



MBA8155 G7: Jennifer Dang, Osman Fatih Karaca, Stephanie Scott



# Your Dashers



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01



# Business Concern



How can DoorDash reduce **customer wait times** and improve **order-fulfillment efficiency** without reducing service **quality**?

### Operational Management Themes

- Process flow efficiency
- Cycle time reduction
- Capacity and resource management
- Quality control



# How DoorDash Currently Manages Wait Times

## Delivery cycle relies on:

- Estimating restaurant prep time
- Predicting Dasher travel time
- Assigning the best driver to an order

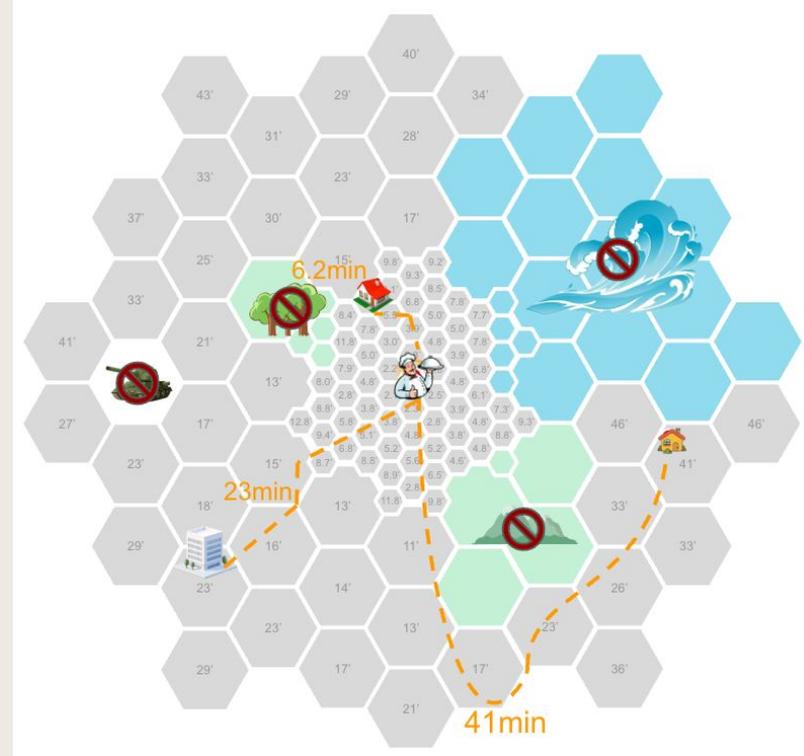
## DoorDash's core tools include:

- Real-time Dasher location data
- Historical demand patterns
- Restaurant performance metrics



# The Geo-Grid-Cache

- DoorDash **assigns drivers** and **predicts travel time** using its Geo-Grid-Cache system.
- Cities are divided into **hexagonal “zones”** using the H3 geospatial grid.
- The system **precomputes travel times** between zones instead of calculating a full route each time.
- Dashers often wait in **“hotspots”,** or high-demand zones, to reduce response time.
- **Operational benefits:**
  - Millisecond-level travel-time estimates
  - Faster, more accurate dispatcher decisions
  - Reduced queuing and cycle time



02



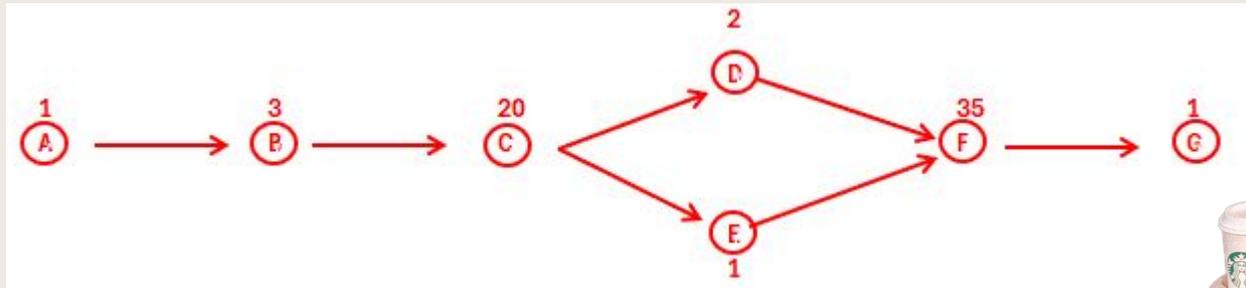
 DOORDASH

# Methodology

# Current Dinner Rush Critical Path Method

Station	Task Assigned	Typical Duration (min)		
A	Order submitted, restaurant receives ticket	1		
B	Driver Assignment	3		
C	Restaurant prep time + Driver Assignment + Travel @ 50 mph	20	Bottle Neck (BN)	
D	Driver waits for food to finish (if early)	2	(Idle Time)	
E	Pickup	1		
F	Driver travels to customer	35	BN	
G	Handoff to customer	1		
<b>Total Cycle Time</b>			63 mins	

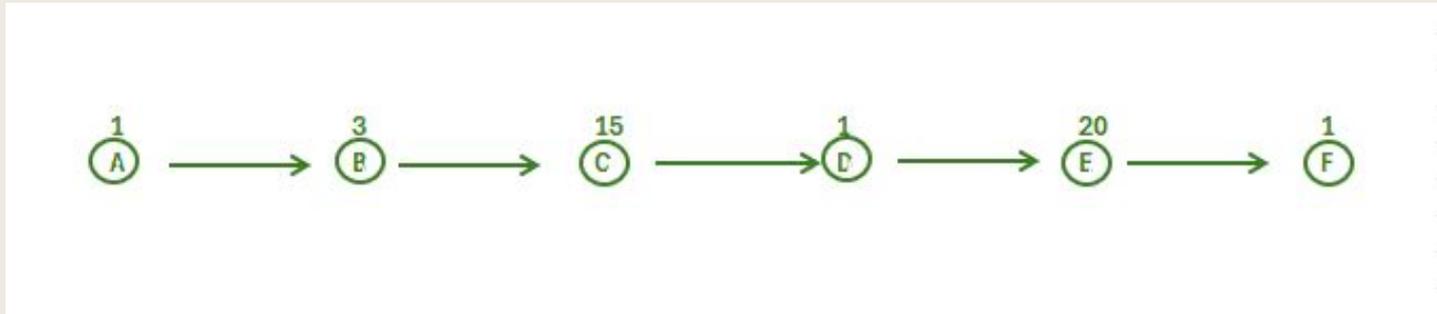
## Process Flow Diagram



# Revised CPM

Station	Task Assigned	Typical Duration (min)			
A	Order submitted, restaurant receives ticket	1			
B	Driver Assignment	3			
C	Restaurant prep time + Driver Assignment + Travel @ 50 mph	15	(Lowered to a 10 mile radius)	Removed Idle Time	
D	Pickup	1			
E	Driver travels to customer	20	(Increased Availability)		
F	Handoff to customer	1			
	<b>Total Cycle Time</b>		<b>41 mins</b>		

## Process Flow Diagram



# Results

1. Decreased total cycle time by **27 minutes**
  - a. (63 mins - 41 mins= 27 mins)
2. **No more idle time**
3. **Increased capacity:** tightening delivery zones and improving driver availability
4. **Increased Efficiency**
  - a. Before: (68 mins) / (7 stations x 68 mins)=**14.29%**
  - b. After: (41 mins)/ (6 Stations x 41 mins) = **16.7%**
  - c. 2.41% Difference



# Data Collection



# Data Source 1

## Dataset 1: Kaggle Delivery Dataset

SUMMARY OUTPUT					
Regression Statistics					
Multiple R	0.9100483291				
R Square	0.8281879614				
Adjusted R Square	0.8281443675				
Standard Error	3.891310396				
Observations	39423				
ANOVA					
	df	SS	MS	F	Significance F
Regression	10	2876706.436	287670.6436	18997.82122	0
Residual	39412	596788.1934	15.14229659		
Total	39422	3473494.629			
	Coefficients	Standard Error	t Stat	P-value	Lower 95%
Intercept	29.70719098	0.3213702289	92.43915057	0	29.07729756
Delivery_distance_km	2.307571167	0.00626784036	368.1604882	0	2.295286049
Speed_km_per_hour	-0.8563609066	0.00257941886	-331.9976138	0	-0.8614166299
Delivery_person_Age	0.09413546597	0.003585310572	26.25587493	0	0.08710817056
Delivery_person_Ratings	-1.766344839	0.06381695981	-27.67829812	0	-1.891427623
Buffet_dummy	-0.01050038551	0.05548958702	-0.1892316392	0.8499122456	-0.1192613177
Snacks_Dummy	-0.0712131625	0.05516218581	-1.290977895	0.1967189151	-0.1793323804
Drinks_Dummy	-0.08179931407	0.05551114984	-1.473565479	0.1406066084	-0.1906025099
Scooter_Dummy	-0.9347276419	0.04290000689	-21.78851962	0	-1.018812693
Bicycle_dummy	-1.507999178	0.563133296	-2.67787252	0.007412211544	-2.611754054
Elec_Bic_Dummy	-0.9471911594	0.07288920444	-12.9949444	0	-1.090055762

- 39k rows
- Contains:
  - Driver age, ratings
  - Coordinates
  - Delivery distance
  - Speed
  - Total delivery time
- **Strengths:** reliable and real-world structure
- **Limitations:** no timestamps for prep time, driver wait time, or stage breakdown

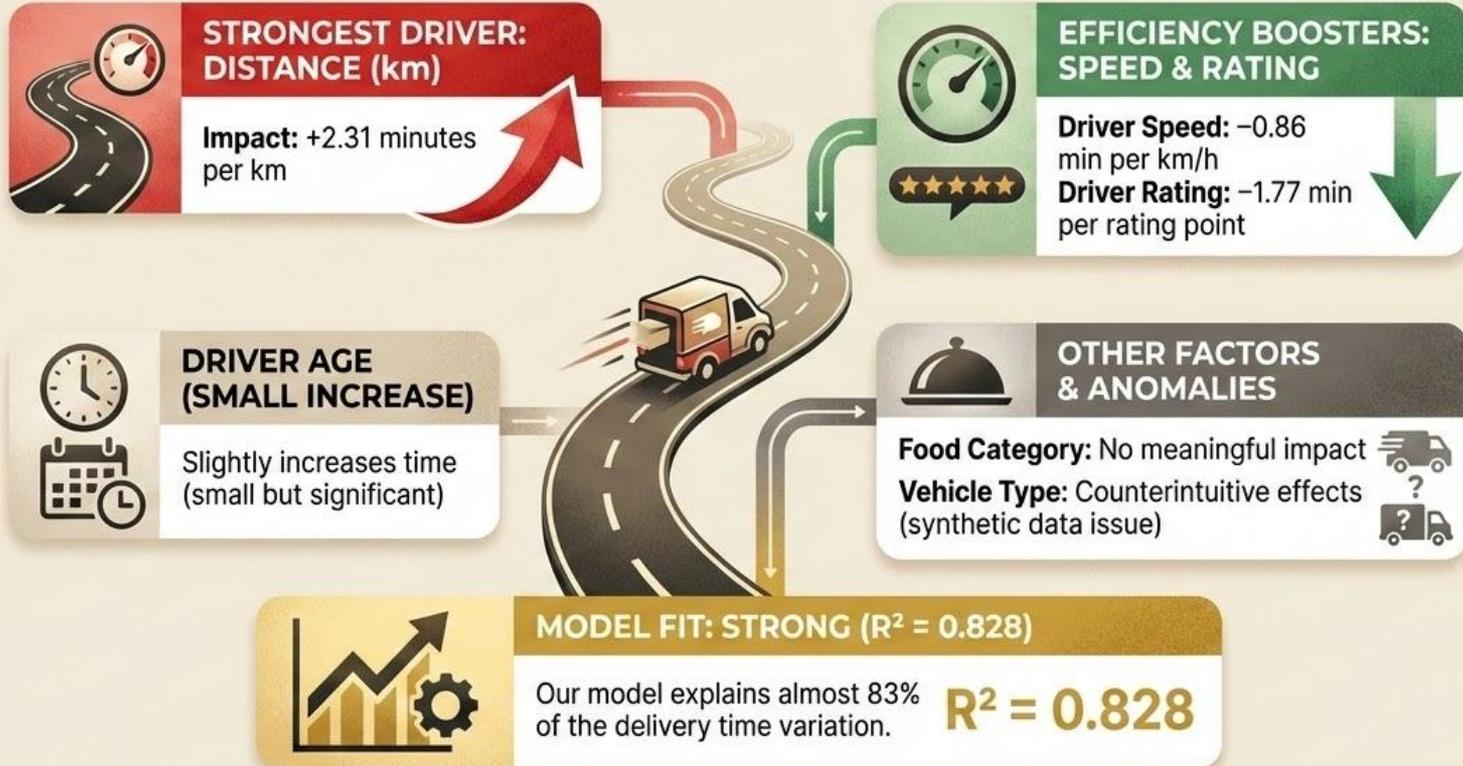
# Data Source 2

SUMMARY OUTPUT					
<i>Regression Statistics</i>					
Multiple R	0.9144588498				
R Square	0.836234988				
Adjusted R Square	0.8361353515				
Standard Error	13.45904424				
Observations	13158				
<i>ANOVA</i>					
	<i>df</i>	<i>SS</i>	<i>MS</i>	<i>F</i>	<i>Significance F</i>
Regression	8	12162654.78	1520331.847	8392.859472	0
Residual	13149	2381887.07	181.1458719		
Total	13157	14544541.84			
	<i>Coefficients</i>	<i>Standard Error</i>	<i>t Stat</i>	<i>P-value</i>	<i>Lower 95%</i>
Intercept	44.30924249	0.446088303	99.32841143	0	43.434845
Order total	0.1664422096	0.004330635797	38.43366595	0	0.157953538
Amount of discount	-0.06264164925	0.01847672776	-3.390299954	0.0007002149584	-0.09885870398
Amount of tip	-0.09281724046	0.05265462949	-1.762755552	0.07796495402	-0.1960279184
Refunded amount	0.1298971199	0.02150757373	6.039598957	0.00000000158665777	0.08773916933
Is Asap Dummy	-11.89983402	0.3894548659	-30.55510423	0	-12.6632218
Mountain_Dummy	-1.135147697	0.2988885577	-3.797896131	0.0001465859839	-1.721012434
San_Jose_Dummy	2.67856019	0.3338991613	8.022063247	0	2.024069613
prep_time_min	0.949084638	0.005329647236	178.0764459	0	0.9386377597

## DoorDash Synthetic Operational Dataset

- 13k rows
- **Contains:** customer order time, restaurant acceptance time, driver arrival time, delivery completion time, and regional labels.
- **Strengths:** Includes all operational timestamps.
- **Limitations:** Smaller sample size.

# What Drives Delivery Time?



# Why the Regression and CPM Analysis was Chosen

## Fits Our Business Question

- The Goal Is understanding Operational drivers.
- Regression gives more casual insight

## Alternative Methods Considered

- Time Series Forecasting
- Machine Learning Models
- Queuing Theories

## Clear Interpretability

- Main Goal is Communication Executives
- Coefficients tells us How strongly impacts delivery time





# Recommendations



# 01

## Reduce Delivery Radius During Peak Hours

- **Shortens driver travel times** and lowers total cycle time
- **Increases delivery density** and improves fulfillment efficiency
- **Reduces long-haul assignments** that contribute to late orders

# 03

## Restaurant Speed Tiers

- Categorize restaurants as **Fast, Standard, or Slow** based on prep-time data
- Guide customer ordering by adding clear speed labels

# 02

## Optimize Driver Positioning with the Geo Grid Cache

- **Pre-position drivers** before peak hours based on historical data
- Increase accuracy of driver assignment and minimize queuing

# 04

## Incentivize Restaurants

- **Reward restaurants** that meet accurate prep-time estimates
- Provide visibility boosts high performers
- Encourage real-time order status updates

# Thank You!



# Questions?

# Why Two Data Sets are Needed

- Missing critical operational timestamps
- Could not calculate prep time
- Could not estimate driver wait time
- Could not isolate travel vs queuing delays

## With Data Sets

- Prep time
- Driver wait time
- Travel time
- Total time
  - Enables queue analysis & process bottleneck detection