

Business Case

1. What is the average delivery time for all orders?

The average delivery time for all orders is 12 days, 3 hours, and 7 minutes. This was calculated by creating a 'delivery_time' column, which contains the difference between the date the package was sent to the customer and the date the order was approved. The mean function from numpy was then applied to this column to determine the average delivery time.

2. Calculate the 75th and 90th percentiles of the delivery time and interpret the results. Do you think it's relevant to include percentiles along with the average in this analysis? Why or why not?

Yes, I believe it is relevant to include percentiles along with the average, as the average provides a central measure, while percentiles offer a more detailed and comprehensive view of delivery times and help identify outliers that may affect customer experience. In this analysis, I calculated the 75th and 90th percentiles of delivery time using Python's quantile function. This function sorts all delivery times and then identifies the values that divide the sample into specific percentiles. As a result, it was observed that 75% of the orders are delivered within 15 days and 3 hours, and 90% are delivered within 22 days and 13 hours.

3. Propose at least one indicator to measure delivery performance of the orders, given the promise made to the customer.

I calculated the on-time delivery rate, which is the percentage of orders delivered on time out of the total number of orders delivered. To do this, I first determined the total number of orders delivered. Then, I identified those orders that were delivered within or before the promised delivery date. I divided the number of orders delivered on time by the total number of orders delivered and multiplied the result by 100 to express it as a percentage.

This indicator provides a measure of how well delivery promises made to customers are being fulfilled. The percentage I obtained is 91.89%, indicating a good performance in delivering orders and a high reliability in meeting promised delivery dates to customers, which contributes to a positive customer experience.

4. Based on the previous point, which are the three states with the best delivery performance?

First, I calculated the delivery promise fulfillment rate for each state. Then, through Python queries, I sorted the states according to their rates in descending order and selected the

top three states with the best performance. In this analysis, I found that the top three states with the best delivery performance are Rondônia, Acre, and Amazonas, with rates of 97.1%, 96.2%, and 95.8% respectively. This indicates that these states have a high proportion of orders delivered on time compared to other states.

By focusing on delivery performance at the state level, we can identify a significant strength in on-time delivery in the northern region of the country.

5. Do you identify any geographic patterns in delivery delays? Are these patterns consistent over time?

To identify the states with the highest delivery delays, I filtered the delivered orders and calculated the number of days by which the orders were delivered before the promised date by subtracting the promised date from the actual delivery date. Then, I grouped the data by the customer's state and calculated the median delay for each state, opting for the median instead of the mean to avoid the influence of outliers. I visualized the median delays per state on a bar chart, revealing significant geographic patterns in delivery delays.

The states with the highest delays were Maranhão and Alagoas. Time series analysis indicated that these patterns were relatively consistent, with certain specific periods showing poorer performance. In particular, Alagoas experienced the highest delay in the third quarter of 2017, while Maranhão had the highest delay in the fourth quarter of 2017. Additionally, there was a general deterioration in delivery times over the years, with earlier records from the last quarter of 2016 showing lower delays compared to the final quarters of 2018.

These findings suggest that both structural issues and specific temporal factors, such as adverse weather conditions and local events, impact delivery times in these areas. Therefore, it is crucial to improve logistical infrastructure and address socio-economic factors affecting transportation efficiency to mitigate these delays and enhance the customer experience.

6. What initiatives do you propose to improve delivery times and performance? Rank these initiatives according to the priority you would give them for implementation and justify.

1. Implementing advanced inventory management systems to enable more precise and efficient control of products in warehouses can significantly reduce waiting times between order receipt and shipment to customers. This ensures that products are readily available for fulfillment, enhancing overall delivery speed and customer satisfaction.
2. Establishing additional warehouses in strategic locations across Latin America can help minimize transit times and shipping costs. This may involve investing in local logistical infrastructure or partnering with reliable regional logistics operators to improve the capacity for fast and cost-effective delivery throughout the region.

3. Adopting emerging technologies such as artificial intelligence, machine learning, and process automation can optimize logistical operations, from inventory management to delivery route planning. These solutions can identify demand patterns, predict inventory needs, and streamline delivery efficiency, leading to a substantial improvement in delivery times and customer satisfaction.

By prioritizing these initiatives, the company can strengthen its logistical infrastructure and enhance its ability to meet customer delivery expectations quickly and reliably. This, in turn, can drive growth and competitiveness in the e-commerce market in Latin America.