# Conclusion and Recommendations

## Copy of comments

* The data has 1898 records (rows) and 9 attributes (columns)
* 5 numerical variable columns:
  + 'order\_id', 'customer\_id', 'food\_preparation\_time', and 'delivery\_time' have int datatype
  + 'cost\_of\_the\_order' has float datatype
* 4 columns of object (categorical variables/str) datatype: 'restaurant\_name', 'cuisine\_type', 'day\_of\_the\_week', and 'rating'; strangely 'rating' has an object datatype
* There appears to be no missing values.
* It takes between 20 and 35 minutes to prepare food after an order is placed
* The average food preparation time is 27 minutes
* A total of 736 (38.78%) orders are not rated.
* Data was collected for 1898 orders
* Orders were registered from 1200 clients
* 178 restaurants received orders
* A total of 14 cuisine types were ordered
* 'American' was the most frequently ordered cuisine type (about 580 orders, 30.56%) followed by 'Japanese' (about 480, 25.29%) and 'Italian'(about 280 orders, 14.75%)
* 'Vietnamese' cuisine type was the least frequently ordered (less than 20 orders, 1.05%)
* cost\_of\_the\_order' is slightly right-skewed
* most orders cost between 12 and 23 dollars
* half of the orders cost less than 14 dollars
* As expected, 'day\_of\_the\_week' has two values; orders are either placed during weekdays or during the weekend
* The number of orders received during the weekend is over twice greater than those received during weekdays. Probably, people tend to use office and school restaurants during weekdays and, therefore, don't need to order food online.
* The only ratings provided are 3, 4, and 5
* some orders were not rated.
* Among the orders rated, most had a rating of 5 (about 580, 30.56% of all orders) followed by 4 (about 380, 20.02% of all orders)
* The orders received are fairly distributed across food preparation times with peaks at 21, 26, 31, and 34 minutes, meaning relatively large numbers of orders registered preparation times around these peaks.
* Most orders are prepared between 23 and 31 minutes
* Half of the orders are prepared in less than 27 minutes
* 'delivery\_time' is slightly left-skewed
* most orders are delivered in between 20 and 28 minutes
* half of the orders are delivered in less than 25 minutes
* The top 5 restaurants in terms of the number of orders in descending number of orders are 'Shake Shack' (219 orders, 11.54%), 'The Meatball Shop' (132 orders, 6.95%), 'Blue Ribbon Sushi' (119 orders, 6.27%), 'Blue Ribbon Fried Chicken' (96 orders, 5.06%), and 'Parm' (68 orders, 3.58%)
* All 14 cuisine types were ordered during the weekend
* 555 (29.24%) orders cost above 20 dollars
* The average delivery time is 24.16 minutes
* The IDs of the top 3 most frequent customers who will, therefore, be benefitting from the discount are 52832 (13 orders, 0.68%), 47440 (10 orders, 0.53%), and 83287 (9 orders, 0.47%)
* Southern dishes have the largest variability in cost whereas korean dishes are the least cost variable
* French dishes tend to be the most expensive meanwhile vietnamese dishes are the cheapest
* Korean dishes have outliers in both directions of the distribution
* Meditarannean dishes are right-skewed with several upper outliers
* Relatively fewer outliers are registered for vietnamese dishes
* Thai dishes have the greatest variability in preparation time whereas the least variability is registered for korean dishes
* Italian and Thai dishes generally have the longest preparation time followed by Japanese and Spanish dishes whereas Korean and Vietnamese dishes are the most rapidly prepared dishes
* Some korean dishes took abnormally long to prepare
* Delivery time during weekdays is significantly higher than during the weekend
* Weekend delivery times tend to be more variable than weekday delivery times
* The top 14 restaurants in terms of revenue raised between 506 and 3580 dollars each from the orders
* 'Shake Shack' generated the greatest amount of revenue from the orders (3580 dollars) followed by 'The Meatball Shop' (2145 dollars)
* Among the top 14 restaurants, 'Five Guys Burgers and Fries' registered the least revenue (506 dollars) followed by 'Nobu Next Door' (623 dollars)
* Orders with the longest delivery time were generally rated 3 whereas those with the least delivery time were rated 4 on average.
* There is hardly any observable relationship between the food preparation time and the rating though orders with the longest preparation time and widest preparation time variability register a rating of 3 on average
* The variability of cost is greatest for orders rated 3
* Among the dishes rated, the most costly dishes are rated 5 whereas the least are rated 3
* The cheapest dishes tend not to be rated
* There is hardly any correlation among delivery time, food preparation time, and cost of the order
* Correlation between preparation time and cost and preparation time and delivery time is slightly positive
* Delivery time and cost are slightly negatively correlated
* It turns out each restaurant having registered more than 50 ratings also has an average rating of over 4
* Only 4 (2.25%) restaurants respect these criteria and are, thus, eligible for the promotional offer: 'The Meatball Shop', 'Blue Ribbon Fried Chicken', 'Shake Shack', and 'Blue Ribbon Sushi'
* The revenue raised by FoodHub is around 6166.3 dollars
* A total of 200 (10.54%) orders were delivered in more than 60 minutes from the time the order is placed
* On average, orders are delivered in 28 minutes on weekdays and 22 minutes on weekends

## Conclusion

This analysis was carried out on data collected from 1898 online food delivery orders made by 1200 clients in New York via the food aggregator company, FoodHub. Altogether, 14 cuisine types were ordered from 178 restaurants. A total of 9 attributes were recorded and analyzed. The principal attributes under scrutiny are the cuisine type and feedback ratings. In an effort to provide actionable information to FoodHub seeking to ameliorate customer experience and improve business performance, we uncovered the relationship between these two main parameters and the other attributes.

Here below a list of observations derived from the analysis:

* Volume of orders
  + 'American' was the most frequently ordered cuisine type (about 580 orders, 30.56%) followed by 'Japanese' (about 480, 25.29%) and 'Italian'(about 280 orders, 14.75%)
  + 'Vietnamese' cuisine type was the least frequently ordered (less than 20 orders, 1.05%)
  + The number of orders received during the weekend is over twice greater than those received during weekdays. Probably, people tend to use office and school restaurants during weekdays and, therefore, don't need to order food online.
  + The top 5 restaurants in terms of the number of orders in descending number of orders are 'Shake Shack' (219 orders, 11.54%), 'The Meatball Shop' (132 orders, 6.95%), 'Blue Ribbon Sushi' (119 orders, 6.27%), 'Blue Ribbon Fried Chicken' (96 orders, 5.06%), and 'Parm' (68 orders, 3.58%)
  + The IDs of the top 3 most frequent customers who will, therefore, be benefitting from the discount are 52832 (13 orders, 0.68%), 47440 (10 orders, 0.53%), and 83287 (9 orders, 0.47%)
  + All 14 cuisine types were ordered during the weekend
* Food preparation time
  + It takes between 20 and 35 minutes to prepare food after an order is placed, and 27 minutes on average
  + The orders received are fairly distributed across food preparation times with peaks at 21, 26, 31, and 34 minutes, meaning relatively large numbers of orders registered preparation times around these peaks.
  + Thai dishes have the greatest variability in preparation time whereas the least variability is registered for korean dishes
  + Italian and Thai dishes generally have the longest preparation time followed by Japanese and Spanish dishes whereas Korean and Vietnamese dishes are the most rapidly prepared dishes
* Food delivery time
  + most orders are delivered in between 20 and 28 minutes
  + half of the orders are delivered in less than 25 minutes
  + The average delivery time is 24.16 minutes
  + A total of 200 (10.54%) orders were delivered in more than 60 minutes from the time the order is placed
  + Delivery time during weekdays is significantly higher than during the weekend
  + Weekend delivery times tend to be more variable than weekday delivery times
  + On average, orders are delivered in 28 minutes on weekdays and 22 minutes on weekends
* Cost of orders
  + most orders cost between 12 and 23 dollars
  + half of the orders cost less than 14 dollars
  + 555 (29.24%) orders cost above 20 dollars
  + Southern dishes have the largest variability in cost whereas korean dishes are the least cost variable
  + French dishes tend to be the most expensive meanwhile vietnamese dishes are the cheapest
* Ratings
  + A total of 736 (38.78%) orders are not rated.
  + Among the orders rated, most had a rating of 5 (about 580, 30.56% of all orders) followed by 4 (about 380, 20.02% of all orders
  + It turns out each restaurant having registered more than 50 ratings also has an average rating of over 4; only 4 (2.25%) restaurants respect these criteria and are, thus, eligible for the promotional offer: 'The Meatball Shop', 'Blue Ribbon Fried Chicken', 'Shake Shack', and 'Blue Ribbon Sushi'
* Revenue
  + The top 14 restaurants in terms of revenue raised between 506 and 3580 dollars each from the orders
  + 'Shake Shack' generated the greatest amount of revenue from the orders (3580 dollars) followed by 'The Meatball Shop' (2145 dollars)
  + Among the top 14 restaurants, 'Five Guys Burgers and Fries' registered the least revenue (506 dollars) followed by 'Nobu Next Door' (623 dollars)
  + The revenue raised by FoodHub is around 6166.3 dollars
* Food preparation time vs Rating
  + There is hardly any observable relationship between the food preparation time and the rating though orders with the longest preparation time and widest preparation time variability register a rating of 3 on average
* Food delivery time vs Rating
  + Orders with the longest delivery time were generally rated 3 whereas those with the least delivery time were rated 4 on average.
* Cost of dishes vs Rating
  + The variability of cost is greatest for orders rated 3
  + Among the dishes rated, the most costly dishes are rated 5 whereas the least are rated 3
  + The cheapest dishes tend not to be rated
* Food preparation time vs Food delivery time vs Cost
  + There is hardly any correlation among delivery time, food preparation time, and cost of the order

## Recommendations

* FoodHub should prospect and make promotion offers to restaurants that serve American, Japanese, and Italian dishes since these three cuisine types account for more than half of orders
* Optimal capacity management can be attained by allotting significantly greater logistics allowance (number of delivery cars and personnel and software availability and stability) during the weekend, which registers more than half of orders made during the entire week
* Service delivery agents should be stationed close to restaurants serving Japanese and Italian dishes to reduce total delivery time by compensating for the relatively long preparation time of these popular dishes
* The greater delivery time during weekdays needs to be investigated considering that a lot fewer orders are received than during weekends
* Advertisement of expensive French dishes might result in additional revenue generation
* Customer experience should be carefully gauged when advertising expensive dishes to determine whether the average ratings for this class of dishes remain high as the relative number of orders rises
* Clients tend to be more sensitive to delivery time than preparation time; so FoodHub should think of cost-effective strategies for delivery time reduction