

ANALYSIS OF FULFILLMENT & DELIVERY PROCESS

Muesli company x group 4, 29.09.25



AGENDA

1

Project scope



AGENDA

- 1 Project scope
- 2 Fulfillment & delivery process
- 3 Introducing performance KPIs



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- 1 Project scope
- 2 Fulfillment & delivery process
- 3 Introducing performance KPIs
- 4 Performance analysis



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- 1 Project scope
- 2 Fulfillment & delivery process
- 3 Introducing performance KPIs
- 4 **Performance analysis**
- 5 Recommendations to optimize delivery service

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- 1 Project scope
 - 2 Fulfillment & delivery process
 - 3 Introducing performance KPIs
 - 4 **Performance analysis**
 - 5 Recommendations to optimize delivery service
 - 6 Executive summary
 - 7 Appendix
- 

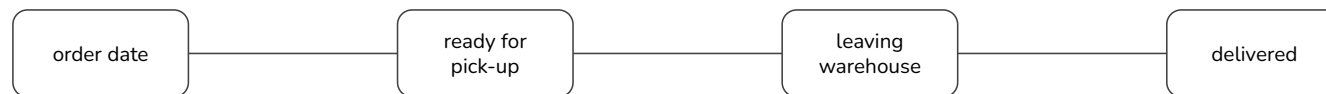


Project scope

Stakeholder	Muesli company
Stakeholder expectations	<ol style="list-style-type: none">1. Understanding of fulfillment & delivery process2. Development of performance KPIs3. Performance analysis of KPI set4. Recommendations to improve fulfillment & delivery services
Outcome	10-15 min stakeholder presentation
Data	Provided by stakeholder <i>order data (5009 orders), campaign data (333 orders), logistics data (3002 orders), intern data (204 orders)</i>
Timing	25. - 29.09.25



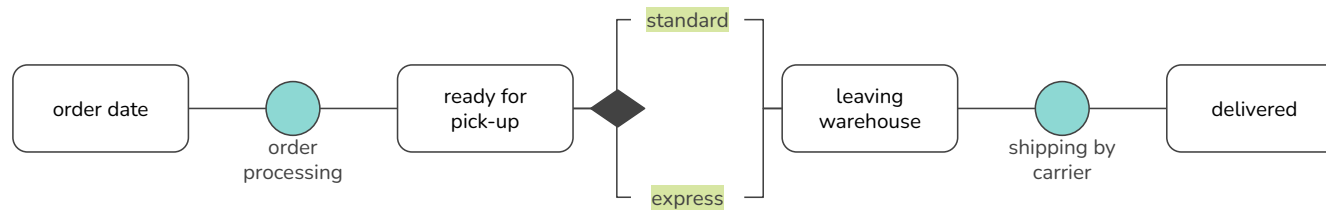
Fulfillment & delivery process



order
status



Fulfillment & delivery process



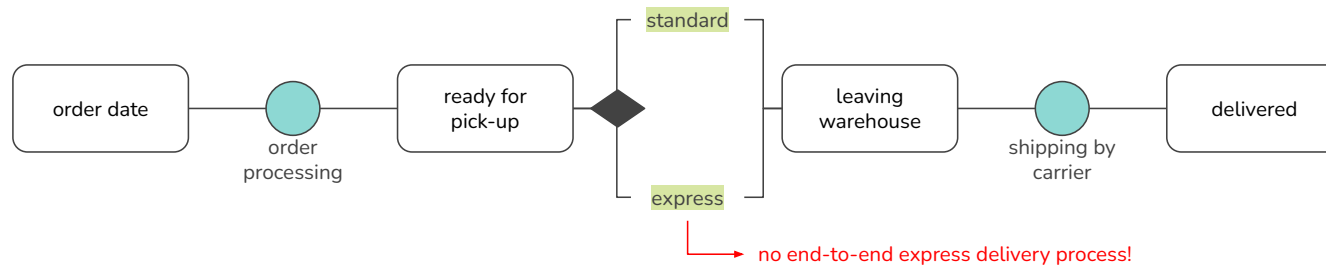
order
status

action

shipping
mode



Fulfillment & delivery process



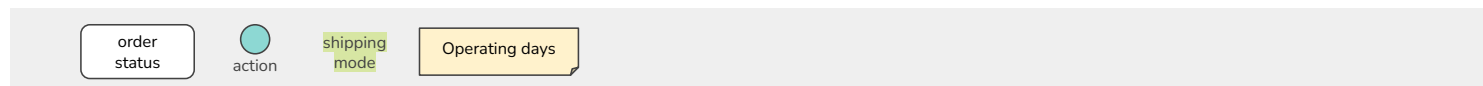
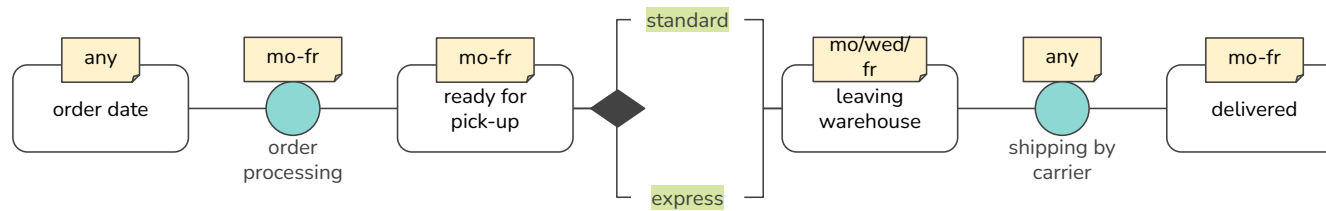
order
status

action

shipping
mode

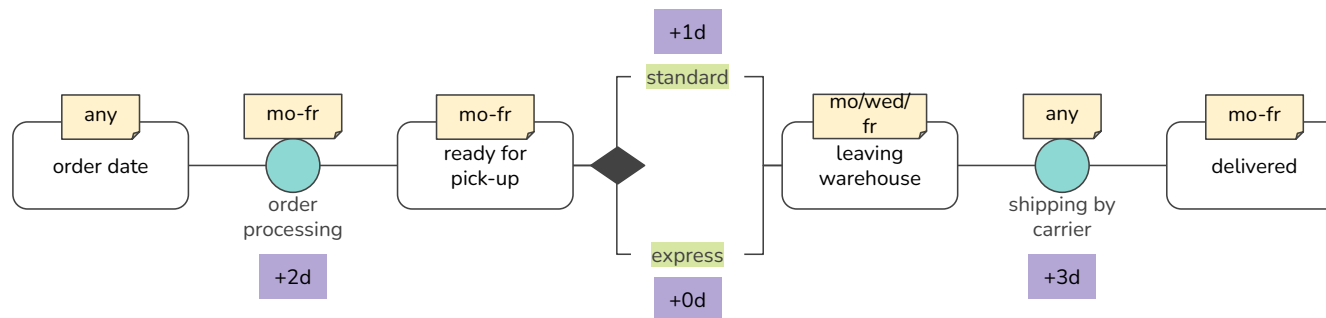


Fulfillment & delivery process



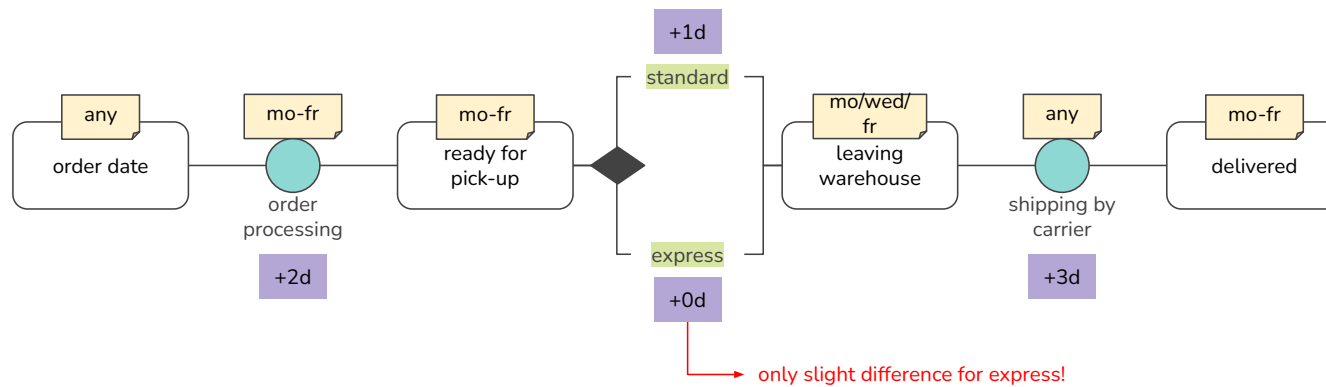


Fulfillment & delivery process



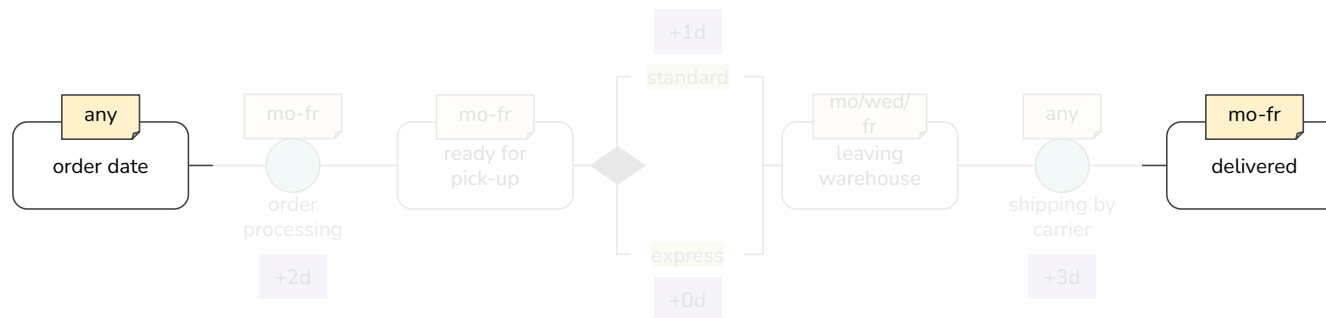


Fulfillment & delivery process



Introducing performance KPIs

order 2
delivery



order
status



action

shipping
mode

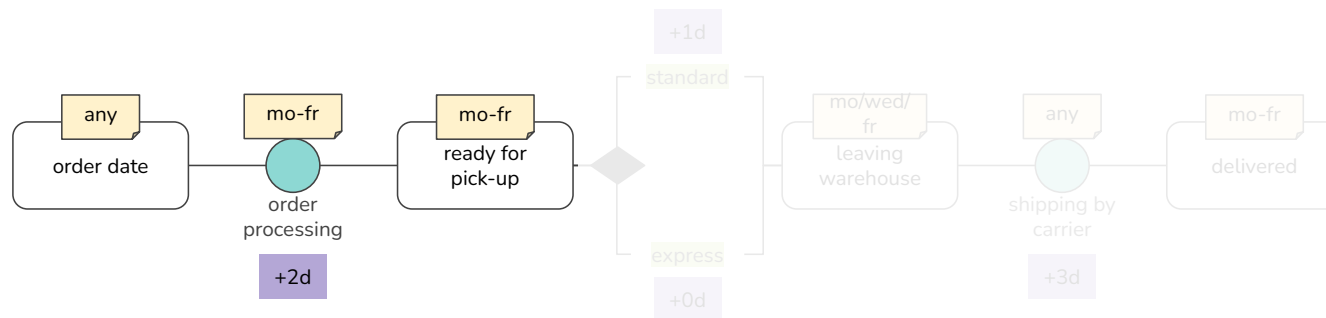
Operating days

assumption/
plan

Introducing performance KPIs

order 2
delivery

order 2 ready
for p.u.



order
status



action

shipping
mode

Operating days

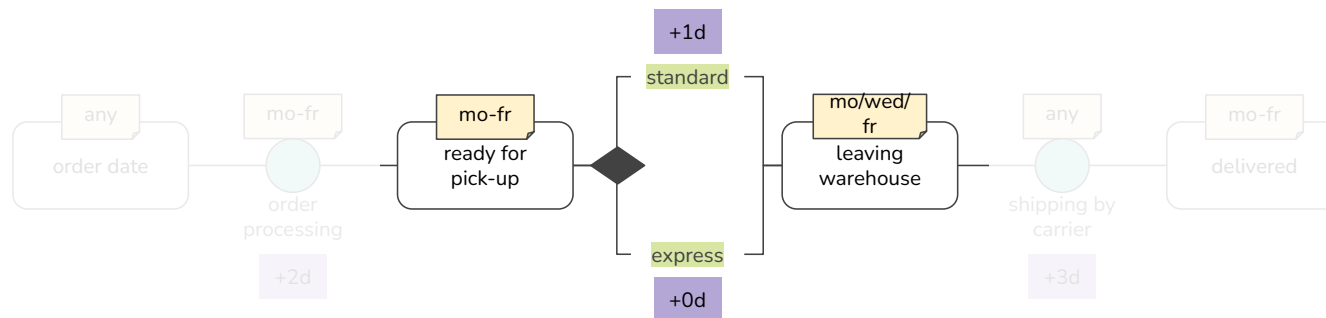
assumption/
plan

Introducing performance KPIs

order 2
delivery

order 2 ready
for p.u.

ready for p.u. 2
shipping



order
status



action

shipping
mode

Operating days

assumption/
plan

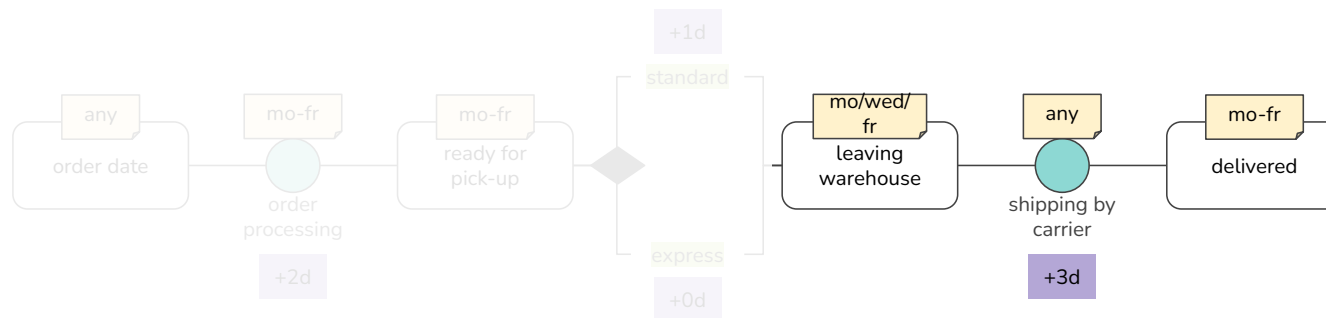
Introducing performance KPIs

order 2
delivery

order 2 ready
for p.u.

ready for p.u. 2
shipping

shipping 2
delivered



order
status



action

shipping
mode

Operating days

assumption/
plan

PERFORMANCE ANALYSIS

- 1 E2E process
- 2 Order process step 1
- 3 Order process step 2
- 4 Order process step 3





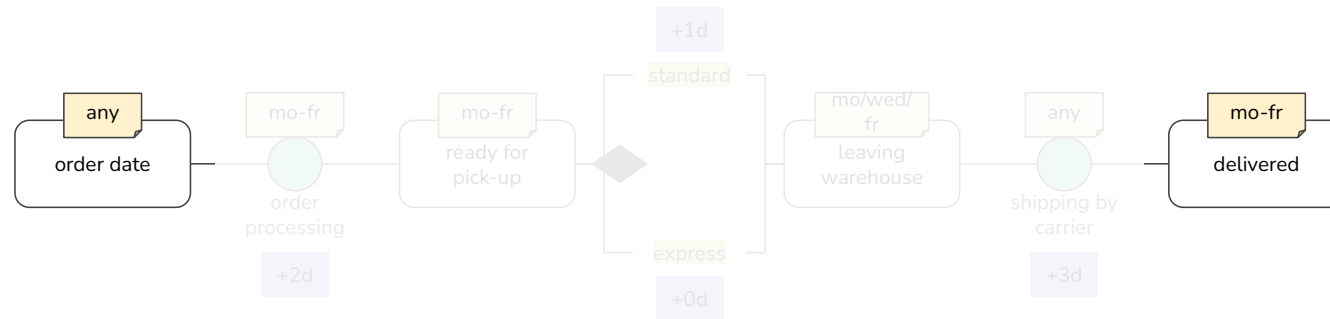
Performance Analysis

	order 2 delivery	order 2 ready for p.u.	ready for p.u. 2 shipping	shipping 2 delivered
Plan / assumption				
Actual (EDA)				

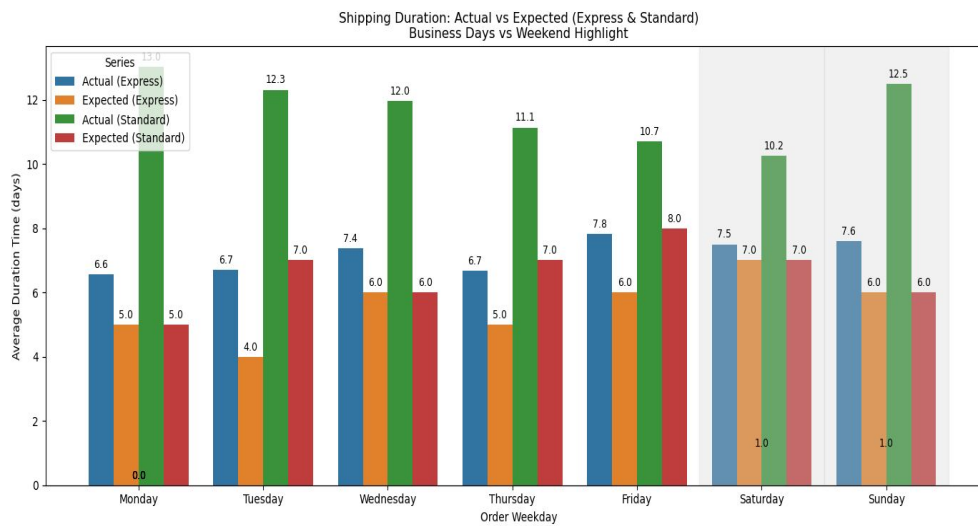


E2E process

order 2
delivery



From the Day Ordered to delivered



Actual delays are higher for **Standard** than for **Express**.

Business days show more stable performance than weekends.

Deviation highlights consistent **underperformance vs expected times**.



Average Delay: From the Day Ordered to delivered

Day	Expected (Express)	Actual (Express)
Monday	5	6.56
Tuesday	4	6.71
Wednesday	6	7.38
Thursday	5	6.67
Friday	6	7.83
Saturday	7	7.50
Sunday	6	7.59
Day	Expected (Standard)	Actual (Standard)
Monday	5	13.03
Tuesday	7	12.31
Wednesday	6	11.95
Thursday	7	11.14
Friday	8	10.71
Saturday	7	10.25
Sunday	6	12.49

Express shipments: a bit slower than expected.

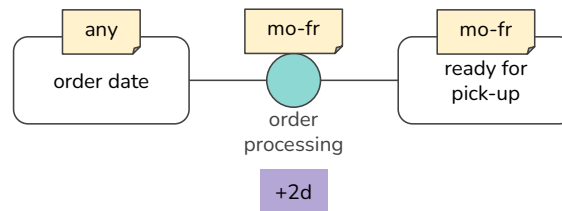
Standard shipments: often slower, especially Monday and Sunday.

Numeric deviations confirm systematic gaps in planning vs reality.

Ship mode	Expected	Actual
Express	5.57	7.05
Standard	6.57	11.93

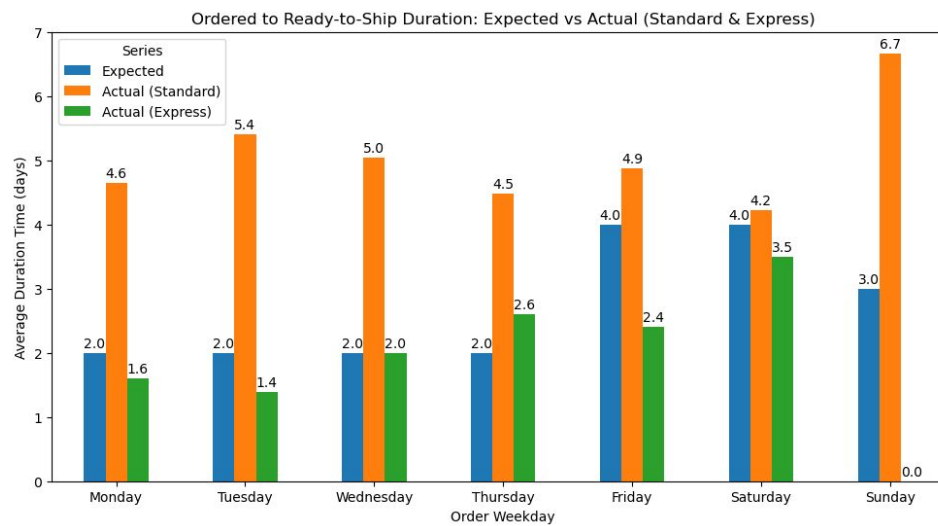
Order process step 1

order 2 ready
for p.u.





Order process step 1 : Ordered to ready for p.u



Express preparation times remain consistently low.

Standard preparation exceeds expected values across all weekdays.

preparation slows down on weekends for Express



Average Delay: From the Day Ordered to ready for p.u

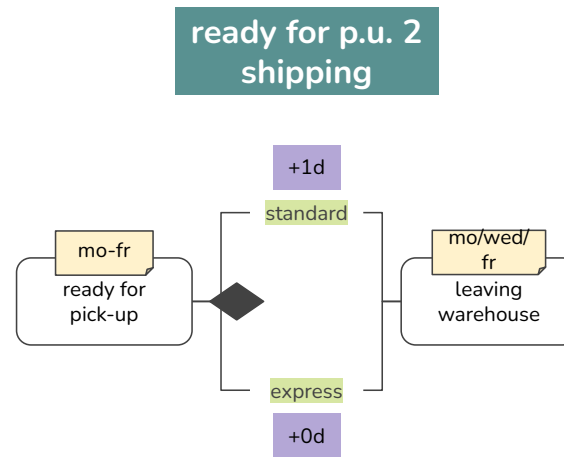
Day	Expected (Express)	Actual (Express)
Monday	2,00	1.60
Tuesday	2,00	1.38
Wednesday	2,00	2.00
Thursday	2,00	2.60
Friday	4,00	2.40
Saturday	4,00	2.40
Sunday	3,00	-
Day	Expected (Standard)	Actual (Standard)
Monday	2	4.64
Tuesday	2	5.40
Wednesday	2	5.04
Thursday	2	4.48
Friday	4	4.88
Saturday	4	4.22
Sunday	3	6.67

Express shipments: mostly faster than expected. for all days especially for weekends

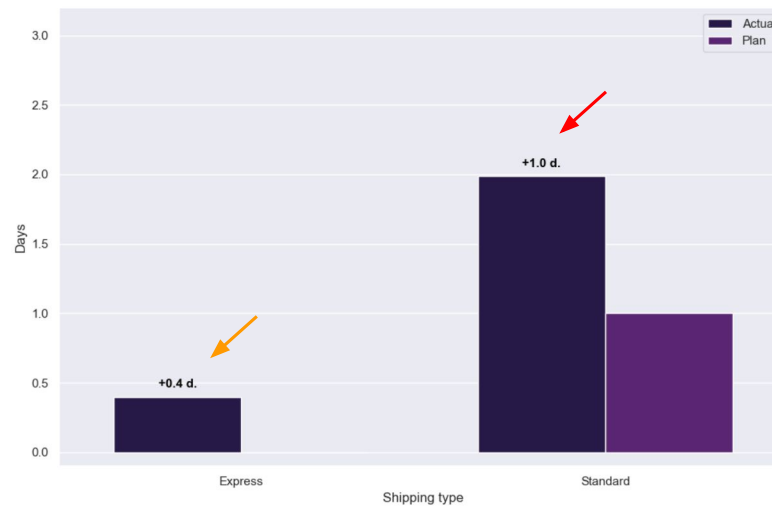
Standard shipments: often slower, especially during business days

Ship mode	Expected	Actual
Express	2.71	2.04
Standard	2.71	4.93

Order process step 2

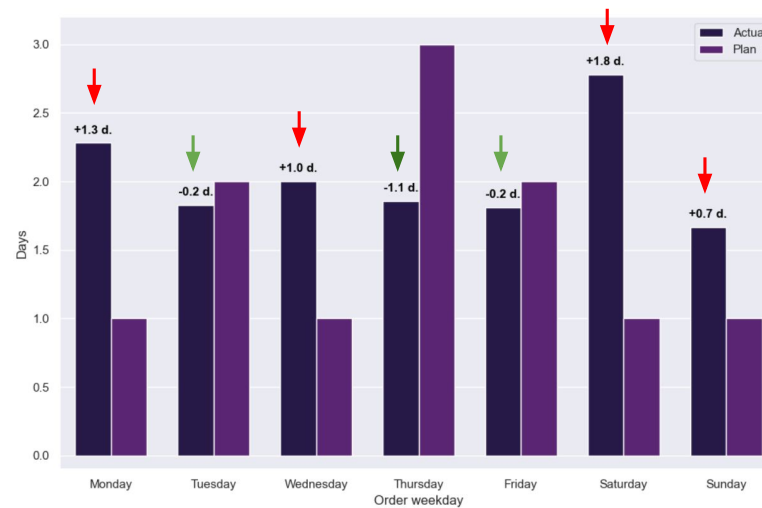


ready for p.u. 2 shipping



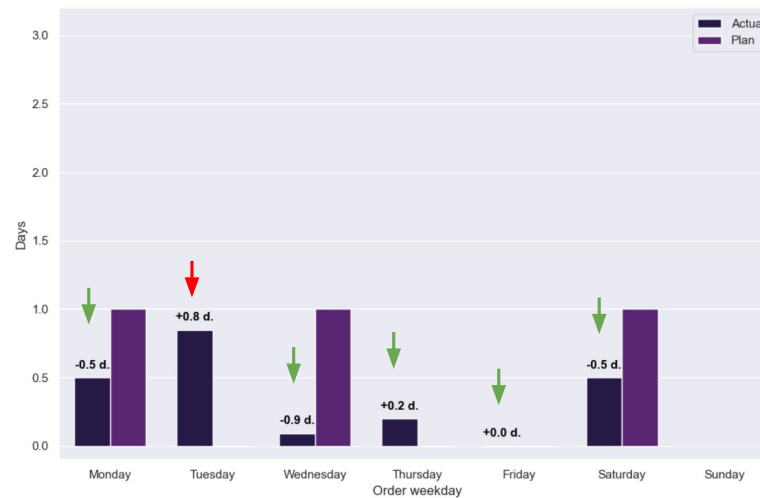
- express orders are faster
- process takes longer than expected
- especially longer for standard shipments: +1 d. on average
→ 50% efficiency drop vs. assumption

ready for p.u. 2 shipping by order weekday for **standard shipping**



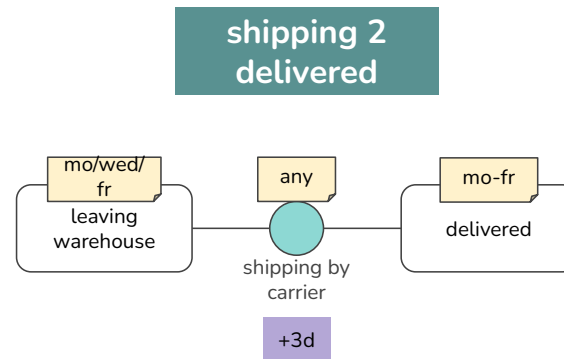
- only orders placed on tue & fr perform as expected
- **orders placed on thu** exceed the assumption

ready for p.u. 2 shipping by order weekday for **express shipping**



- 6/7 days **process is as expected**
- **for orders placed on tue** the process takes longer
- no orders on sunday

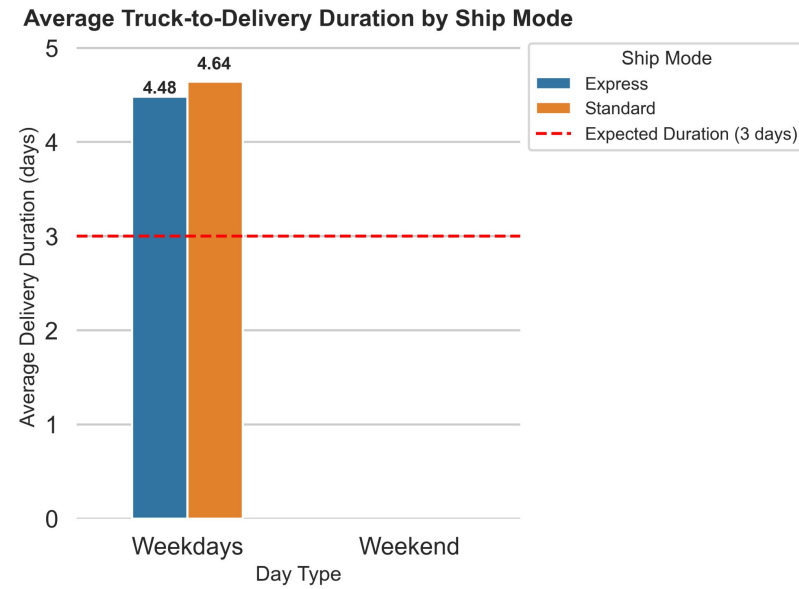
Order process step 3



Data source: campaign and order process

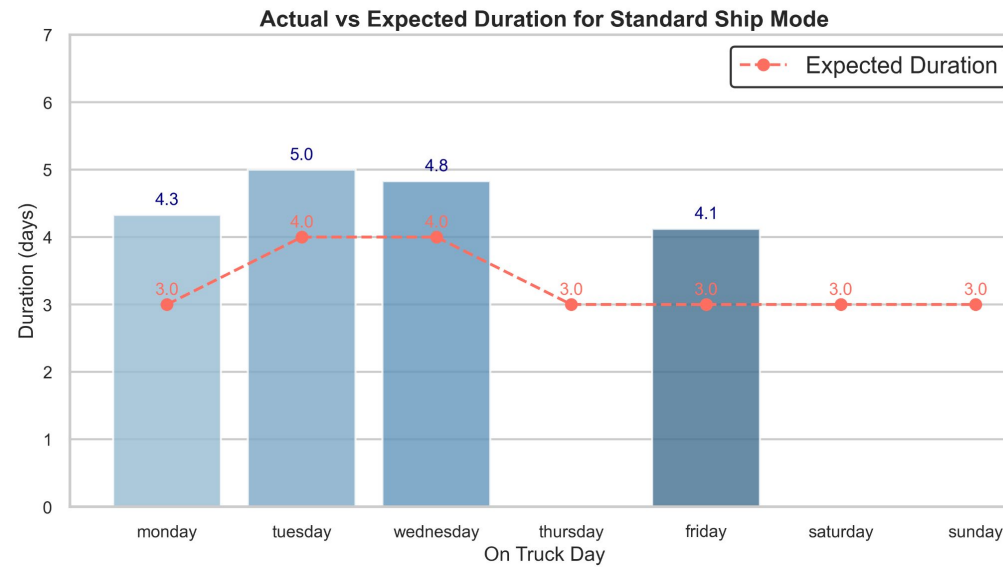
Data size: 333 rows after merging due to the small size of campaign data

Shipping 2 delivered: weekdays & weekends



Delivery type	Status = Order received by warehouse	Status = Order is ready for shipment	Status = Order leaves warehouse	Status = Order delivered	On_truck_2_delivery	standard shipment	express shipment
Standard	Mon	Tue	Wed	Fri	3	3	
Express	Mon	Tue	Wed	Fri	3		3
Standard	Tue	Wed	Fri	Mo	4	4	
Express	Tue	Wed	Wed	Fri	2		2
Standard	Wed	Thu	Fri	Mo	4	4	
Express	Wed	Thu	Fri	Mo	4		4
Standard	Thu	Fri	Mo	Wed	3	3	
Express	Thu	Fri	Fri	Mo	4		4
Standard	Fri	Mo	Wed	Fri	3	3	
Express	Fri	Mo	Mo	Wed	3		3
Standard	Sat	Tue	Wed	Fri	3	3	
Express	Sat	Tue	Wed	Fri	3		3
Standard	Sun	Tue	Wed	Fri	3	3	
Standard	Sun	Tue	Wed	Fri	3		3

Actual vs Expected Duration for Standard Ship Mode for On Truck





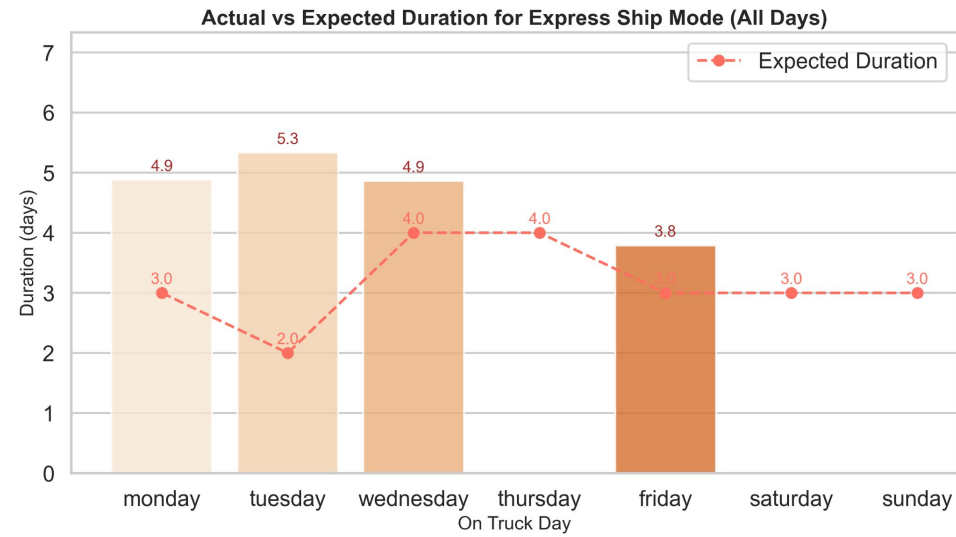
Average delay for standard shipment

	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday	Sunday
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Order numbers	30	7	171		50		
Delay	1.3	1.0	0.8		1.1		

Order numbers of standard shipment: 258
Percentage: 77.5%
Average delay: 0.92 days
Observation:
Wednesday is the busiest day for the trucks to pick up, the average delay is 0.8 days.

Actual vs Expected Duration for Express Ship Mode for On Truck





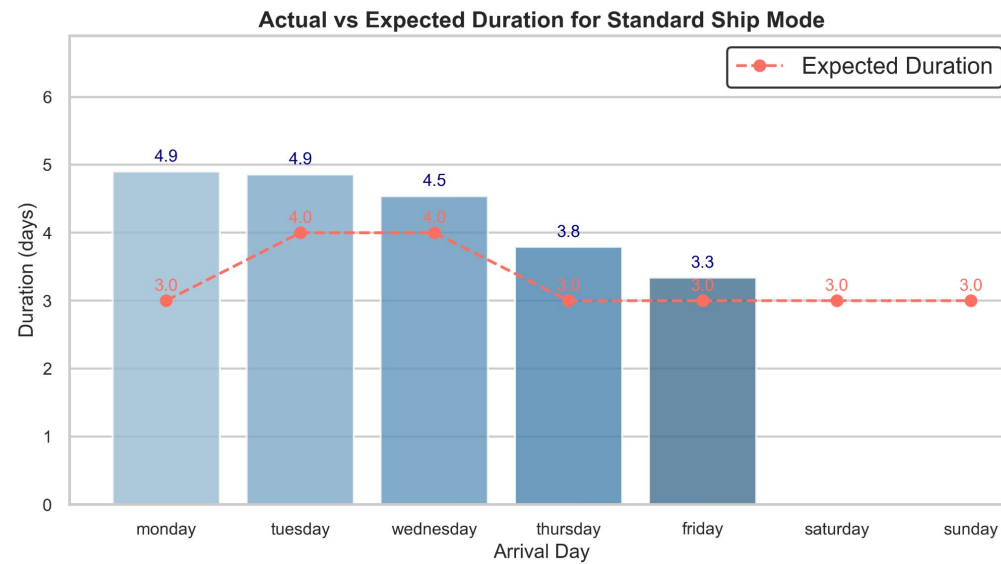
Average delay for express shipment

	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday	Sunday
--	--------	---------	-----------	----------	--------	----------	--------

Order numbers	16	3	28		28		
Delay	1.3	1.0	0.8		1.1		

Order numbers of express orders: 75
Percentage: 22.5%
Average delay: 1.03 days
Observation:
Delay of express delivery is 1.03 days while delay for standard delivery is 0.92 days.
Express shipment shows no advantage in terms of average delay in comparison to standard shipment.

Actual vs Expected Duration for Standard Ship Mode for Arrival Day



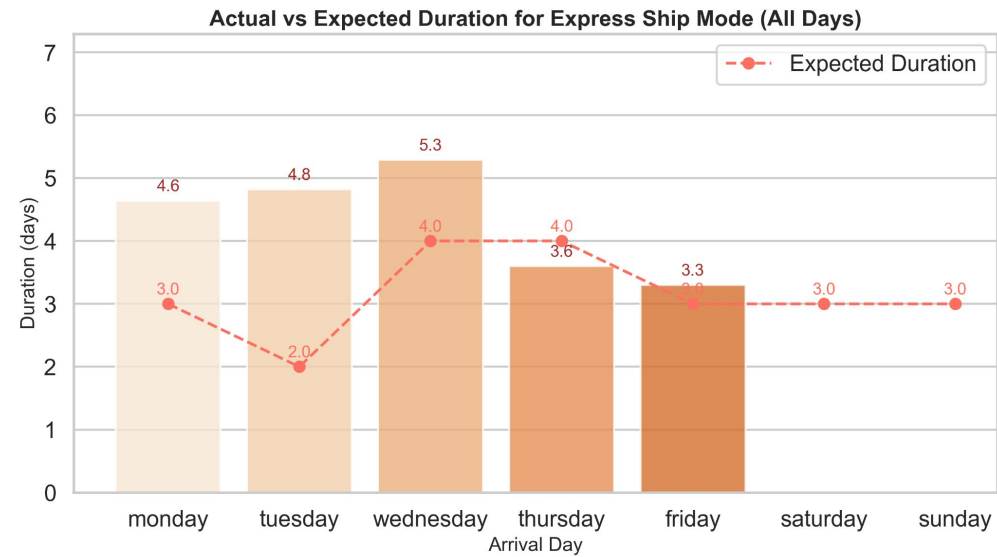


Average delay for standard shipment

	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday	Sunday
Order numbers	173	29	13	14	29		
Delay	1.9	0.9	0.5	0.8	0.3		

Order numbers of standard shipment: 258
Percentage: 77.5%
Average delay: 1.48 days
Observation: the busiest day for delivery day is Monday while the average delay is 1.9 days.

Actual vs Expected Duration for Express Ship Mode for Arrival Day





Average delay for express shipment

	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday	Sunday
Order numbers	42	11	7	5	10		
Delay	1.6	2.8	1.3	0.4	0.3		

Order numbers: 75
Percentage: 22.5%
Average delay: 1.49 days
Observation:s express shipment doesn't show advantage in terms of average delay in comparison to standard shipment

RECOMMENDATIONS TO OPTIMIZE DELIVERY SERVICE





Recommendations

General

- Optimize delivery process for high demand sales days

Delivery

1. Improve Delivery Efficiency

- **Set Clear Targets:** Define and publish delivery time promises (Standard vs. Express) on POS.
 - **Standard:** 2–3 days
 - **Express:** Next-day or ≤ 1 day (real differentiation from standard).
- **Customer Communication:** Ensure expectations are clearly visible at checkout and in order confirmation.

2. Ensure Express Service Value

- **Implement E2E Express Flow:**
 - Dedicated order picking & packing lanes for express orders.
 - Prioritize carrier handoffs for express shipments.
 - Real-time tracking visibility for customers.
- **Measure Success:** Track express delivery completion times vs. promise.



Recommendations

3. Fix Standard Order Processing Bottleneck

- **Current State:** Standard orders take up to 5.4 days (target = 2.0 days).
- **Root Cause:** Insufficient warehouse processing capacity.
- **Action Plan:**
 - Increase warehouse staff during high-demand periods.
 - Optimize workflow (batch picking, automation, or cross-training staff).
 - Set KPI: >95% of standard orders processed within 24h.

4. Stabilize Weekend Fulfillment

- **Issue:** Increase in volume & delays for express orders on Friday/Saturday.
- **Action Plan:**
 - Review and adjust **weekend staffing schedules**.
 - Align **carrier pickup & handoff times** to ensure weekend coverage.
 - Consider **weekend-specific incentives** for staff and carriers.

Appendix

- Git Project: [Link](#)
- Database (cleaning function):

```
def data_cleaning(df, df_type):  
    # make col name lower  
    df.columns = df.columns.str.lower()  
  
    # orders data  
    if df_type == "orders":  
        # dropping cols  
        df = df.drop(["index", "customer name", "origin channel", "category", "sub-category", "product id", "sales", "quantity", "discount", "profit"], axis=1)  
        # dropping duplicates  
        df = df.drop_duplicates()  
        # renaming values in ship mode  
        df["ship mode"] = df["ship mode"].str.replace("class", "")  
        df["ship mode"] = df["ship mode"].str.replace("second", "standard")  
        df["ship mode"] = df["ship mode"].str.replace("first", "express")  
  
    # campaign data  
    elif df_type == "campaign":  
        # dropping cols  
        df = df.drop("customer name", axis=1)  
        # dropping duplicates  
        pass  
  
    # order process data  
    elif df_type == "order_process":  
        # dropping cols  
        df = df.drop("row id", axis=1)  
        # dropping duplicates  
        df = df.drop_duplicates()  
        # dropping 1 duplicate row for id (scanned on truck twice)  
        df = df.drop_duplicates(subset=["order id"], keep="first")  
        # dropping column order date, because not match with order date in orders data  
        df = df.drop("order date", axis=1)  
        # dropping column ship mode, because not match with ship mode in orders data (assumption: second class shipping = standard)  
        df = df.drop("ship mode", axis=1)  
  
    # intern data  
    else:  
        # dropping cols  
        pass  
        # dropping duplicates  
        df = df.drop_duplicates()  
        # dropping column pickup date, because not match with on truck scan date  
        df = df.drop("pickup date", axis=1)  
  
    return df
```