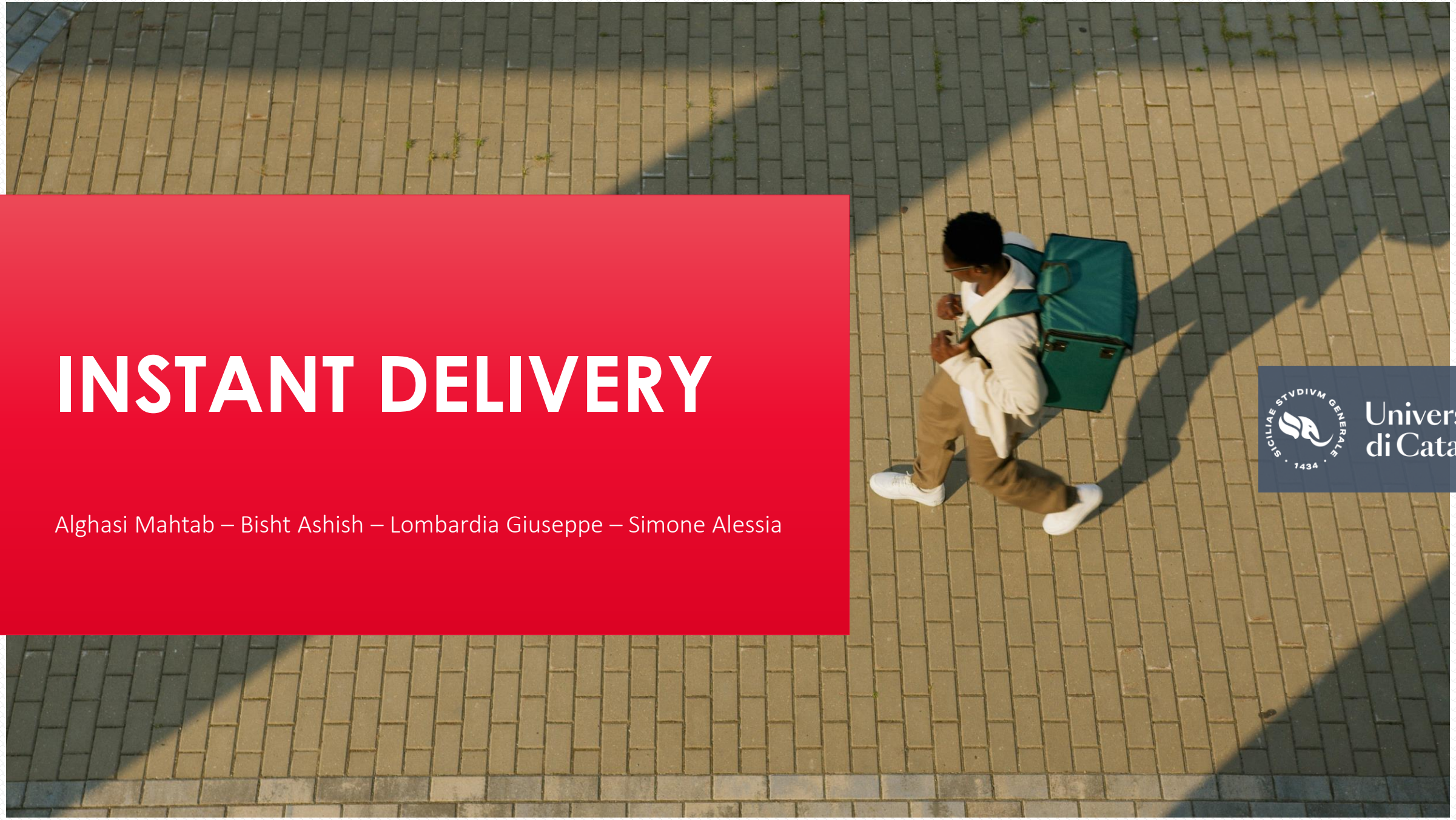

INSTANT DELIVERY

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INTRODUCTION

DEFINITIONS AND NOTATIONS

Orders

It refers to the goods which are placed by the customer online, picked up from the merchant and delivered to the customer within a given time.

Merchants

Merchant is defined as a person or company engaged in the business of selling or trading goods. A wholesaler and a retail store owner are the examples of a merchant.

Couriers

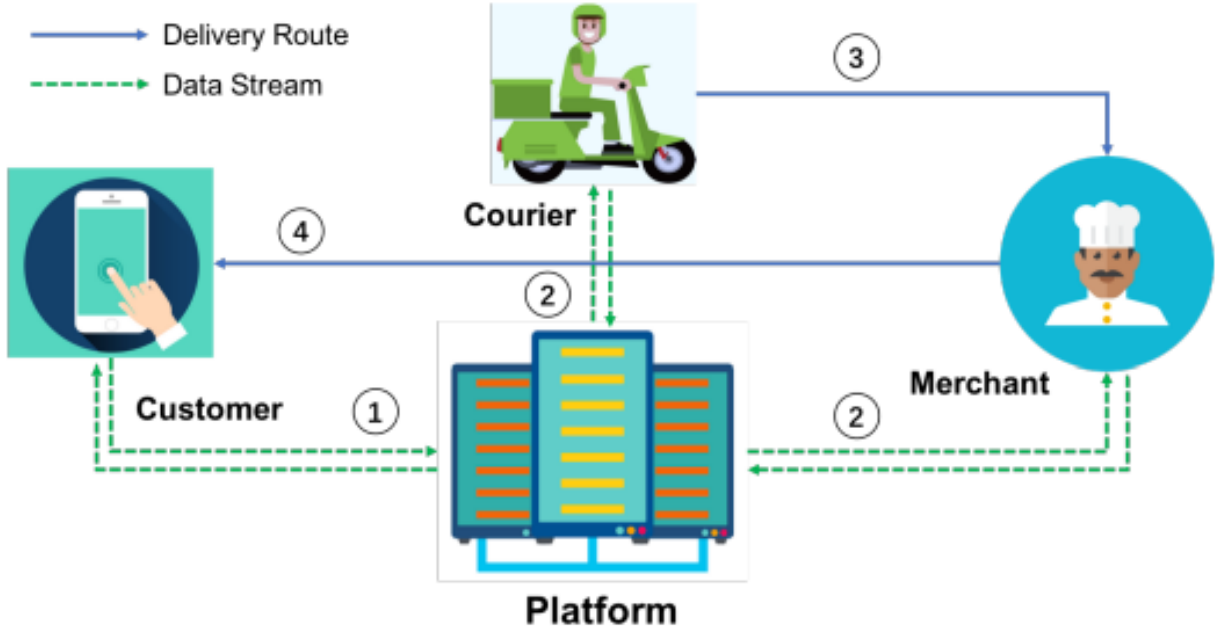
A courier is a person or company who transports packages. In Instant delivery Couriers are responsible for order delivery.

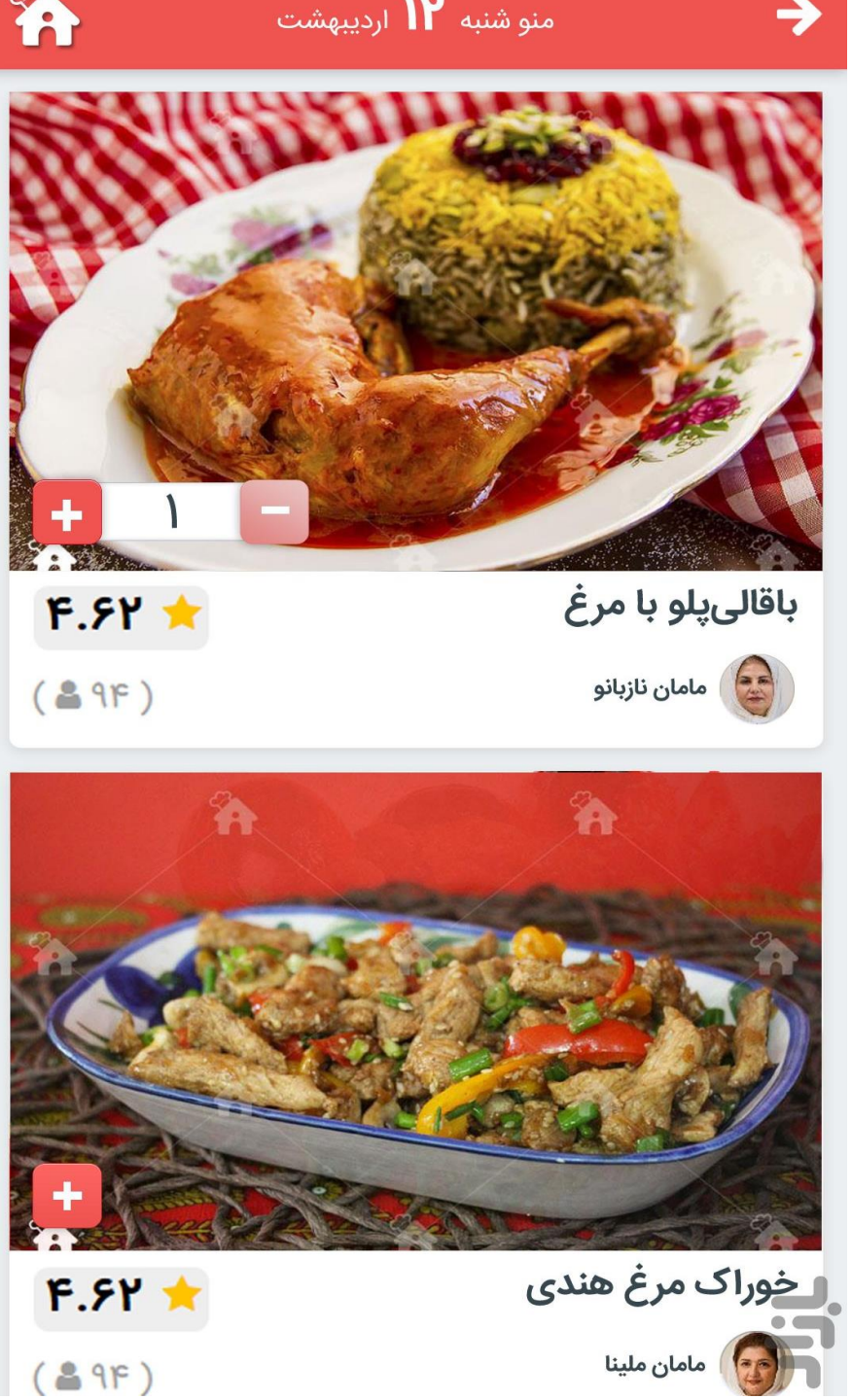
The instant delivery services are quite simple: it is a system to deliver some Orders within a short period.

INSTANT DELIVERY SCENARIO

Steps:

1. **Customers** place orders online through the platform.
2. The platform notifies the **merchants** to prepare the products and make the packages.
3. The platform assigns a **courier** to pick up the packages.
4. The courier **delivers** the packages to customers.





FUNDAMENTAL GOALS AND CHALLENGES

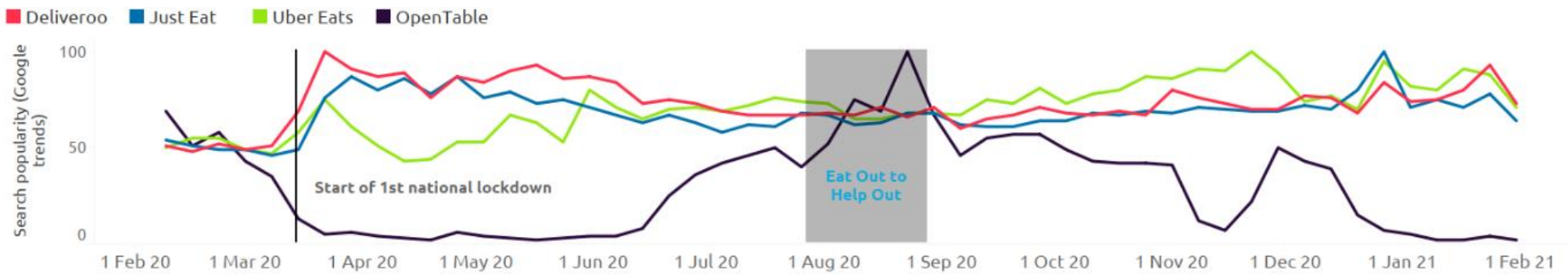
FUNDAMENTAL GOAL

- Reducing the overdue rate becomes the fundamental goal for instant delivery to ensure their business success.
- **Falling to meet these standards will result in a decline in business and reduced brand perception**
- Suppose we take the strategy that a 35min package is claimed to be delivered in 45 minutes. In this case, we will have no overdue risk but may lose the customer as he may go to other platforms with shorter ToD.

CHALLENGES

- Order dispatch: several nearby orders can be assigned to one courier who can finish all the orders by one trip. Order dispatch is conducted by region. Usually, dozens of couriers are responsible for the delivery of all orders in a region, which is about a few square kilometers.
- Accurate prediction of DT: an end-to-end measurement from time that customers place orders to that of final delivery

INSTANT DELIVERY VS COVID PANDEMIC



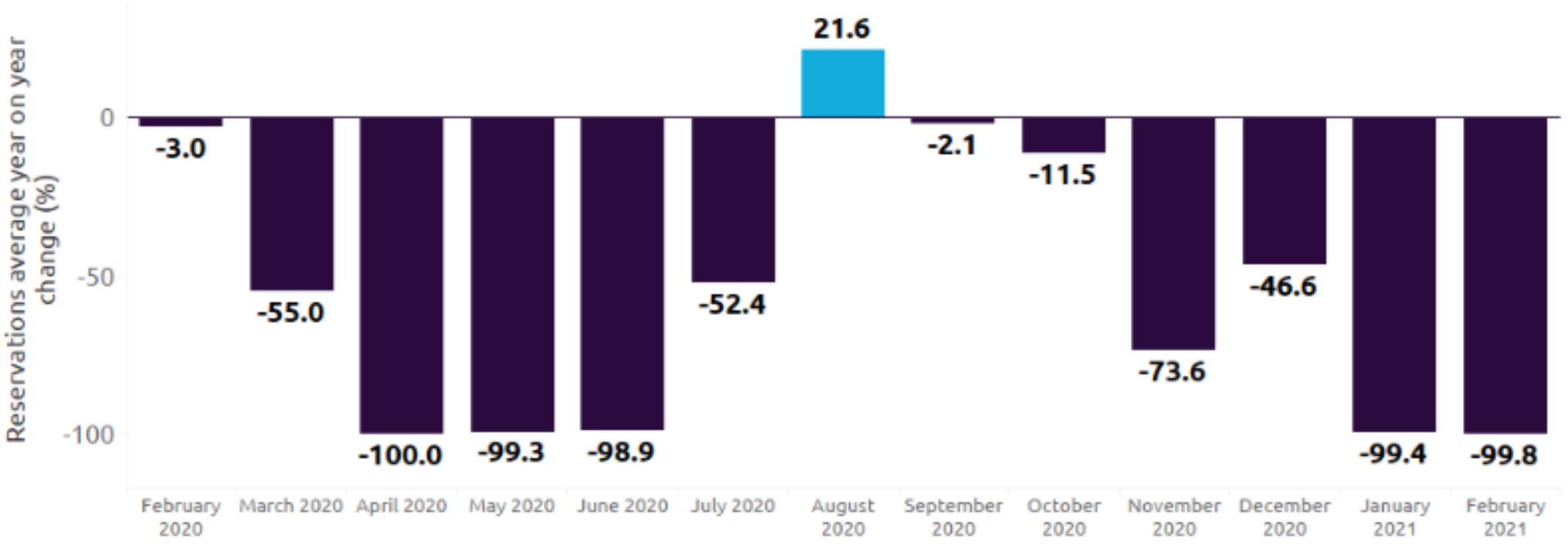
THE IMPACT OF COVID PANDEMIC ON INSTANT DELIVERY

Purchasing behavior has changed massively as a result of Covid-19.

With more and more people ordering their products online, retailers found themselves struggling to fulfil orders.

One of the markets that suffered the most during this period was the food market: with restaurants closing, the wait for online food orders getting longer and families getting more and more tired of cooking at home, individuals started to turn to takeaways. As a result, online food delivery services such as Deliveroo saw a big increase in search popularity, and it didn't take long for companies like Deliveroo to realize the opportunity to leverage their network to partner with retailers in food delivery.

Source: OpenTable



THE IMPACT OF COVID PANDEMIC ON INSTANT DELIVERY

On the flipside and as expected, consumers took every opportunity to eat out when lockdown restrictions eased.

The Eat-Out to Help-Out scheme in August proved to be quite successful during that time with restaurants only allowing customers to eat with a booking and no walk-ins.

Data from OpenTable shows restaurant bookings in 2020 halved compared to 2019, which fell in each month apart from August 2020, where the Eat Out to Help Out Scheme was live.

THE IMPACT OF COVID PANDEMIC ON INSTANT DELIVERY

Consumers quickly made the most out of the scheme which saw the biggest spike in restaurant bookings on the last day of the offer, although it was later announced that the scheme would be extended.

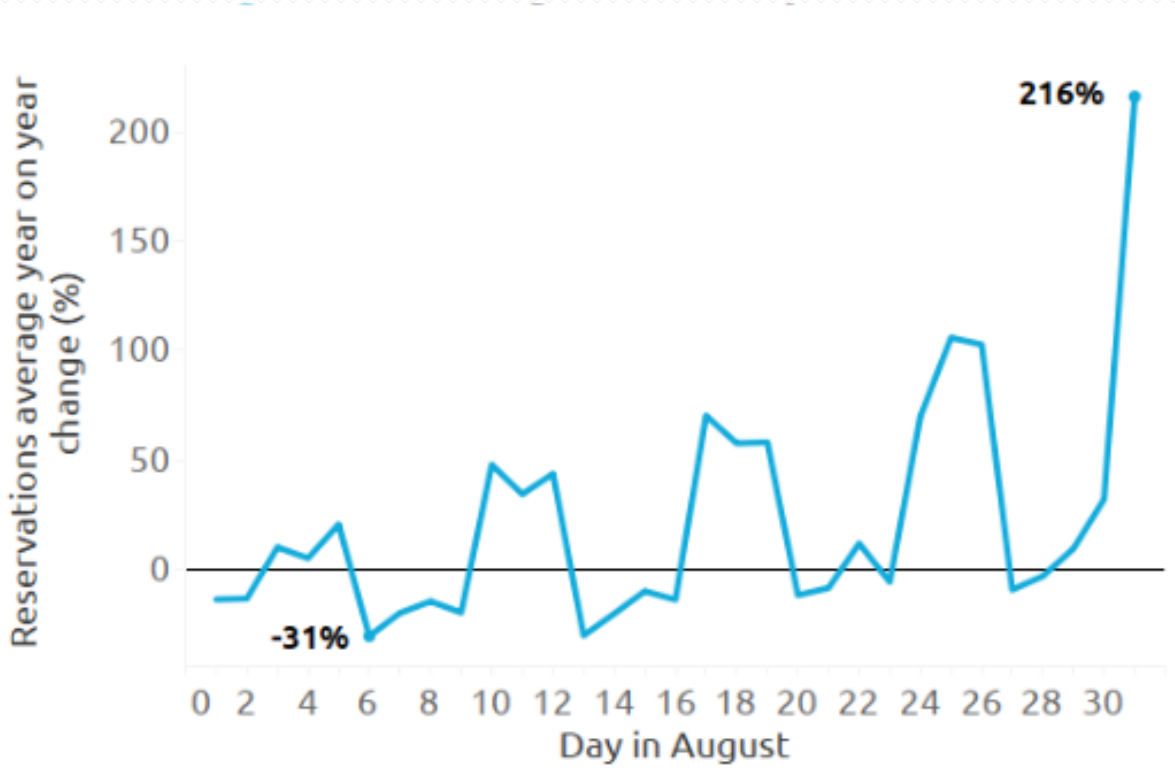
With lockdown restrictions still in place and consumers' behavior shifting towards convenience and speed of delivery, it can only be assumed that the rise of third-party online food delivery services will not be slowing down any time soon and we expect to see a few new players entering the market too.

+216%

On the last day of August 2020, restaurant's reservations were over 3X higher than during the same day in 2019

-31%

On the first days of August 2020, restaurant's reservations were -31% lower than during the same dais in 2019

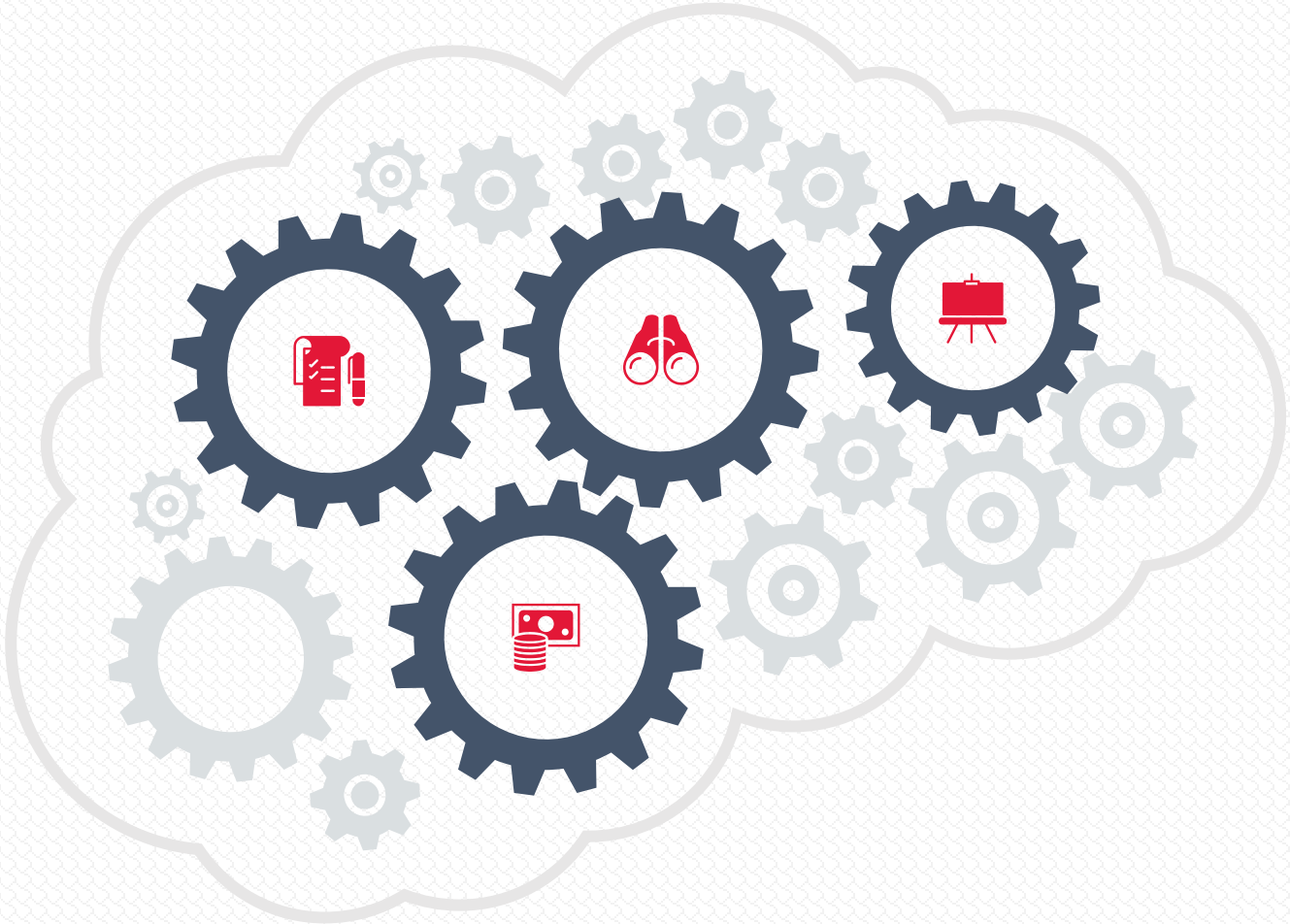


DARK VS LIGHT SIDE
OF AI INTO THE MARKET

STRENGHTS

- The biggest among them is customer loyalty.
- Most of the delivery service companies allow their customers to order products 24/7, usually through their website.
- Instant delivery is part of the urban model of the city in 15 minutes where goods and services are quickly accessible by foot or by bicycle.
- Low or no delivery fees, the convenience is mind-bending.
- Delivery is fast.
- AI can harness the logistic big data to make real-life business and operational decisions, which earlier required human intelligence.
- With increasing investments being made in it every year, AI is getting C-level sponsorship more often.

OPPORTUNITIES



Innovate products and services are always in demand.

Making these available to the customers gives you the opportunity to out-muscle your opponents.

A route optimization solution, powered by artificial intelligence, can make logistics operations more efficient, resulting in cost reduction, improved customer experience, and better resource management. It can reduce the manual efforts required to adapt the routes and provide better visibility of the shipment to the planning managers as well as the customers.

An AI-based solution for logistics have the capability to use historical data on drop sizes and routes to suggest a better route and pick-up plan. This enables the delivery organizations to plan and adjust against the demand fluctuations during peak seasons. Such a system can help prepare a better load plan for vehicles, based on the drop size and route plan, which can again be optimized through AI-based optimization.

THREATS AND WEAKNESS

Logistics companies face various obstacles while trying to stay ahead of the curve.

They face **the shortage of local delivery resources** for last-mile delivery and cannot adjust for the fluctuating demand.

Also, their existing systems and processes are often designed to bring operational efficiencies by **focusing on long-distance travel**, and there is very little overlap between national and local transportation providers.

Planning operations at **the local level** is a different challenge as compared to long-distance planning.

It involves more stops and several packages to drop in and around a small area. For example, finding the minimum distance from place A to B is simple.

When we extend this problem where we need to visit multiple places (e.g., 500+), finding the best route can become more complicated. We can also consider other complexities such as time windows, customer preferences, multiple vehicles, and vehicle capacity & availability.

To elaborate on this point, consider that there are 9.33e+157 (100 factorial) ways in which the 100 points can be covered without considering any constraints.

The complexity grows further as we add constraints to the problem.

CUSTOMERS AND DIGITIZATION

HOW HAVE CUSTOMER EXPECTATIONS EVOLVED WITH DIGITIZATION

With doorstep delivery becoming more a norm than an exception, **customers expect much more now**, as the market abounds with multiple types of delivery modes. With options like same-day delivery, home or workplace delivery, curbside delivery, and even delivery lockers with automated guided vehicles to pick up from a designated place, the customer is spoilt for choices. This has meant that customers now want **faster and cheaper delivery**, with more control over the experience. Don't be surprised, if sometime soon, the experience of product delivery overtakes delivery price as the critical differentiator in determining customer experience.

HOW HAVE CUSTOMER EXPECTATIONS EVOLVED WITH DIGITIZATION

The crux of the matter is that today, customers want delivery in a specific time window, as per their availability at home or office. Thus, operation planning managers at last mile delivery organizations need to **optimize vehicles' capacity and routes** by considering the time window for each delivery.

When this constraint of delivery time window gets added to the problems of driver shortage and limited vehicle capacity, it becomes very **challenging to plan the logistics of last-mile delivery**, which may result in late deliveries and lower customer satisfaction.

Given the delivery time window and the shortage of resources, meeting customer expectations results in higher expenses. Last mile delivery organizations have been struggling to reduce the driven distance to cut the overall transportation cost.

Cutting transportation costs is the topmost priority for most logistics providers

DELIVEROO
BIG DATA IN PRACTICE

HOW DELIVEROO USES BIG DATA

INFORMS STRATEGIC DECISIONS FROM THE TOP DOWN

Constant experimentation helps the team to understand product changes made.
"Graphs help our operations team understand and react to trends, and agents all across the business are running queries on our dataset 24 hours a day." –Webb

FUELS MACHINE-LEARNING MODELS

Data is used to support decisions and recommendations, as machine-learning models need to be constantly re-trained to ensure that they are running on the most up-to-date and relevant information.

ENABLES REAL TIME OPERATIONAL MONITORING

Since its operations are based in busy cities, connecting customers to riders and restaurants, the work environment is often quite unpredictable. Deliveroo makes use of real time data, both to see and react quickly to problems that may arise and predict and avoid these if possible.

SNOWFLAKE'S CLOUD DATA WAREHOUSE

To become more efficient, Deliveroo announced that it would incorporate Snowflake's data warehouse to access data quicker and tie-up with newer restaurants in areas of higher consumer demand.
Snowflake is a data warehouse built for the cloud. The fundamental purpose of the data warehouse is to make it easy for companies like Deliveroo to amass all their data, enable rapid analytics, and make quick insights from available data. The shift to Snowflake's cloud data warehouse has enabled us to make good on our promise that got Deliveroo started.

‘FRANK’ made Deliveroo stand out

Frank uses **machine learning** — a technology that allows software to become more accurate in **predicting outcomes** without being explicitly programmed — to evaluate the most efficient way of distributing orders based on the **location of restaurants, riders, and customers.**

- ***EOD = time to prep food + time to load vehicle with food + time to travel to customer***

- **EOD 25 mins = 15 mins prep time + 3 mins loading + 7 mins travel**

Data is used for **'real-time operational monitoring**.' Because its operations are based in congested cities, connecting customers to riders and restaurants, the work environment is frequently unpredictable. Deliveroo makes use of real-time data to **detect and respond quickly** to potential problems, as well as **predict and avoid them if possible**.

- The following are the reasons that affect the **EOD**(Estimated Order Duration)
- The specific dish that is being prepared
- The location of the restaurant
- The time of day and the day of the week
- The number of riders on the road
- How many live customer orders there are
- The distance from the restaurant to the customer
- Frank then plans the orders for each rider who is online, based on their **live location** and the **estimated time it will take a rider to travel to the restaurant**.

The **algorithm** can also tell Deliveroo's 10,000 UK restaurants how long it will take them to **prepare a meal** based on the time of the day and the type of order, Deliveroo said. Deliveroo claims that its 15,000 UK riders are benefiting from Frank because it allows them to complete **more deliveries per hour and earn more money**.

In 2021, Deliveroo's 'Frank' algorithm was recognized by the courts as **'discriminatory'** against riders

Amazon and Deliveroo

Deliveroo uses AWS in every part of its core business: accepting orders, transmitting them to restaurants, and delivering meals to customers. On AWS, Deliveroo can go deeper into its data, using analytics and machine learning to enhance every part of the business.

"It simplifies things from an architectural point of view and means we don't have to manage the data flow between systems managed by different vendors, and all of the headache that comes with that," Will Sprunt CIO Deliveroo

Deliveroo also uses AWS machine learning (ML) and data analytics services, providing customers with personalized restaurant recommendations and making rider dispatch more efficient.

To meet demand on backend and frontend apps, it moved to a containers architecture based on **Amazon's Elastic Container Service (ECS)**

Elastic Kubernetes Service (EKS) for the load balancing, monitoring, and storage it needed.

It also migrated its **PostgreSQL** databases to **Amazon Aurora**, with its improved throughput and scalability.

A serverless architecture using **Amazon DynamoDB** to publish into managed Kafka clusters now meets Deliveroo's variable demand on backend and customer-facing apps.

Deliveroo uses **Amazon SageMaker** to recommend restaurants, products, and features to users based on their past orders.

Source: www.snowflake.net

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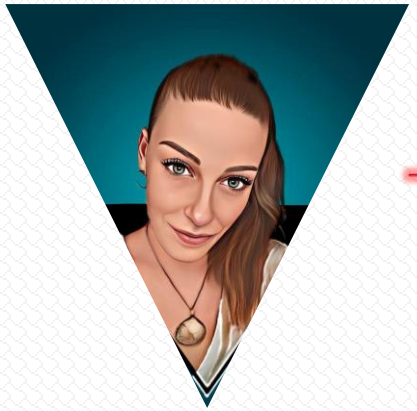
THANK YOU FOR YOUR ATTENTION



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