRIMAX, we found that all brands are going to face recession in sales, whereas HM face the most.

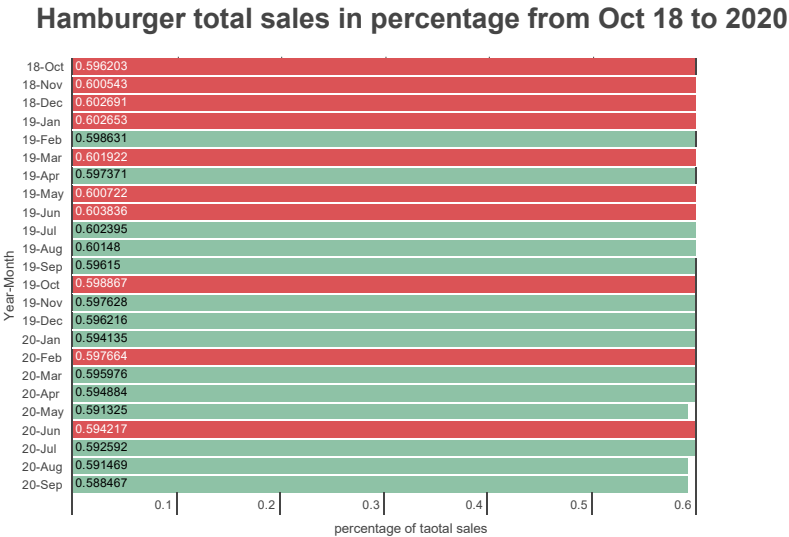
Bar charting the HM monthly sales' percentage of total monthly sales from Oct 2018, we found that HM's percentage have 7 months with increase out of 9 months, which shows in short term, even with impact of veggie burger, our HM is cannot be substituted by our other brands. Only in long term prediction, it will slowly lose influence to the total sales.

Therefore, we suggest to invent veggie products on all three brands, with a relative more focus on veggie burger.

The graphs are below.



**description:** Each line contains three segments, represents sales begin in 2018 till the impossible burger released on Oct, sales from OCT 2018 till Sep 2019, forecast monthly sales in future 12 months.



**description:** Red represents increase in percentage compare with last month. Green is the opposite.



2.

Decompose the sales trend, we found a general seasonality for all sales. The seasonality suggests that from Oct to Dec (Winter) are our major well selling months. This also helps explain why our competitor released their new product on Oct as well. Hence, we suggest that the new products should release on Oct.

The graph is below.



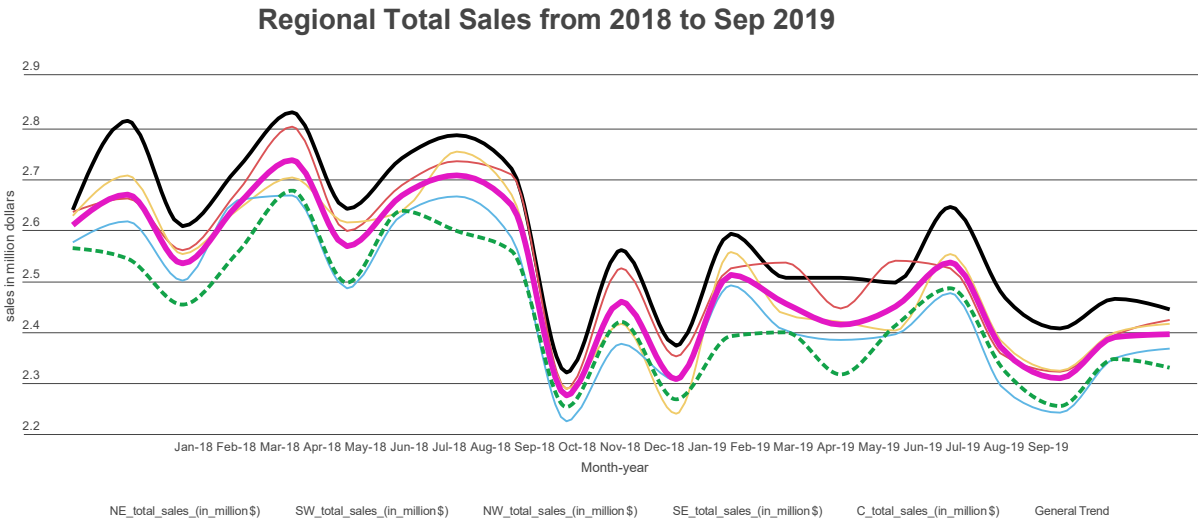
**description:**

Positive value means seasonal increase in that month, whereas negative value means the opposite.

3.

Grouped the sales data by its region, and line plot them with adding the general trend, we found that North East America market provides the most sales, whereas the Central America provides the least. Such observations are same for the whole given time period. However, the difference is not significant enough to conclude that some markets can be excluded. Thus, we suggest to try NE as our test point for new products release, and if it succeeds, we then suggest to promote them all over the states.

We sliced the plot from 2018 to Sep 2019 to make it less complex to observe. The graph is below.



**description:**

We can observe that most of the times all the other region's sales curve is between the max boundary of NE's, and the min boundary of C's. In general, all of them follows the general trend we derived at the beginning.