

Problem Statement:

Decreased extension of annual subscriptions by few important users of a supply chain company. The reason for the same is the bad service experience that the users faced, this includes, delayed delivery and missing items in their orders. This issue needs to be resolved before the company's expansion to more cities.

Understanding the data:

Customers table - We have about 40 unique users in the dataset. The data consists of the customer's ID, Name and City.

Products table - We have about 20 different products that the customers can purchase from us.

Orders table - We have a dataset of about **60,000 orders** that were placed from March to August 2022 by the users. We see here that the orderIDs are repeating. Upon analysing we found that each unique item in an order has a separate row. Each of these rows will have an orderID, productID, customerID, productQty, orderPlacementDate, orderExpectedDelivery, orderActualDelivery, orderActualQty.

Cleaning:

The data was cleaned in Google Sheets before importing into **MySQL Workbench**. The duplicate rows were removed from it and no missing values were found in it. So, the next step was to import the data into the database management system.

Analysis & Hypothesis:

- I will be analysing if there is a particular city where we see most delays or most missing order cases. This will be analysed on order line level..
- Second, I will analyse the data to find any trends between the product categories ordered and the delays or missing items cases.
- I will follow the same steps for each customer and try to deduce patterns on the same from the data.
- For finding insights and successfully sharing them with the stakeholders, I will create a Power BI dashboard that would give us a clear understanding of the business on the various levels we discussed above.
- The five metrics that we will be looking at in the dashboards are:
 - On Time Delivery(OT) - This will measure if all the items in an order were delivered on time.
 - In Full Delivery(IF) - This will measure if all the items in an order were delivered in full.
 - On Time In Full Delivery(OTIF) - This will measure if all the items in an order were delivered on time and in full.
 - Line Fill Rate(LIFR) - A metric for the supply planning team to understand how many lines they shipped out of the total lines ordered.
 - Volume fill rate(VoFR) - This metric will be useful for the supply planning team to understand the total quantity they are able to ship for a customer per order or for a given period of time.

Dashboard Insights:

- A total of **57,200** orders were placed during the date range, which exceeded our target of **50,000** by **20%**.
Out of these only **37,700** were delivered to users in full, which falls short on our target of **14%**.
Only **40,600** were delivered to users in time, which falls short on our target of **47,000** by **14%**.
- The highest numbers of orders were placed in the dairy category, higher than the orders in the other two categories by **75%**.
- We also have a view of the percentage distribution of the orders placed by each customer. Using this we can prioritise catering to our high affinitive users.
- The above metrics can be seen in the first page of our report, giving the absolute values of three of our key metrics.
- **71%** of the order items were on time, below the target by **24%**.
66% of the order items were in full, below the target by **29%**.
48% of the order items were on time and in full, below the target by **42%**.
- Here, we can see that compared to the other cities, Vadodara has the least percentage of order items being delivered on time and in full, lower than Surat by **4%**.
- Three stores out of the total show very low OT%, standing at around **29%** while the other stores are above **70%**.
Five stores in particular show a below **45%** IF% while all the others are above **52%**.
- No week on week trend can be seen in our key metrics.
- Next, we have the customer wise LIFR% values and about 6 customers have very low values.
- There is no visible trend between the city and the number of additional days taken to deliver the orders.
Similarly product categories also show similar trends among them.

Additional Insights:

- For the IF% and OT% metrics on city level, the difference of the percentages among the cities is not too big. However, to understand if this difference is statistically significant, I performed a **Bootstrap Simulation**. The confidence interval that the simulation gave back included 0, establishing that the difference in the metric between the two cities is **not significant**.
- The product with productID : '25891301', name : 'AM Ghee 250' has the least on time deliveries and the least deliveries in full. The difference from the products with the best delivery stats is 3%. It isn't possible to determine its statistical significance as we don't have enough metric points to do so.

Next Steps:

- We saw that the IF% is lower than OT%, so we will tackle that first. On the city and category level the metric is similar, however, for certain stores the metric is significantly lower than the other.
- Fix Underperforming Stores Immediately. Three stores have OT% as low as 29%, and five stores have IF% below 45%. Investigate local operational issues like staffing, warehouse stockouts and transportation.
- For these stores we can conduct an on site investigation on the logistic vehicle, the delivery agents and the delivery route. It is possible that the certain onsite mishaps on the route to these stores are causing this.
- Now, the five stores with a very significant decrease in the OT% indicate a route specific problem with the order delivery. Also, it is probable that the items are mostly low in stock, thus further increasing the delivery time.
- We will prioritize service recovery for High-Affinity Users by proactively reaching out to these customers with poor OTIF% and offering service recovery.
- Based on the above points we might need to alter our shipping provider.
- Due to the consistently low OTIF% of Vadodara, we suggest using customer feedback surveys in Vadodara to explore qualitative issues and deploy micro-fulfillment hubs or last-mile partners to improve speed and reliability.
- Once the above are fixed, we would like to shift focus on our high affinity users and continue tracking and further prioritizing improvements on their metrics.
- We have further found that dairy products are our main source of revenue making up to 75% more orders than other categories so improvements on their packaging, stocking, cold chain logistics and delivery routing should be made.
- Improve Fulfillment for Key Products. Product 'AM Ghee 250' has the lowest OT and IF rates. Check for persistent stock outs or supply chain bottlenecks for this SKU.
- We can pilot store-level SLAs and performance-based incentives. Redistribute demand temporarily from low-performing stores to nearby high-performing ones.