Supershop Analytical Business Case Study

Objective:

To provide an overview of the current week's operations, analyze the on-time performance of orders and provide recommendations for any improvements

Assumptions:

+ *I'm assuming that only future orders can have an early delivery and that immediate orders can only be delivered on-time or late*
+ *I'm assuming that duplicate order ID's count as unique orders as they correspond to different shopper, store and day of the week*

Submitted by Gabriela Roestandy

Current Week Overview: Market X

Total Orders: 8,671

1% Early*
19% Late
80% On-time

Total Shoppers: 369

1% Early*
29% Late
70% On-time

Top 5 Stores:

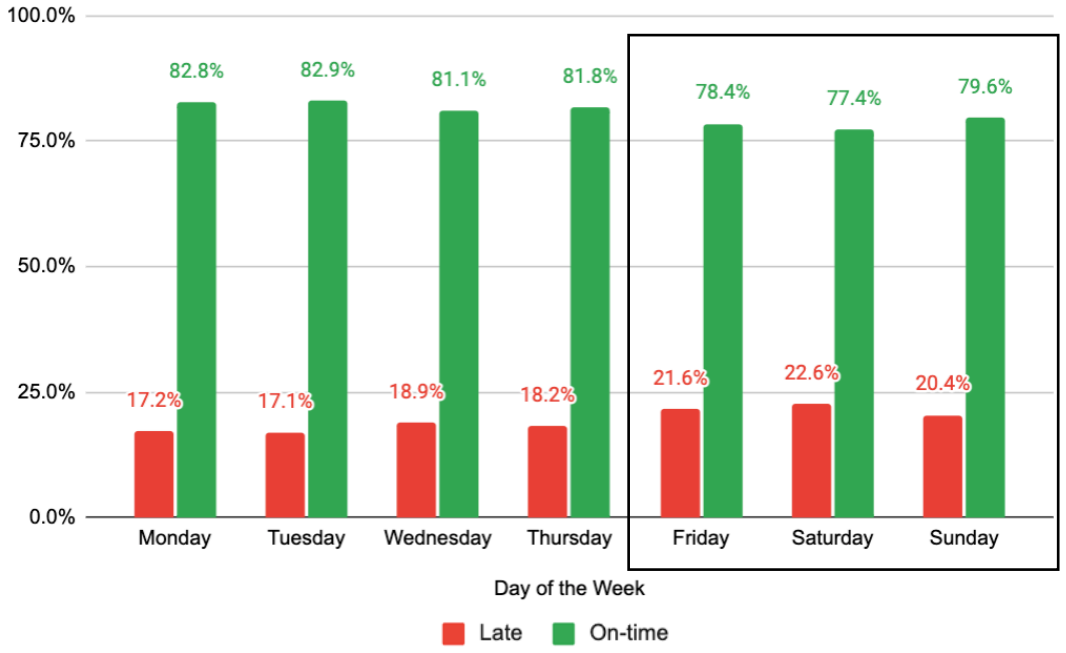
Store ID	*Order Qty*
537	5523
613	2289
538	254
3376	240
7877	137

Top 5 Shoppers:

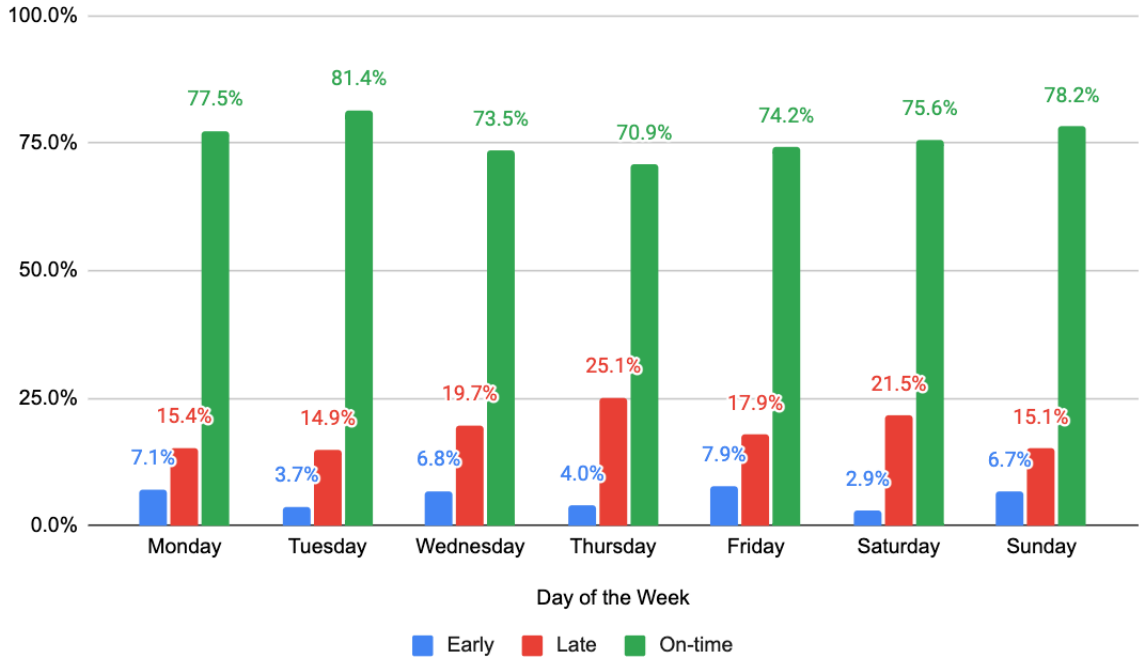
Shopper ID	*Order Qty*
1089	157
1150	154
1183	149
1107	144
1136	130

Average Order Size:
12 items

On-time Performance for Immediate Orders (85% of total orders)



On-time Performance for Future Orders (15% of total orders)

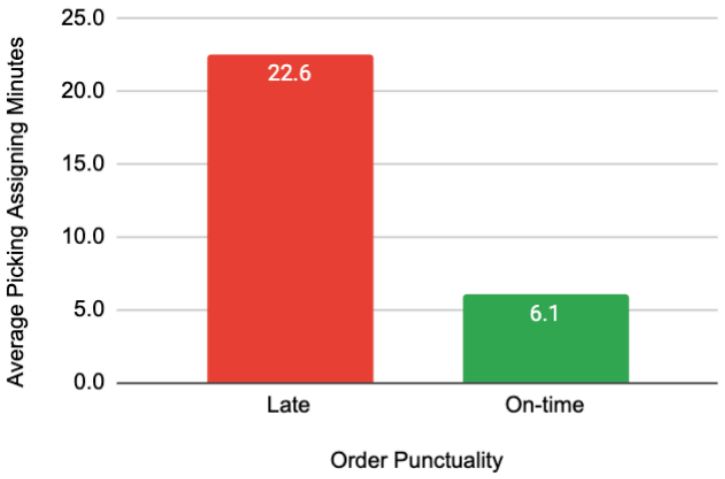


+ All orders are **below the 90%** on-time standard for each day of the week
+ It appears that weekends have lower on-time rates for immediate orders, but not by a significant amount- could be due to increased traffic at stores

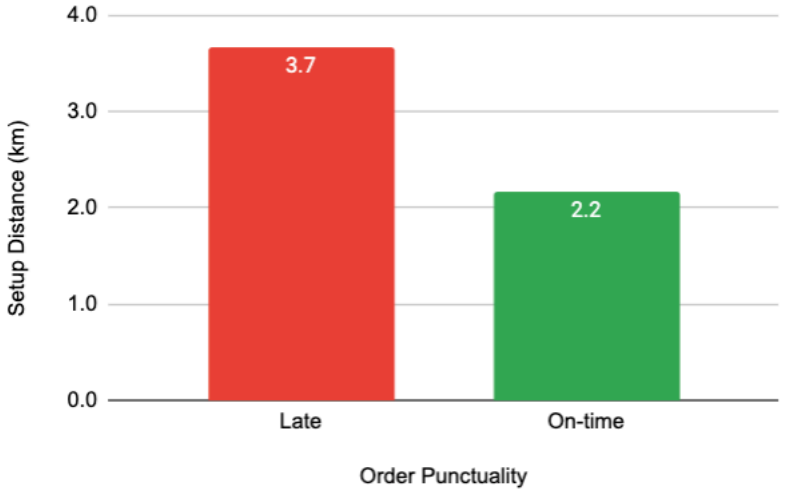
**Future orders only*

The most important variables affecting on-time delivery appear to be:
Picking Assigning Time, Distance & Picking Speed

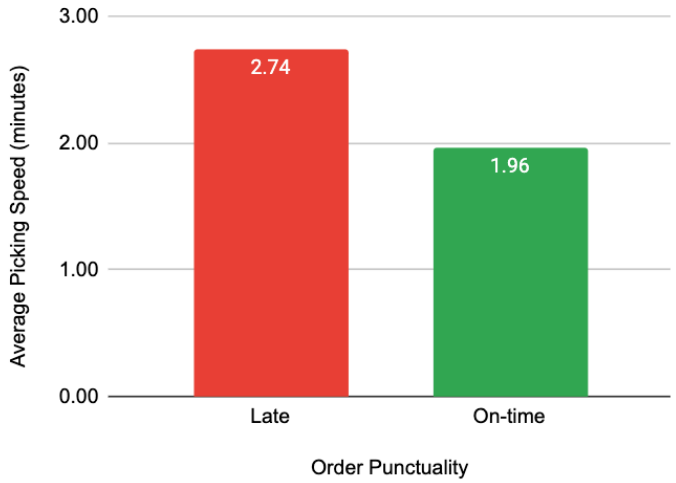
1 It takes almost **4x as long** for a late order to be accepted by a shopper compared to on-time orders



2 Late orders tend to have the **farthest km distance** between shopper and store location



3 Late orders tend to have **a higher picking speed average by almost 40%** compared to on-time orders



What is causing a shopper to take a long time to accept the orders that end up being late in graph 1?

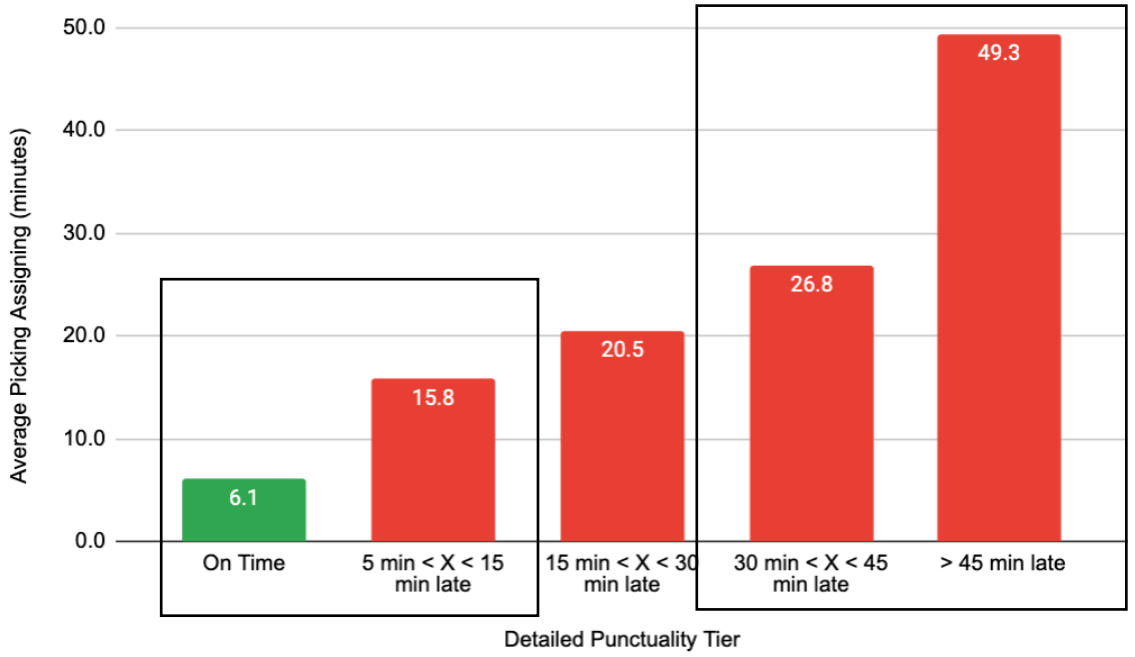
+ Late orders tend to have a farther setup distance as seen in graph 2, **around 68% further** than orders that are on-time. This might cause a shopper to hesitate accepting an order that is far, and instead wait to see if a closer order will pop up before they decide to accept the further ones

+ The higher picking speed average for late orders in graph 3 could be due to the **type of products being ordered** and the **availability and searchability** of those products. More detailed product order data would be needed to further investigate this, but this could be another factor in determining a shopper's likelihood of accepting an order more quickly

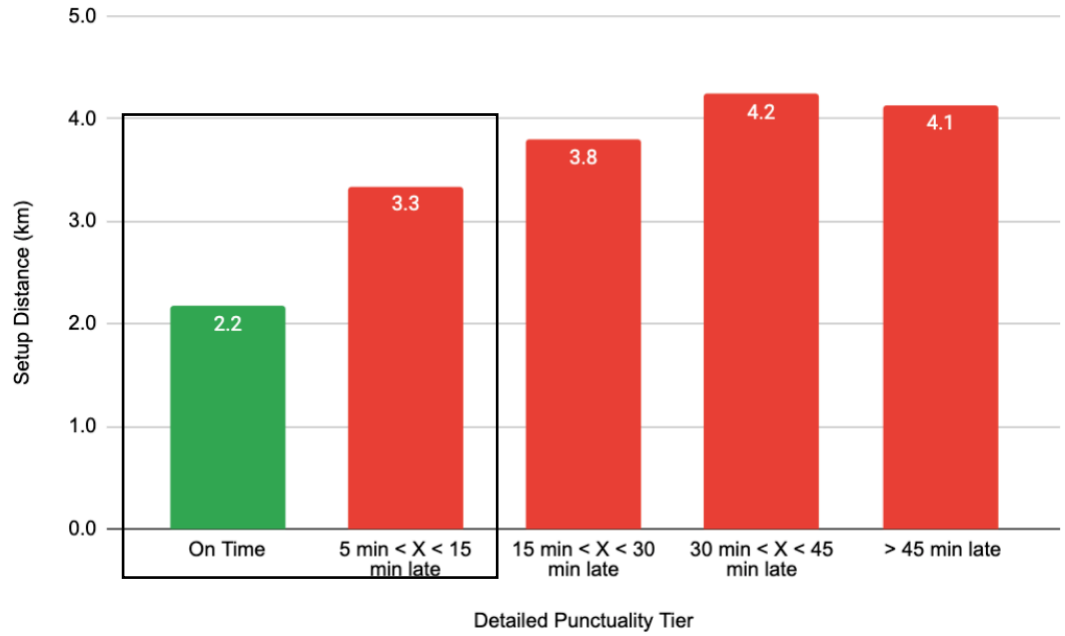
Note: I have taken early data out in this analysis since they make up less than 1% of all orders to make it easier to focus on the late and on-time orders

A further look into late orders

+ A shopper is able to take up to 15 minutes* to accept an order before that order becomes at least 5 minutes late
+ Once the 15 minute mark is passed, it only takes an extra 5 minutes of waiting before an order becomes incrementally 15 minutes late up to 45 minutes
+ If a shopper takes longer than 27 minutes to accept an order, then that order will likely be over 45 minutes late
+ If the initial picking assigning time is minimized, this could add a buffer for orders from crossing one tier to the next and improve overall punctuality



+ The cut-off setup distance of an order is 3.3 km before it enters the 5 – 15 minute late range
+ It takes an extra 0.5 km in setup distance for an order to become incrementally 15 minutes late up to 45 minutes
+ Orders that are 30 to over 45 minutes late hit a cut-off setup distance of around 4 km
+ On-time orders with a setup distance of 2 - 3 km have a 41% average picking acceptance rate while all subsequent late tiers have around 35% for distances farther than 3 km- this further indicates the preference of shorter setup distances for shoppers when accepting an order

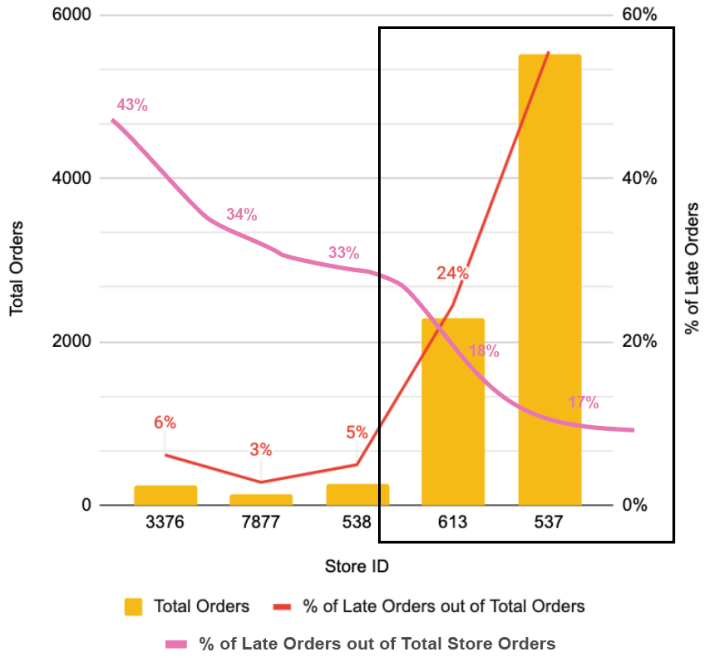


Note: I have taken early data out in this analysis since they make up less than 1% of all orders to make it easier to focus on the late and on-time orders
**Assuming that the detailed punctuality tier takes into account the 5 minute buffer*

The most popular stores have the highest on-time delivery percentage

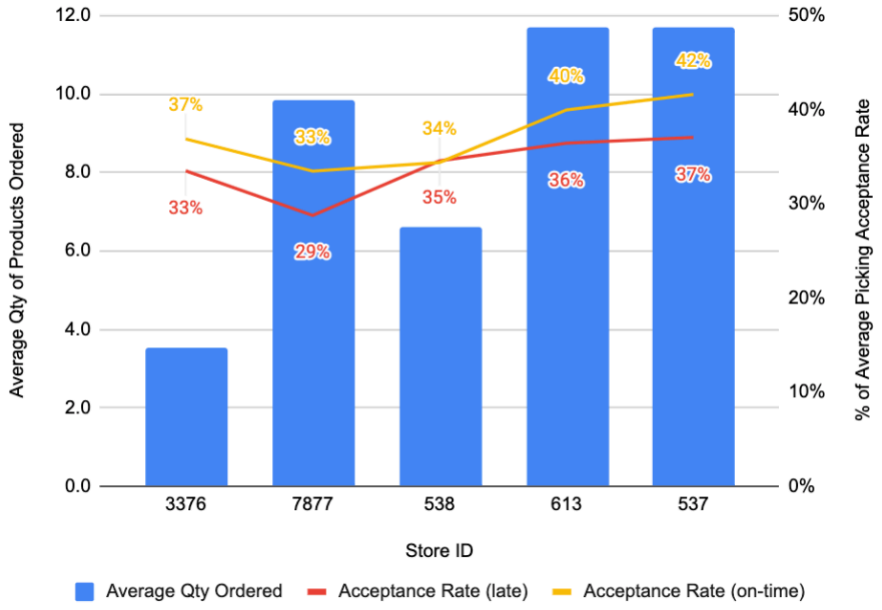
64% of all orders come from store 537, while 26% of all orders come from store 613- all other stores make up less than 2% of all orders. Though Store 537 and Store 613 both have the highest late percentage out of total orders, they have the lowest late percentage out of their respective total store orders as seen in graph 1.
Stores 538, 7877 and 3376 appear to have a much higher late percentage out of their respective total store orders, indicating poorer performance in on-time deliveries for lower order volume stores

1 *% of Late Orders & Total Orders*



2 *% of Late Orders & Average Order Size*

3 *% Average Picking Acceptance Rate & Average Order Size*



Why are stores 537 and 613 so popular with shoppers?

+ The average order size of store 537 and 613 is 68% higher than all other stores as seen in graph 2
+ In graph 3, store 537 and 613 have a much higher acceptance rate for both late and on – time orders compared to all other stores
+ The above indicate that shoppers have a preference of accepting orders from store 537 and 613, potentially due to the volume of orders and bigger order size coming from both popular stores. Additional data on both stores would be needed to determine external factors that might influence a shopper's preference such as accessibility, product offering and store size/capacity

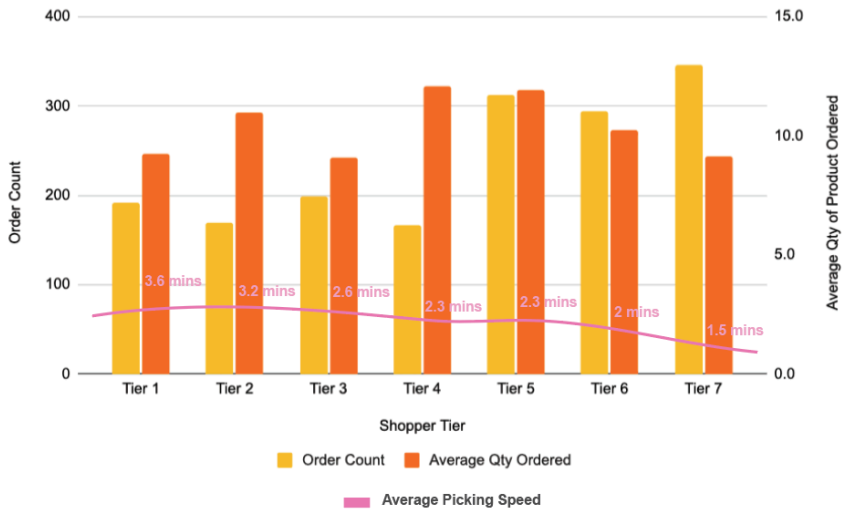
Shopper Tier Analysis & Behavior

Breakdown of Shoppers by Experience

There appears to be a more or less equal split of shoppers with different experience levels, with the highest 3 being the tier 1 (20%), tier 7 (18%) and tier 6 (17%)*

1

Order Count & Size by Shopper Tier



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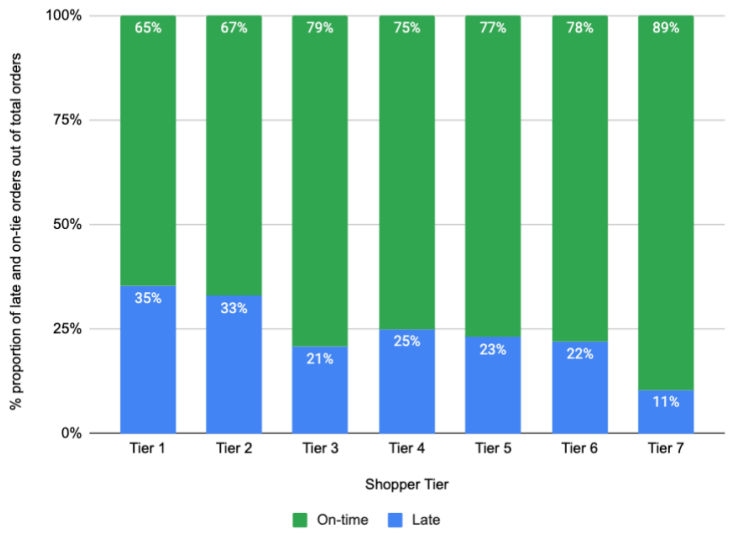
Order Punctuality by Shopper Tier



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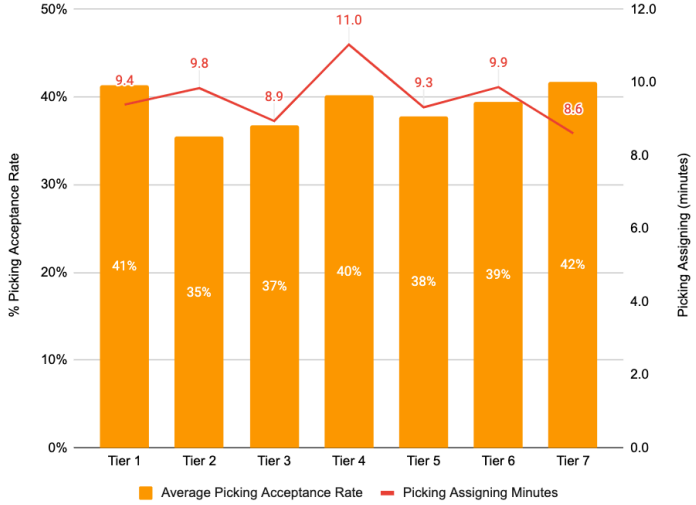
Picking Acceptance Rate & Assigning Time by Shopper Tier



+ Higher tiered shoppers tend to accept more orders with a higher quantity of products per order and become more efficient as the average picking speed gradually decreases as seen in graph 1
+ As a shopper completes more orders, they become more efficient and are able to satisfy bigger order sizes. While lower tiered shoppers complete a high number of orders, they tend to take on smaller order sizes
+ As shoppers complete more orders, the proportion of their orders that are completed on-time increases while late orders decreases. However, there is a fluctuation in the on-time improvement once a shopper starts to complete over 150 orders as seen in graph 2
+ As a shopper reaches 150 orders, their picking acceptance rate increases along with the picking assigning time. This could be due to shoppers becoming more selective about which orders they would like to fulfill as they now have more knowledge & experience about which orders would work better for them. More data on pricing and incentives could confirm this behavior

Tier Legend/ % of All Shoppers

[0.0,25.0)	*Tier 1*	*20%*
[25.0,50.0)	*Tier 2*	*10%*
[50.0,100.0)	*Tier 3*	*12%*
[100.0,150.0)	*Tier 4*	*9%*
[150.0,250.0)	*Tier 5*	*14%*
[250.0,500.0)	*Tier 6*	*17%*
[500.0,inf)	*Tier 7*	*18%*

Summary & Recommendation

Based on the analysis performed, we can summarize the findings as follows:

- The most important variables affecting on-time delivery appear to be picking assigning time, distance & picking speed
- Late orders tend to have:
    - Higher picking assigning time average
    - Farther setup distance
    - Higher picking speed average
- High initial picking assigning time is driving up overall punctuality
- The most popular 2 stores have the highest on-time delivery percentage while low order volume stores have an overall lower on-time delivery percentage
- As shoppers complete more orders, their productivity increases through a decrease in average picking speed and percentage of late deliveries

There are several strategies that can be implemented in order to improve the on-time delivery rate:

1. Incentivize shoppers to accept an order more quickly to reduce initial picking assigning time
    a. Offer an incentive for shoppers to accept orders that are farther in distance- e.g. increase in pay incentive or extra points based on x amount of orders accepted for stores with a distance farther than 3 km

2. Examine current training provided to new shoppers/ lower tier shoppers in order to boost productivity
    a. Provide extra guidance on how to maximize each shopping trip based on strategies used by more experienced shoppers

3. Closely monitor shopper performance metrics as they reach a different completed pickings tier in order to prevent shoppers from selectively choosing certain orders only
    a. Add extra/new incentives for completing more orders once a a shopper hits a new completed pickings tier to maintain a consistently low picking acceptance rate