**Problem:**

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| Given a groceries vendor who is listed in Instant Delivery Company X platform, we would like you to help to define **multiple pricing scheme** (delivery fee) for that vendor with information as below: |
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| - Commission rate for the vendor: 25% |
| - Delivery fee should range from: 0.99 - 4.99 |
| - Average food value per order: 40$ |
| - Target revenue per order: $12 |
| Revenue per order = Commission rate \* Average basket value + Delivery fee |
|  |
| **Question:** |
| 1. Please design 3 pricing schemes (include the principle of the design with numbers to support) that can meet the target revenue per order. Please list down all the assumptions that you have made and why you have made them (if applicable) |
|  |
| 2. Since now that you have identified 3 different pricing schemes, what would be the KPIs that you will use to evaluate the most optimal pricing scheme? Please indicate why you have chosen these KPIs as well. |
|  |
| 3. If you have to conduct A/B testing to define the best pricing scheme, how will you conduct this A/B testing? |

**Question 1:**

In all strategies, I assume that:

1- Pricing scheme is applied to only one country as different countries will have different currencies and economical situations

2- Average basket value is distributed with exponential distribution with mean = 40. I picket that distribution as it can be described only mean value, small values are more likely to occur compared to large ones like real-life orders. Also, it is easy to compute CDF (cumulative distribution function) between two values compared to other complex distributions.

3- No delivery costs exceed the delivery fee. If it does, customers cannot shop from that grocery.

4- There will be always enough couriers to meet demand.

5- In order not to lose the customers who have not willing to buy more to reach the minimum basket amount yet are okay with paying the difference between the small basket size and their order there can be a small order fee. For example, a person who only wants to buy something that costs 6$ needs to pay a 9$ difference between the minimum basket amount and his order.

6- Instant Delivery Company X is both focused on profit and growth. To make new customers try the app and increase engagement it would be helpful to have a small basket amount, but still, a small order fee will decrease money loss. However, it would be dissuasive for most of the small orders and probably new users.

7- 1% of purchasers are willing to pay a small order fee. Otherwise, they don’t order.

**1- Fixed delivery fee**

The first price scheme would be a pricing strategy with a fixed delivery fee. From the formula,

Revenue per order = Commission rate \* Average basket value + Delivery fee

And knowing that the average food value per order is 40$ and the commission rate is 25%, we can say that the average revenue generated by the basket is 40\*0.25 = 10$

To reach target revenue by adding a 2$ delivery fee. However, it is meaningful to put a minimum basket size of 15 $ to avoid misuse of very low or no minimum basket value.

Also, it would avoid very small profits that will decrease the average revenue per order. In other words, our target will be more likely to be achieved.

This pricing scheme is very basic but a good reference point to check other pricing strategies’ performance.

**2- Dynamic delivery fee due to minimum basket size**

Delivery fees can be varied more but I will take those main 5 prices (4.99, 3.99, 2.99, 1.99, 0.99) for simplicity.

Briefly, in my pricing model, I decided on a minimum basket range and assigned a delivery fee to them. Then calculated expected revenue per order by using probabilities for that basket range. The average basket value is calculated as (max + min)/2 for simplicity.

For exponential distribution

p(X < x) = 1- e-λx

i = number of ranges

i ∈ {1,2,3,4,5,6}

ai = min of range i

bi= max of range i

c = commission constant

di= delivery fee of range i

s = probability of a customer to order with paying small order fee



Table

Description automatically generated

3- Pricing with costs

3rd pricing scheme would be taking the second one step further by considering the delivery cost. In this pricing method, we also need to consider the delivery cost.

Delivery cost mostly depends on distance and rush hours. The longer distance gets, the longer courier will be busy, and more gasoline will be spent. Also, there can be different delivery fee policies for different times of the day. For example in rush hours, there will be a smaller courier/ order ratio. In other words, a courier is a scarce resource in rush hours, so the delivery should be more expensive, to have a maximum profit per order.

In that case, we need to focus on profit per order which is :

Profit per order = Commission rate \* Average basket value + Delivery fee – Delivery Cost

We need to remake minimum basket order amount vs delivery fee arrangements, by considering delivery profit which is the difference between delivery fee and delivery cost.

To give an example: In that model closer groceries might have a lower minimum basket amount with the same delivery fee compared to distant ones as higher delivery profit will recover the money lost from the minimum basket amount.

Or if a closer grocery has a higher minimum basket amount compared to the distant one, then the delivery fee will be lower for the closer one.

In addition to them, the same grocery might have different delivery costs during the day. For example in rush hours like lunchtime, the delivery cost can be higher compared to the afternoon.

**Question 2:**

I would track those metrics on a weekly, biweekly, and monthly basis as grocery shopping can be made on those frequencies.

Engagement and Growth KPIs:

New Buyer

Active Buyer

Churn

These metrics will help to understand if;

I can attract new users to my app and make them purchase (New Buyer)

I can make users stay and repurchase (Active Buyer)

I make users leave (Churn)

with my pricing policy.

Monetization KPIs:

Average profit per paying user

Order per Active Buyer

Average cost per paying user

First Time Purchase per Active Buyer

These metrics will help to understand if;

I can increase profit with new strategy (Average profit per paying user)

I can make my active users purchase repetitively (Order per Active Buyer)

I can decrease cost (Average cost per paying user)

And in which proportion do my orders come from my growth strategy (First Time Purchase per Active Buyer)

Quality KPIs:

Avg order preparation time

Avg order delivery time

Avg duration of busy time of courier

These metrics can be tracked to understand if my pricing policy affects the quality of delivery.

**Question 3:**

I would run 2 A/B tests

1. 1st pricing scheme (A) vs 2nd pricing scheme (B)

2. 1st pricing scheme (A) vs 3rd pricing scheme (B)

Because 1st pricing scheme is a good candidate to be control group (A). Variation in strategy is low and it is quite easy to compare with group B.

Then data needs to be separated. For each test group number of users should be similar so I would split user data into 3 randomly.

After that, it is better to check KPIs between groups if they were similar before. For example, profit per order can be higher in group A even though we pick users randomly.

In that case, there can be identical groups can be created by machine learning and 3 user group with the same size and similar user profiles can be decided manually.

New users, they can be assigned to groups randomly.

Then I would track all the KPIs Daily, for the 3 pricing scheme listed in 2nd question and evaluate their performance at a given time.

In that case, my assumption to conduct the test is 2 to 3 months to observe people's purchasing behavior and how it is shaped.