

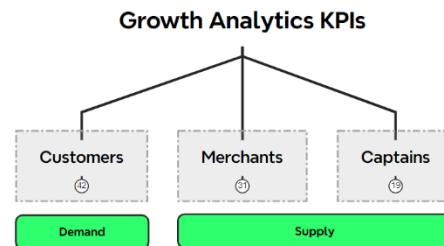
# Careem - Analytics Case Study

To effectively manage the complexity and risk involved in running a business that encompasses three distinct marketplaces, it is crucial to maintain an end-to-end view. This approach necessitates the tracking and monitoring of a diverse array of key performance indicators (KPIs) from various teams within the organization.

In the following discussion, let's deep dive into understanding the different KPIs for each marketplace and try to drill down the priorities of those KPIs to make it easier to comprehend and analyse.

## Key Performance Indicator Identification

The diagram on the right illustrates the distinction between the three marketplaces: Customer Marketplace, Merchant Marketplace, and Captain Marketplace. The Customer Marketplace is primarily responsible for increasing the demand for the application, while the Merchant and Captain Marketplaces are responsible for maintaining the supply side of the business. This distinction is crucial as it enables the identification of the appropriate KPIs for each marketplace and the development of tailored strategies for each.



**Balancing demand and supply are essential for the smooth operation of the business and for providing an exceptional experience to our customers.**

To identify the KPIs, it is essential to start with a metric that the business strives to achieve, which aligns with the role of a Growth Analyst. This key metric, or North Star KPI, should be the **Revenue amount**. All other KPIs are designed to support and improve this primary KPI. For example, while each team may have different KPIs to monitor—such as the logistics team aiming to reduce average delivery time—all efforts ultimately contribute to enhancing the customer experience (CX) and generating more revenue from future transactions.

## Identification of P1 KPIs:

To determine the P1 KPIs, it is vital to further break down the Marketplaces to extract the valuable components of each. Beginning with the Customer Marketplace, it involves three core categories: Marketing, Customer Behaviour & App Journey. Each of these marketplaces have their own set of P1 & P2 KPIs that are essential to monitor to capture the demand. Note: P2 KPIs are derived from P1 KPIs to break them down and understand them more clearly.

Customer Marketplace			
Priority	Marketing	App Experience	Customer Performance
P1	Ad Spend (AS)	Conversion Rate (CR)	Active User (AU)
	Promotional Offer (PO)	Number of Sessions (NS)	Total Orders (TO)
	Social Media/Email Engagement (SMEE)		Customer Lifetime Value (CLV)
P2	Referral Sessions/Traffic (RT)	Click-Through Rate (CTR)	Customer Retention Rate (CRR)
	Emails Opened (EO)	Bounce Rate (BR)	Churn Rate (CR)
	App Installation Rate (AIR)	Abandonment Rate (AR)	Total User Base (TUB)
	Total Impressions (TI)	App Crash Report (ACR)	Repeat Customer Rate (RCR)
	Customer Acquisition Cost (CAC)	App Event Rate (AER)	Average Order Value (AOV)
			Monthly Recurring Rate (MCR)
			Customer Satisfaction Rate (CSS)

### Customer Marketplace:

The customer marketplace primarily consists of three variables: Marketing, Consumer Behaviour, and App Journey. Marketing relates to activities conducted to engage customers and reinforce the brand to continue the transactional journey with them. These activities include the amount of money spent on ads, promotional campaigns, and engagement activities on social media.

The App Experience variable includes the KPIs that highlight the app's performance and track the patterns and activities conducted on it. The P1 KPIs include the conversion rate and number of sessions. Any change in these KPIs can be identified by the P2 KPIs, which include CTR, BR, abandonment rate, or app crash reports such as error rates, load performance, or glitches.

Lastly, Consumer Performance pertains to key figures and values generated through the value exchange with the company. These include the number of active/inactive users, retention rate, and user acquisitions, which can be used to quantify customer engagement.

### Merchant Marketplace:

The Merchant Marketplace captures key performance indicators (KPIs) that enable the business to accurately track the performance and health of the merchants, as well as the app journey.

Merchant Marketplace				
Priority	Marketing	Commercial	App Performance	Kitchen Performance
P1	Ad Spend (AS)	Total Revenue (TR)	Conversion Rate (MCR)	Average Preparation Time (APT)
	Discount Coupons (DC)	Total Active Merchant (TAM)	Number of Sessions (MNS)	Average Rating (AR)
		Order Volume (OV)		Average Cancellation Rate (ACR)
P2	Total Impressions/Clicks	Repeat Order Rate (ROR)	Click-Through Rate (CTR)	Average Acceptance Time (AAT)
	Return on Investment (ROI)	Total Discount & Promotion (TDP)	Bounce Rate (BR)	Average Acceptance Rate (AAR)
		Marketing Spend (MS)	UI Interaction (UII)	Average Preparation Time (APT)
		Merchant Base (MB)	Merchant Health Index (MHI)	Average Completion Rate (ACR)
		Onboarding Time (OT)	Merchant Cuisine Type (MC)	Complaint Resolution Rate (CRR)
			Menu Engineering (ME)	Rating: Food Quality Rate (RFR)
			App Visibility (AV)	Rating: Wrong/Missing Item (RWI)

Starting with the Marketing variable, it encompasses the activities that merchants undertake to increase their visibility on the application. These activities include CPC (cost-per-click) campaigns and banner marketing. The effectiveness of these marketing efforts can be measured through KPIs such as ad spend and discount coupons, which generally have a positive impact on revenue. To determine the impact of these KPIs, secondary metrics (P2) play a critical role, including total impressions/clicks earned and ROI

App Performance is the second layer of the Merchant Marketplace. This is similar to the App Experience in the Customer Marketplace; however, it is important to look from the merchant's perspective and determine key KPIs like conversion rate and number of sessions.

Lastly, the Kitchen Performance layer involves KPIs related to merchant performance in food preparation and order acceptance. This also includes important variables like Complaint Resolution Rate.

## Captains Marketplace:

The Captains Marketplace is divided into two parts: commercial and fleet/captain performance.

P1 Commercial KPIs include delivered orders and active captains, both of which have a positive impact on revenue.

Fleet performance pertains to the captains' performance on the ground. These KPIs explain the overall delivery patterns of the captains and reflect the values that Careem is known for, particularly its reputation for the best delivery service.

Captains Marketplace		
Priority	Commercial	Fleet Performance
P1	Delivered Orders (DO)	Average Delivery Time (ADT)
	Total Revenue (TR)	Captain Utilization Rate (CUR)
	Active Captains	Average Rating (AR)
P2	Total Captains (TC)	Average Time to Merchant (ATM)
	Onboarding Time (OT)	Average Wait Time at Merchant (AWTM)
	Captain Health Index (CAPI)	Average Time to Customer (ATC)
		Average Wait Time at Customer (AWTC)
		Rating: Spillage (RS)
		Rating: Late Delivery (RLD)
		Total Working Hours

## The Equation:

The idea behind segmenting these KPIs into priority is to understand what to see at the time of need to take prompt action immediately. As I have mentioned earlier, the P0 metric is the revenue and every other P1 metric functions to facilitate the revenue.

$$\text{Revenue} = \beta_0 + \alpha(\text{CAS}) + \beta(\text{PO}) + \gamma(\text{SMEE}) + \delta(\text{CR}) + \epsilon(\text{NS}) + \zeta(\text{AU}) + \eta(\text{TO}) + \theta(\text{CLV}) + \iota(\text{MAS}) + \kappa(\text{DC}) + \lambda(\text{TAM}) + \mu(\text{OV}) + \nu(\text{MCR}) + \xi(\text{MNS}) - \sigma(\text{APT}) + \pi(\text{AR}) - \rho(\text{ACR}) + \sigma(\text{DO}) + \tau(\text{TR}) + v(\text{AC}) - \phi(\text{ADT}) + \chi(\text{CUR}) + \epsilon$$

Here, the coefficients represent the following influences:

- **Positive Coefficients:** Indicate a positive impact on the Revenue.
  - $\alpha, \beta, \gamma, \delta, \epsilon, \zeta, \eta, \theta, \iota, \kappa, \lambda, \mu, \nu, \xi, \pi, \sigma, \tau, \chi$
  - Factors like Ad Spend (CAS, MAS), Promotional Offers (PO), Social Media/Email Engagement (SMEE), Conversion Rate (CR, MCR), Number of Sessions (NS, MNS), Active Users (AU), Total Orders (TO), Customer Lifetime Value (CLV), Discount Coupons (DC), Total Active Merchants (TAM), Order Volume (OV), Delivered Orders (DO), Total Revenue (TR), Active Captains (AC), Captain Utilization Rate (CUR), and Average Rating (AR).
- **Negative Coefficients:** Indicate a negative impact on the Revenue.
  - $\sigma, \phi, \rho$
  - Factors like Average Preparation Time (APT), Average Cancellation Rate (ACR), and Average Delivery Time (ADT).
- $\epsilon$  is the error term.
- $\beta_0$  is the intercept.

This assist in determining the possible reasons for the change in the revenue, either increase or decrease. We will drill down on some examples in the scenarios section below.

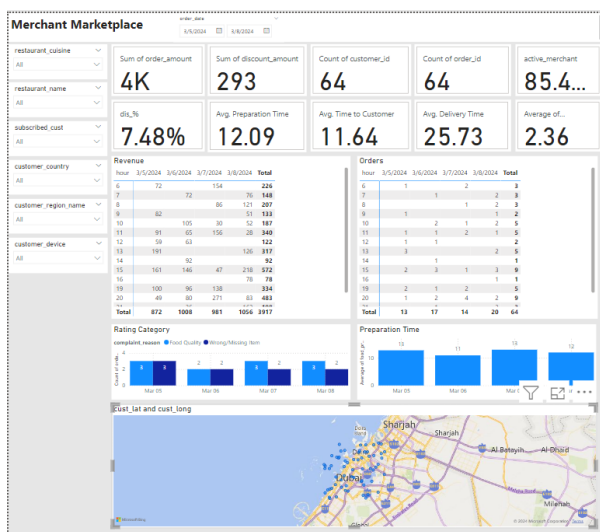
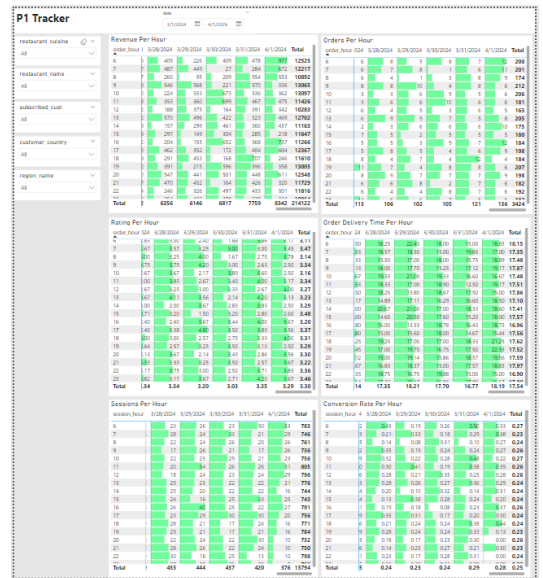
## Dashboard & Report

### P1 Tracker Dashboard:

This dashboard consists of P1 KPIs that were discussed earlier.

Some of the example KPIs mentioned are:

1. Revenue (Dependent Variable – P0)
2. Number of Orders
3. Average Rating
4. Average Order Delivery Time
5. Number of Sessions
6. Conversion Rate



### Merchant Marketplace:

This dashboard provides clear insights to Commercial and Kitchen performance. More information like Marketing spend and app performance can be added in it for future versions.

Some of the KPIs provided are:

1. Revenue
2. Order
3. Rating
4. Preparation time

More KPIs can be included like MHI, Ad spend or App events etc.

### Customer Marketplace:

The dashboard features two set of customer journeys, App Performance & Customer Performance. The dashboard provides insights to the followings:

1. Number of sessions
2. CTR
3. Crash Report

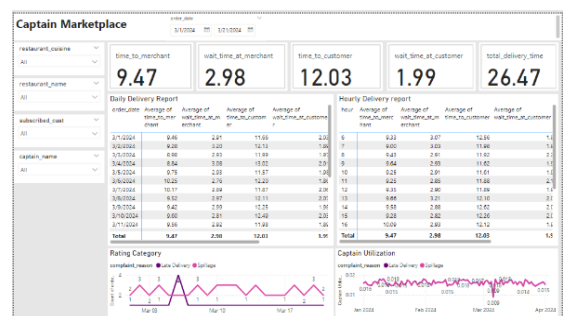
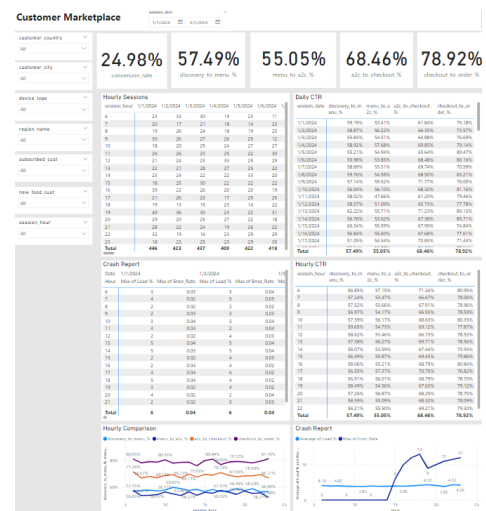
Few features missing in version 1:

1. App events (Impressions & Clicks)
2. Customer Retention
3. Marketing data

### Captain Marketplace:

The dashboard provides insights to captains and operations:

1. Captain Utilization
2. Captain Rating
3. Delivery Time and its breakdown
4. Number of orders



## Scenario 1

### Problem Statement:

On the evening of the 1<sup>st</sup> April, it appeared as if the revenue has dropped significantly after 17<sup>th</sup> hour of the day. This dropped stayed constant until 11PM and a significant number of sales were lost during these hours.

As we have discussed earlier, the impact on the revenue is an output variable, hence, it became inevitable to start scratching the P1 variables to identify the likelihood of this problem.

### Exploration Phase:

The exploration phase consists of the following steps:

1. Drilling down the other P1 Metrics:
  - a. It appears that the order count and rating have gone down as well.
  - b. Order delivery time has not been impacted, which state that whatever orders are getting placed, are being able to deliver on time.
  - c. Number of sessions seems to have gotten impact significantly. This suggests that we need to drill down on Customer Marketplace to understand better.
2. Customer Metrics:
  - a. The daily CTR Report suggests that there has not been a major change in the overall flow of the customer journey despite the drop in the sessions. The CTR tells in the form of % hence it's not a very reliable metric. But this explains that the funnel piece is not broken.
  - b. One of the key KPIs, Crash Report has provided a significant insight into the problem. It has suggested that the Error Rate of logging in the application has spiked up. Meaning that the customers are unable to open the application.
  - c. Using different filters/dimensions on the dashboard, we found out that the New Users have been affected the most.

### Resolution of the Problem:

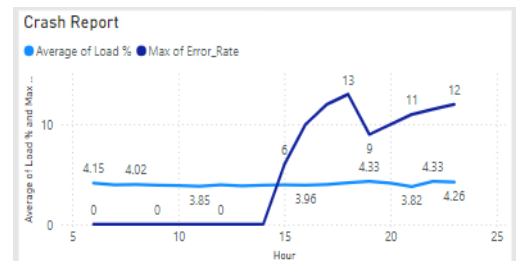
The resolution involves multiple steps to it along with a lot of cross-functional communication with multiple teams and their respective leads.

1. Engineering Team: The engineering team has to be informed about the uplift in the error rate which is resulting in significant revenue lost and affecting the customer experience.
2. Operation Team: The team saw a significant drop in the captain utilization rate (productive hours/total working hours) as there was a drop in the overall number of orders. A clear communication to the captains on floor must be given until the problem resolves.
3. Customer Experience (CX): A proper comm must be communicated to the customers who have been affected by the crash. Clearly apologizing and some form of discount has to be allocated.
4. Brand & Growth: Reset the target and send clear comms to the restaurants/merchants, apologizing for the revenue lost through Careem.

Revenue Per Hour							
hour	17/2024	3/28/2024	3/29/2024	3/30/2024	3/31/2024	4/1/2024	Total
0	380	409	420	409	478	911	2885
7	407	487	449	27	284	672	2326
8	447	260	95	209	554	553	2118
9	418	546	568	221	570	336	2659
10	190	224	333	673	336	362	2118
11	174	353	360	699	407	475	2528
12	262	188	375	164	391	342	1722
13	322	570	496	422	323	469	2602
14	159	157	299	461	300	437	1873
15	388	297	149	304	285	218	1641
16	362	204	155	652	368	737	2478
17	413	462	352	172	404	604	2407
18	489	291	453	168	707	77	2185
19	572	391	215	596	596	206	2576
20	440	547	441	501	443	111	2488
21	367	470	432	164	426	138	1997
22	434	246	326	497	433	48	1984
23	332	254	422	478	329	74	2289
Total	6962	6356	6146	6817	7759	6836	40876

Sessions Per Hour							
session_hour	4	3/28/2024	3/29/2024	3/30/2024	3/31/2024	4/1/2024	Total
0	5	23	20	23	30	33	158
7	6	28	24	33	21	29	161
8	6	22	24	26	20	26	144
9	3	17	26	21	17	26	130
10	1	22	23	29	21	23	139
11	3	20	34	26	26	31	160
12	3	18	24	23	24	29	141
13	0	25	23	22	22	21	143
14	8	25	20	22	22	16	133
15	9	24	16	25	33	25	152
16	8	26	40	25	22	27	168
17	3	23	29	30	30	20	155
18	9	28	21	17	24	16	125
19	1	25	21	17	21	16	121
20	0	22	24	22	30	10	138
21	2	28	26	22	24	10	132
22	9	30	18	25	13	10	125
23	6	27	25	29	20	8	135
Total	0	433	444	437	420	376	2560

Daily CTR				
session_date	discovery_to_menu_%	menu_to_a2c_%	a2c_to_checkout_%	checkout_to_order_%
3/27/2024	57.56%	55.98%	69.38%	77.93%
3/28/2024	54.04%	54.27%	67.55%	83.46%
3/29/2024	53.38%	56.54%	70.16%	76.12%
3/30/2024	55.15%	57.26%	67.98%	76.09%
3/31/2024	59.29%	60.64%	72.95%	80.13%
4/1/2024	60.11%	56.19%	73.41%	81.89%
Total	56.48%	56.85%	70.20%	79.20%



## Scenario 2

Order Delivery Time Per Hour

hour	3/1/2024	3/2/2024	3/3/2024	3/4/2024	3/5/2024	3/6/2024	Total
6	23.50	26.17	26.63	28.00	25.33	29.00	26.29
7	26.00	27.56	23.56	28.50	26.62	26.00	26.28
8	26.00	28.00	27.75	26.67	26.50	22.37	25.46
9	24.83	25.25	28.00	29.00	27.29	26.33	26.84
10	23.78	26.22	25.43	26.36	29.14	24.09	25.88
11	30.33	22.37	25.25	22.67	27.00	25.25	25.03
12	25.25	27.50	24.00	26.40	27.00	25.18	25.79
13	27.25	28.69	28.12	27.00	24.30	30.80	27.51
14	32.43	28.00	26.14	25.60	27.00	29.37	28.26
15	23.25	26.00	27.14	29.29	24.33	34.50	25.79
16	26.00	26.14	26.33	26.00	24.00	34.50	28.23
17	25.37	26.83	25.75	28.33	25.54	34.33	26.70
18	25.50	25.29	26.00	32.00	28.14	34.60	27.72
19	26.00	25.00	25.87	23.20	27.54	25.00	25.80
20	25.58	26.62	26.12	29.20	27.20	26.00	26.50
21	27.57	25.60	23.00	28.33	25.00	25.67	26.06
22	28.14	29.71	25.00	22.80	24.50	24.22	25.79
23	23.78	28.17	24.22	26.40	23.00	30.00	25.89
Total	26.06	26.51	25.87	26.95	26.23	27.07	26.45

## Problem Statement:

On 6<sup>th</sup> March 2024, the P1 metric order delivery time increased significantly from averaging 26.23 to 27.07. Although this change on a daily level is not massive, however, from the value standpoint and the promise to deliver within 30 minutes, it is significant to look at. Looking the overall data, it appears that the spike came around 16<sup>th</sup> hour (4pm) and remained till 18<sup>th</sup> hour.

One important thing to understand is that the business peaks during these hours which could result in an uplift of the delivery time. However, looking at the past 5 days data, it appears that this change has happened apparently because of some other reasons. Hence, a deep dive is

necessary to understand what has happened.

Note: Generally, a slight deviation in the delivery time does not affect much on the revenue as the revenue is already booked, but it might affect the future transactions of the business with the customers.

## Exploration Phase:

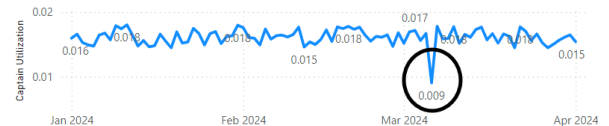
Since this metric is related to Captain Marketplace, we might want to explore that view to better understand the problem.

- Drilling down the P1 metric:
  - Delivery time is primarily built on 4 other metrics:
    - Time to merchant.
    - Wait Time at merchant.
    - Time to customer.
    - Wait Time at customer.
  - The Daily Delivery Report suggests that the time to merchant increased which resulted in the overall delay.
- Now it is known that the time to the merchant has increased, but what caused this increase needs to be verified.
  - On 6<sup>th</sup> March, the Captain Availability metric showed a significant drop in availability percentage. This likely caused an increase in the time to the merchant, as the remaining captains had to cover a larger area.
- The increased time to the merchant is clearly due to a lack of available captains. To understand the impact of this delay, it's important to examine the complaints and ratings metrics, visible on the Captain Marketplace Dashboard. Notably, the late delivery rating parameter on the right has spiked, indicating a rise in late deliveries on that day.

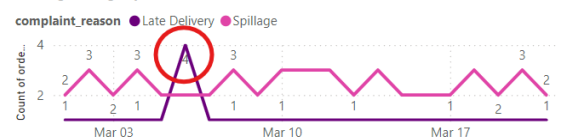
Daily Delivery Report

order_date	Average of time_to_merchant	Average of wait_time_at_merchant	Average of time_to_customer	Average of wait_time_at_customer
3/2/2024	9.28	3.20	12.13	1.89
3/3/2024	8.98	2.93	11.99	1.97
3/4/2024	8.84	3.08	13.02	2.01
3/5/2024	9.75	2.93	11.57	1.98
3/6/2024	10.25	2.76	12.20	1.86
3/7/2024	10.17	2.89	11.87	2.06
3/8/2024	9.52	2.97	12.11	2.07
3/9/2024	9.42	2.99	12.25	1.98
3/10/2024	9.60	2.81	12.49	2.03
3/11/2024	9.56	2.92	11.98	1.89
3/12/2024	9.37	3.11	11.57	2.08
3/13/2024	9.50	3.06	12.26	2.08

Captain Availability



Rating Category



## Problem Resolution:

To resolve this problem and for future performance, it is vital to interact with the other teams:

- Operation: The team needs to submit a report on what caused the captain unavailability that day and based on factors drive a systemic approach to resolve future occurrence.
- Customer Experience (CX): Needs to identify the customers affected and provide monetary or non-monetary benefit to re-gain the customers.