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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3. Introducing performance KPIs
4. **Performance analysis**

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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

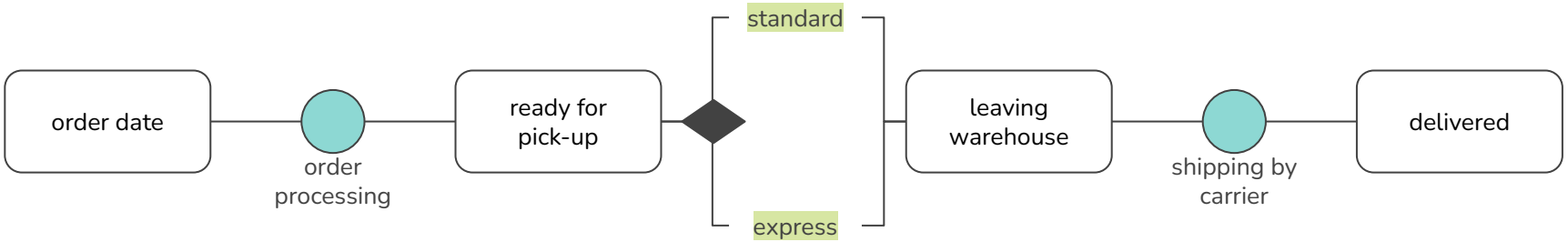
Project scope

Stakeholder	Muesli company
Stakeholder expectations	1. **Understanding** of fulfillment & delivery process 2. Development of **performance KPIs** 3. **Performance analysis** of KPI set 4. **Recommendations** to improve fulfillment & delivery services
Outcome	10-15 min stakeholder presentation
Data	Provided by stakeholder *order data (5009 orders), campaign data (333 orders), logistics data (3002 orders), intern data (204 orders)*
Timing	25. - 29.09.25

Fulfillment & delivery process

order status

Fulfillment & delivery process

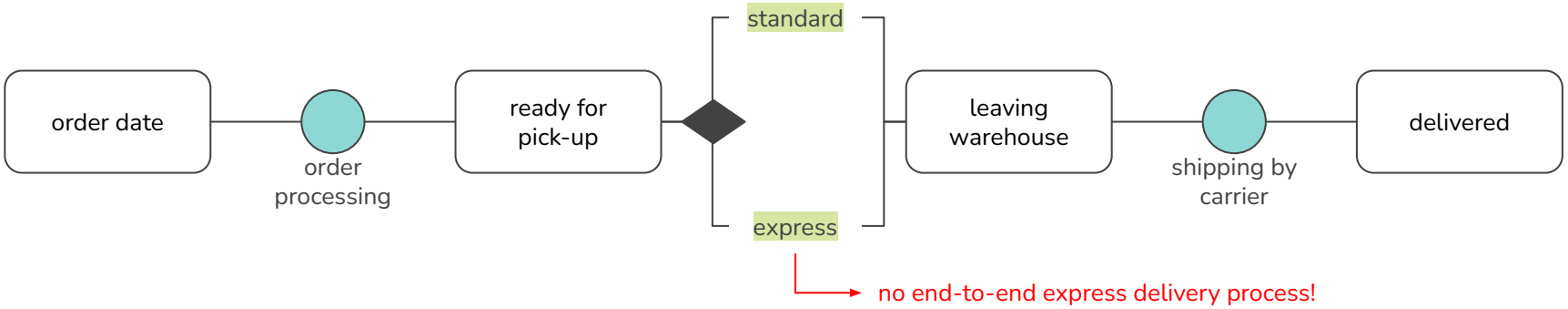


order status

action

shipping mode

Fulfillment & delivery process

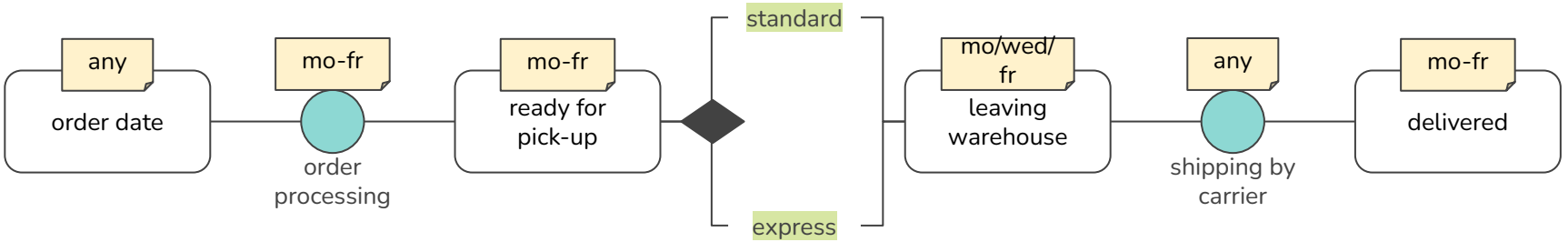


order status

action

shipping mode

Fulfillment & delivery process



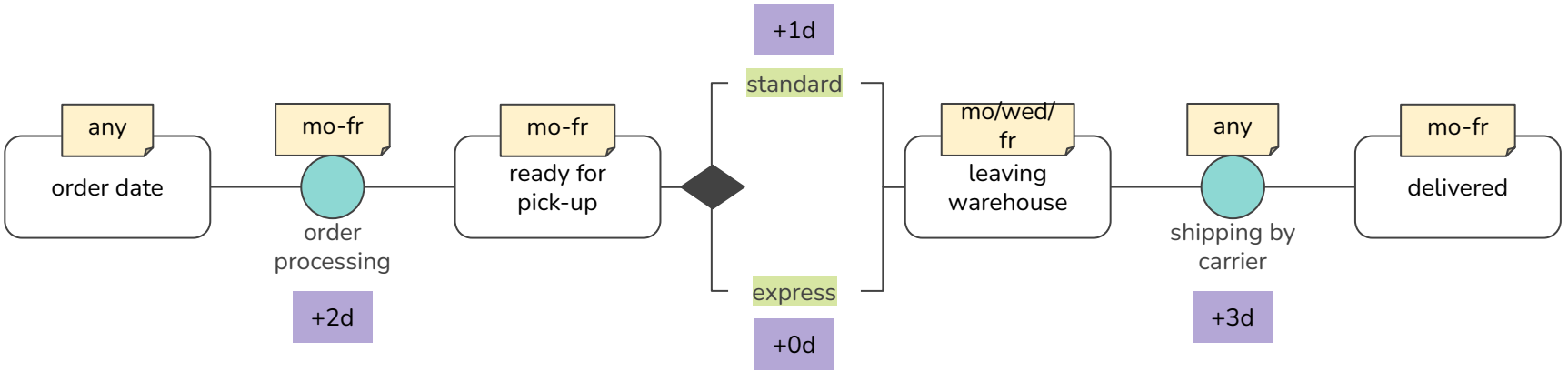
order status

action

shipping mode

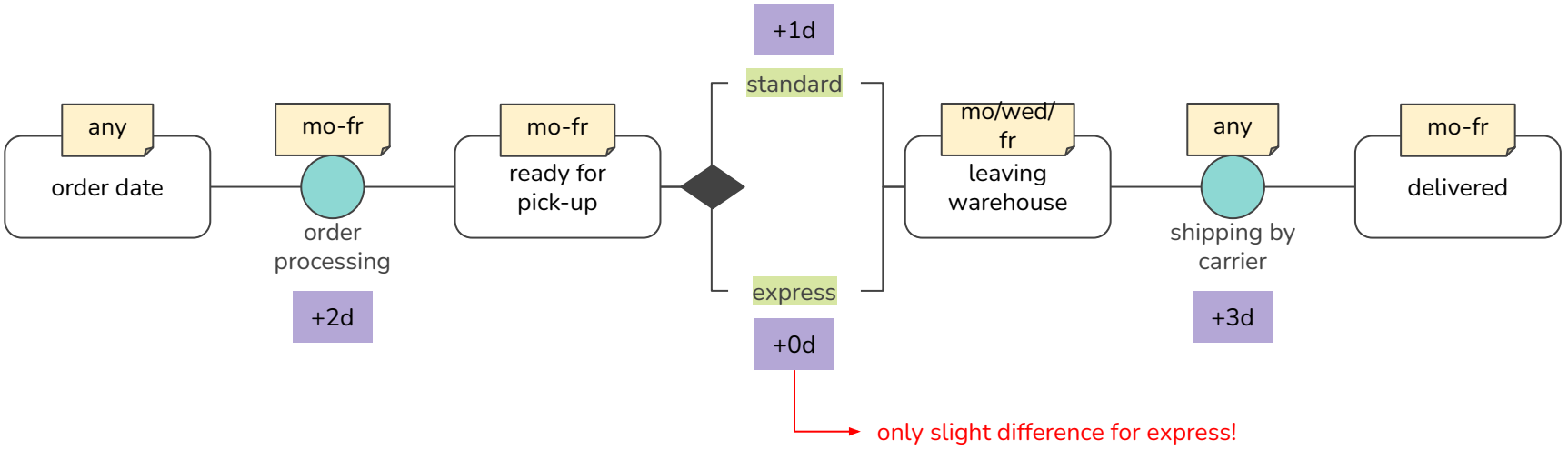
Operating days

Fulfillment & delivery process



order status
action
shipping mode
Operating days
assumption/ plan

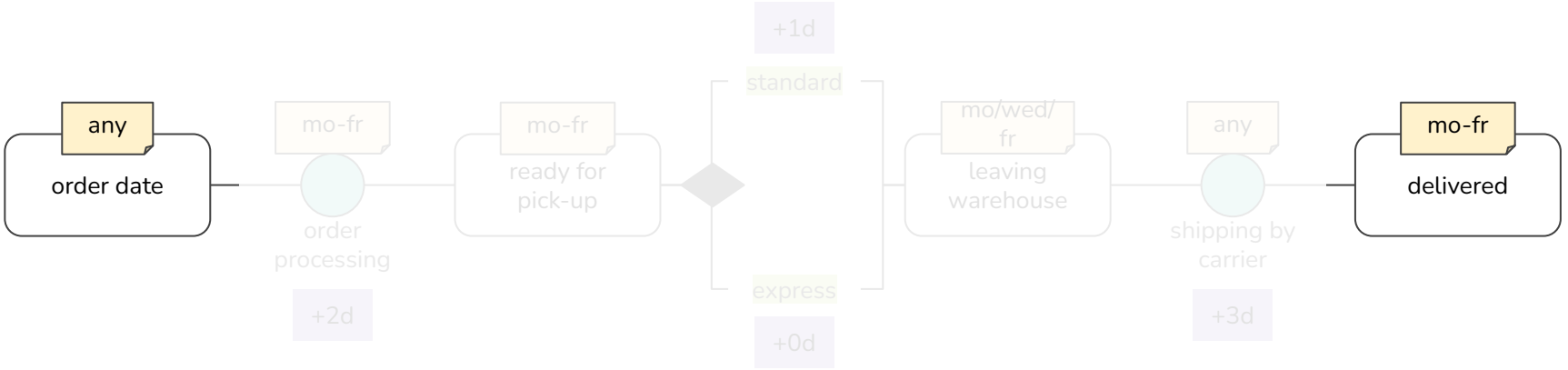
Fulfillment & delivery process



order status
action
shipping mode
Operating days
assumption/ plan

Introducing performance KPIs

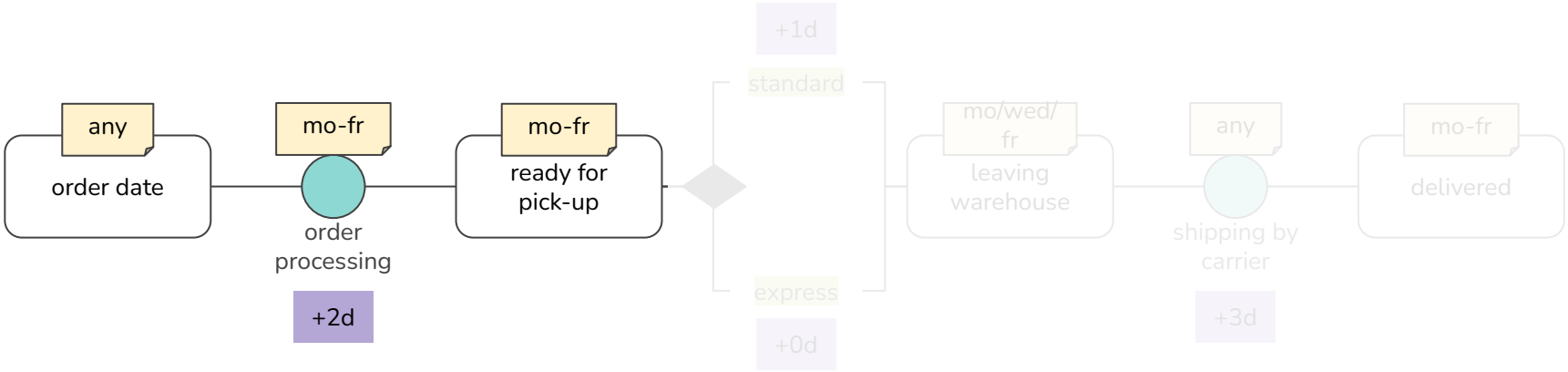
order 2 delivery



order status | action | shipping mode | Operating days | assumption/ plan

Introducing performance KPIs

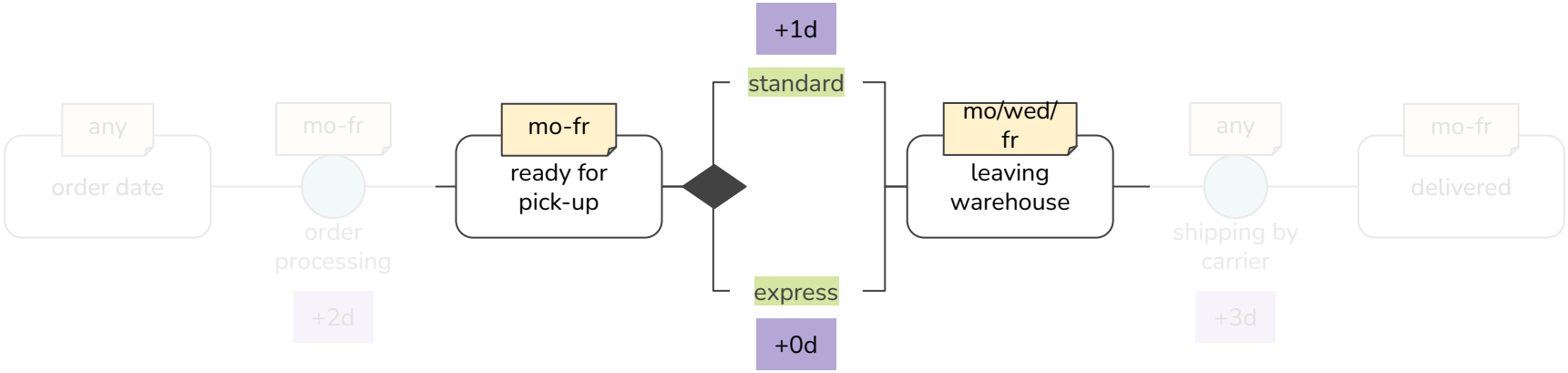
order 2 delivery | **order 2 ready for p.u.**



order status | action | shipping mode | Operating days | assumption/ plan

Introducing performance KPIs

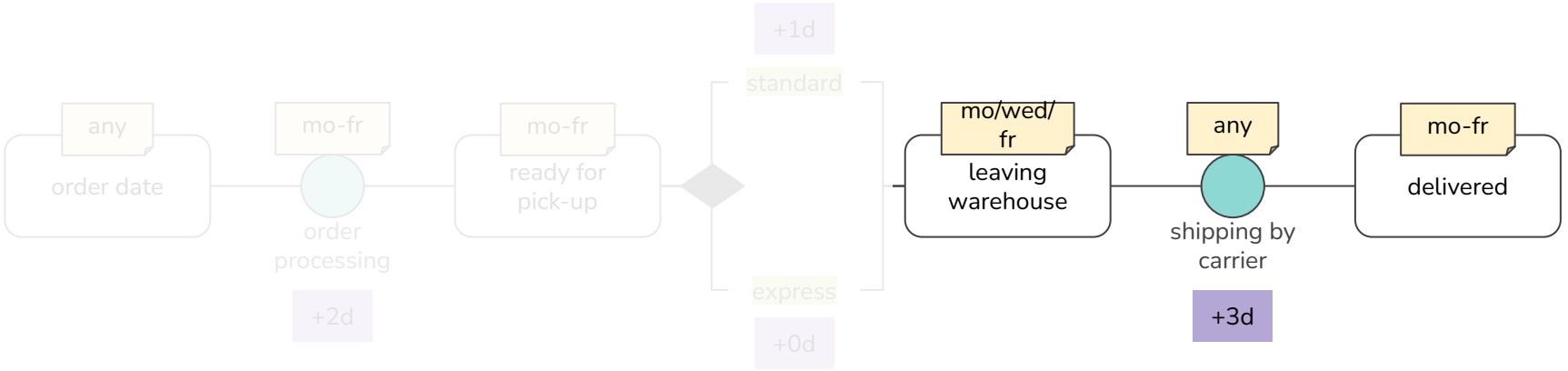
order 2 delivery | **order 2 ready for p.u.** | **ready for p.u. 2 shipping**



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



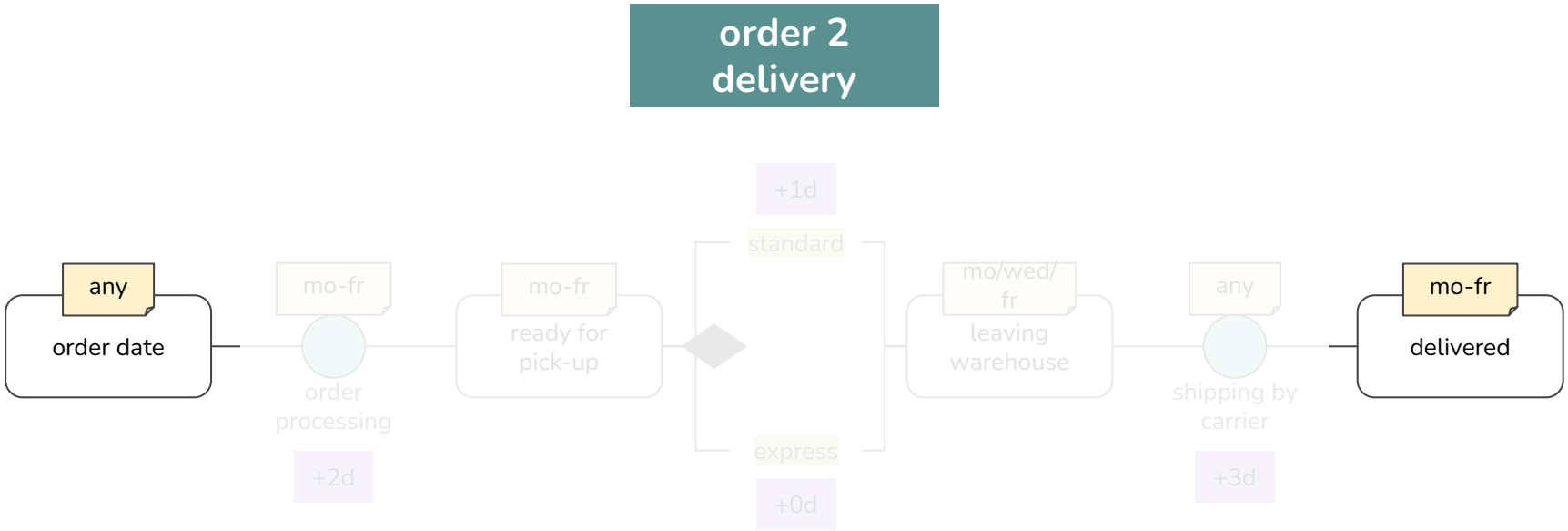
PERFORMANCE ANALYSIS

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

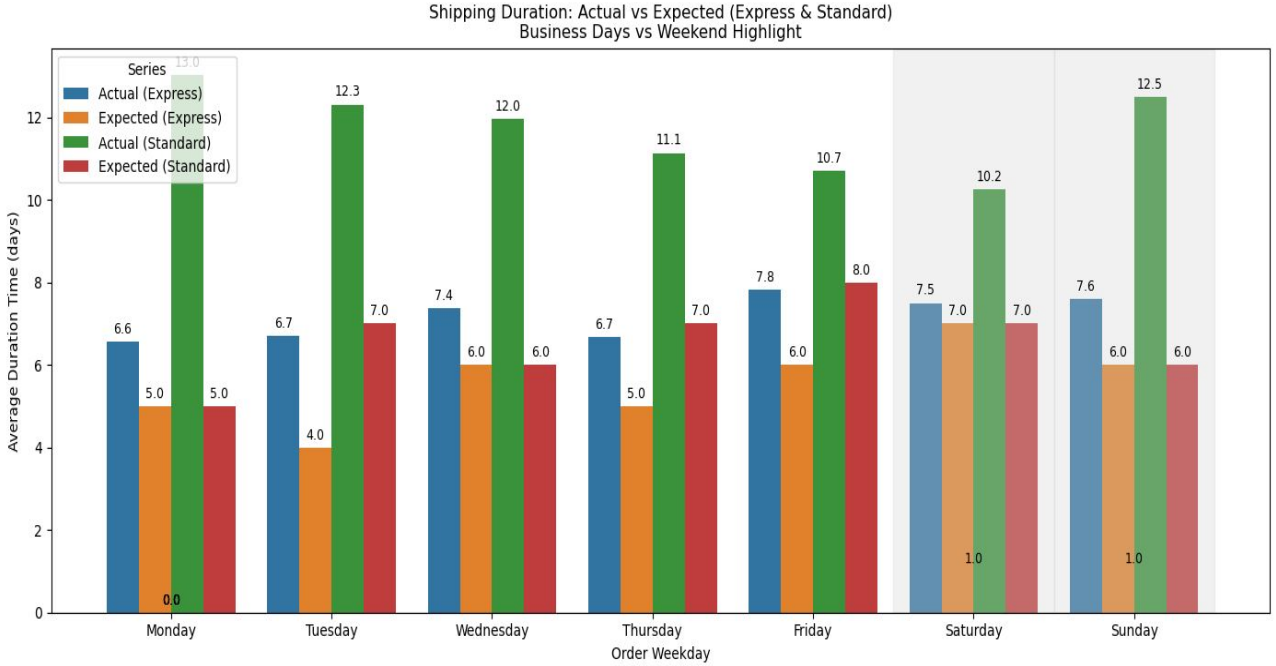
Performance Analysis

	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
any
order date
mo-fr
order processing
+2d
mo-fr
ready for pick-up
+1d
standard
express
+0d
mo/wed/ fr
leaving warehouse
any
shipping by carrier
+3d
mo-fr
delivered

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

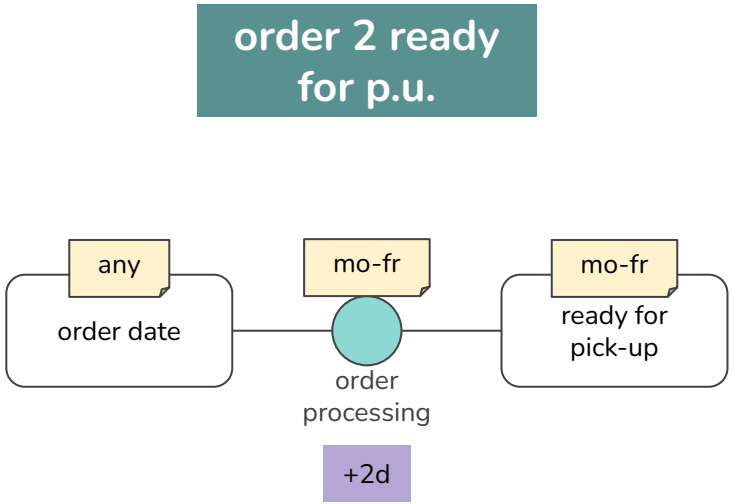
Express shipments: a bit slower than expected.

Standard shipments: often slower, especially Monday and Sunday.

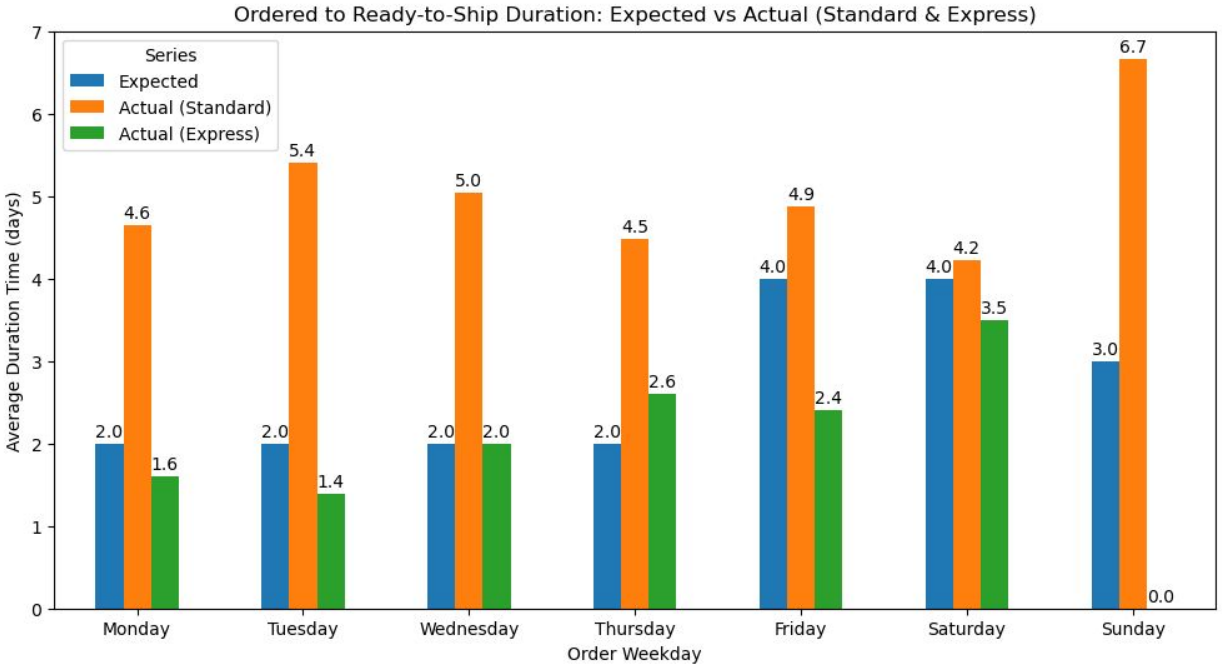
Numeric deviations confirm systematic gaps in planning vs reality.

Ship mode	Expected	Actual
Express	5.57	7.05
Standard	6.57	11.93

Order process step 1



Order 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

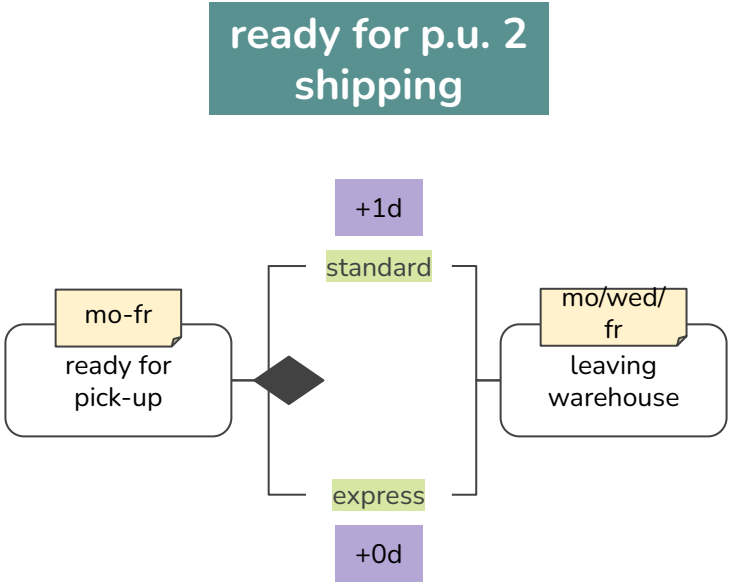
Day	Expected (Express)	Actual (Express)
Monday	2,00	1.60
Tuesday	2,00	1.38
Wednesday	2,00	2.00
Thursday	2,00	2.60
Friday	4,00	2.40
Saturday	4,00	2.40
Sunday	3,00	-
Day	**Expected (Standard)**	**Actual (Standard)**
Monday	2	4.64
Tuesday	2	5.40
Wednesday	2	5.04
Thursday	2	4.48
Friday	4	4.88
Saturday	4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

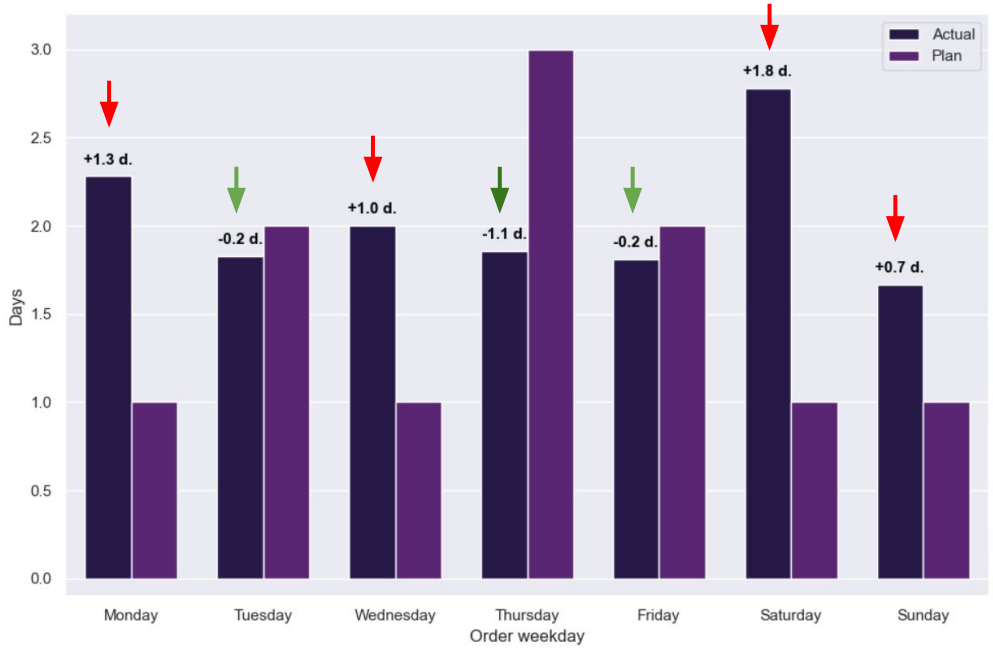
Order process step 2



ready for p.u. 2 shipping

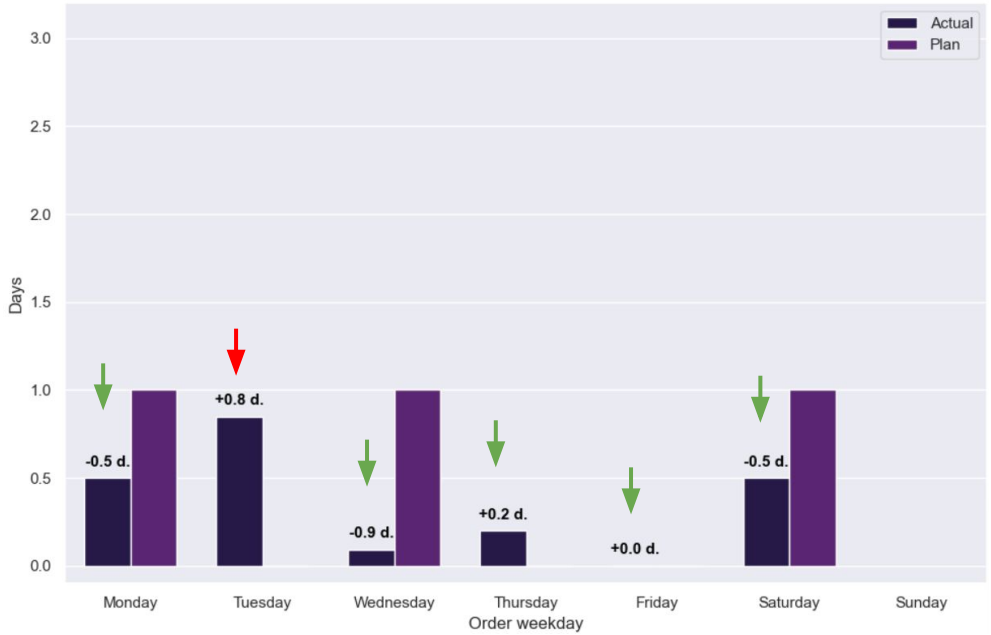
- express orders are faster
- process takes **longer than expected**
- especially longer for **standard shipments**: +1 d. on average → 50% efficiency drop vs. assumption

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



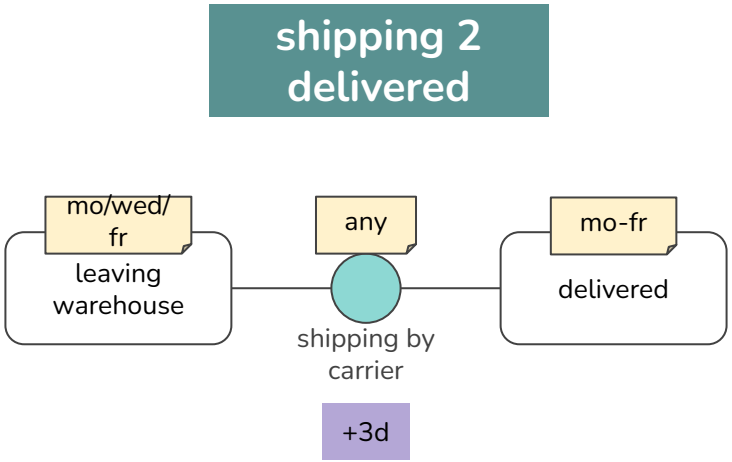
- only orders placed on tue & fr perform as expected
- orders placed on thu exceed the assumption

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



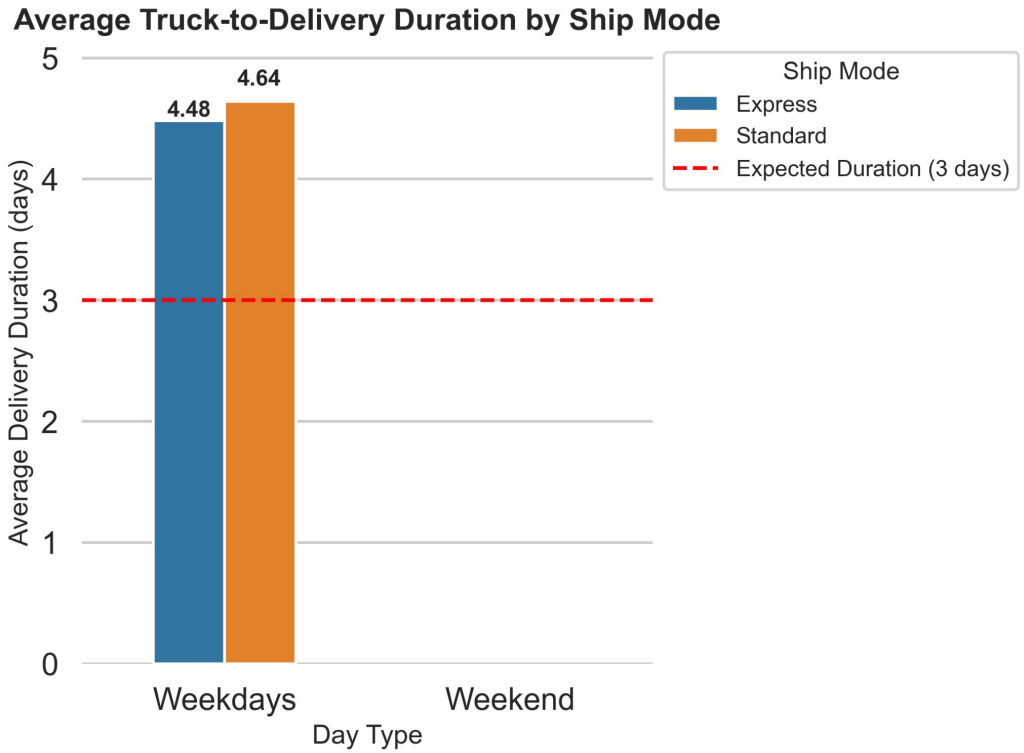
- 6/7 days **process is as expected**
- **for orders placed on tue** the process takes longer
- no orders on sunday

Order process step 3



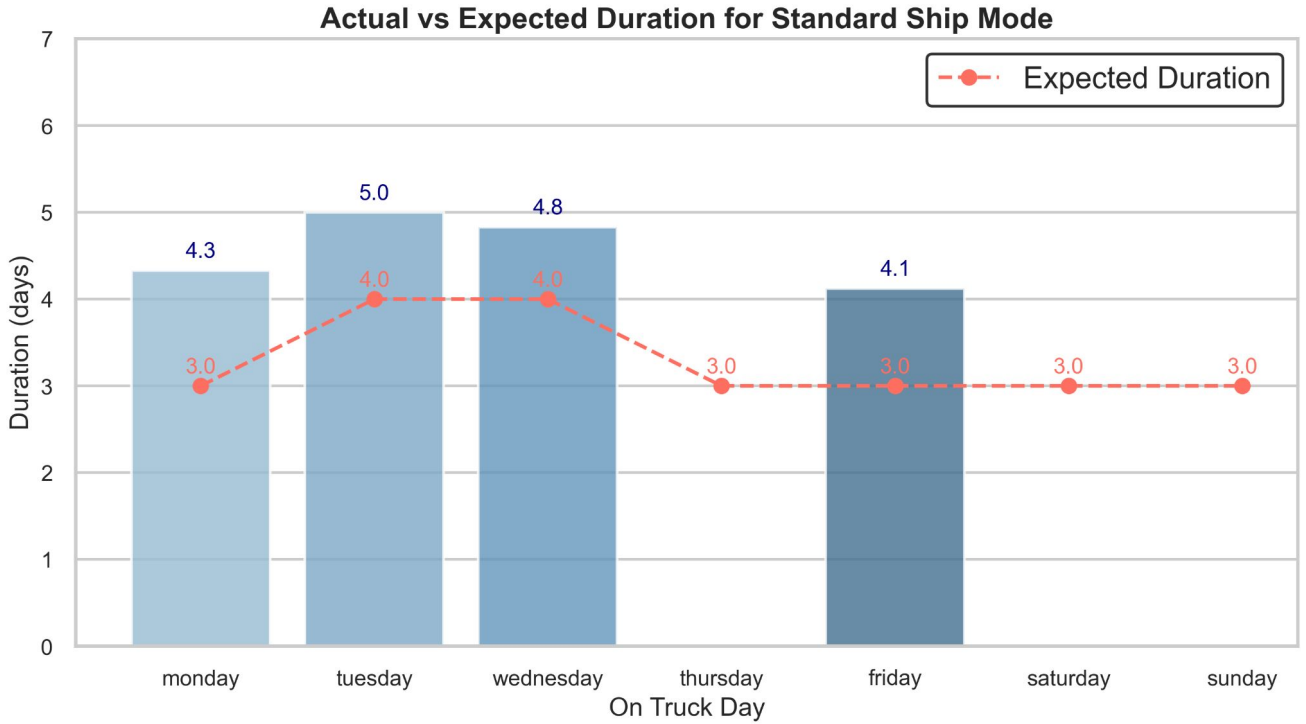
Data source: campaign and order process
Data size: 333 rows after merging due to the small size of campaign data

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

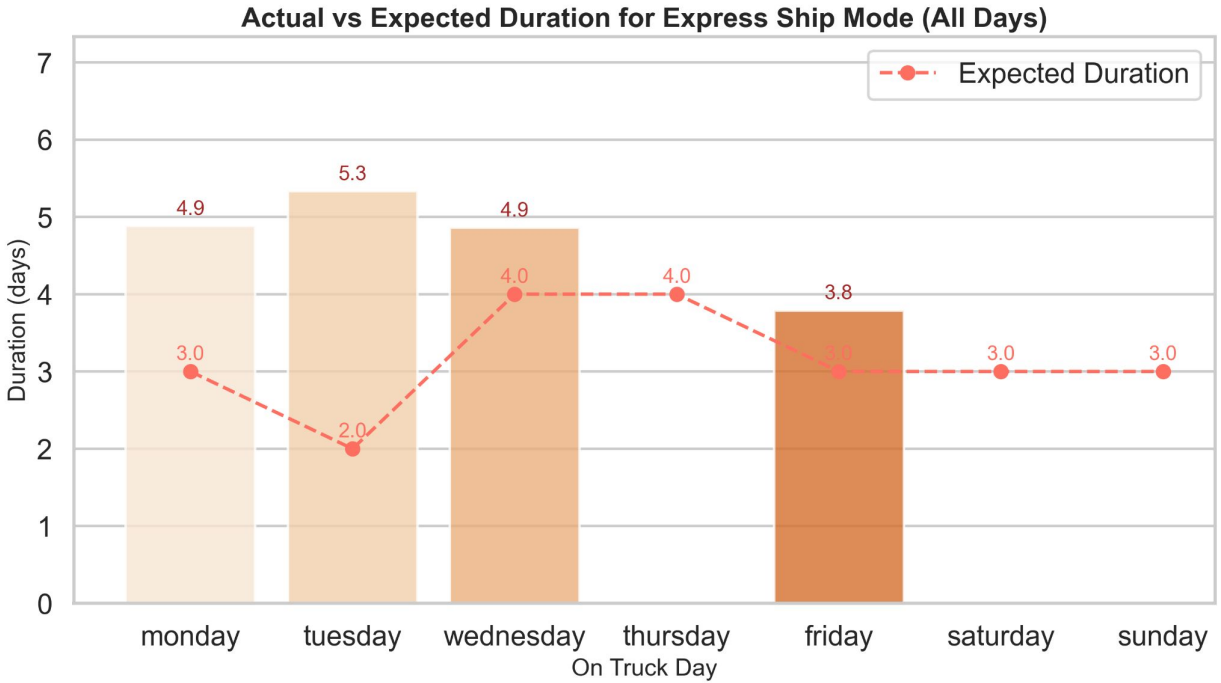


Average delay for standard shipment

	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday	Sunday
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

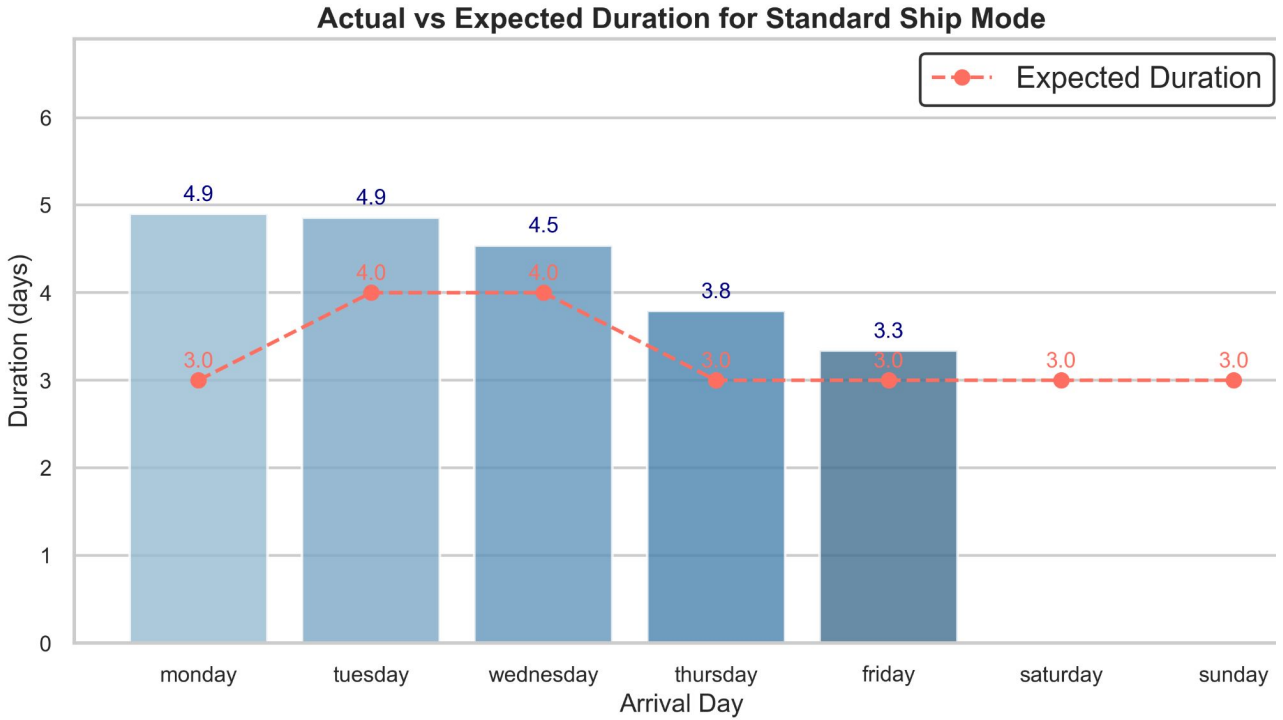


Average delay for express shipment

	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

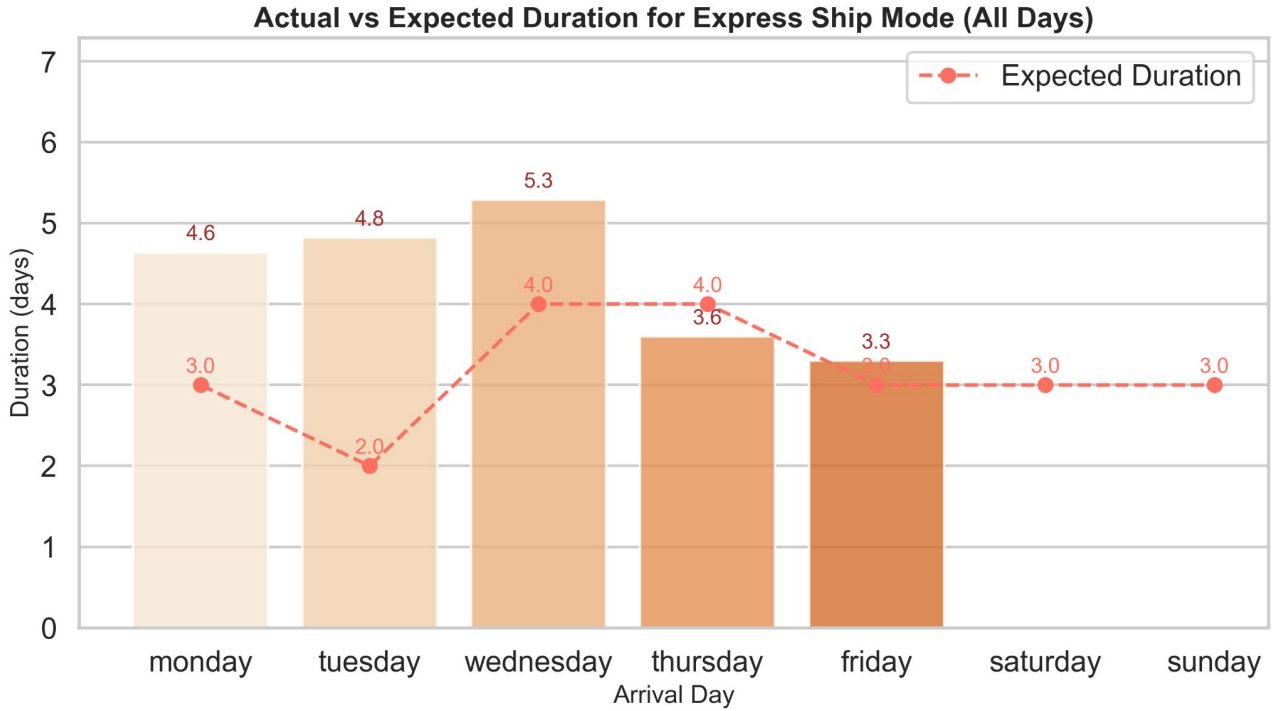


Average delay for standard shipment

	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):

```python
def data_cleaning(df, df_type):

    # make col names 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 100% match with order date in orders data
        df = df.drop("order date", axis=1)
        # dropping column ship mode, because 100% 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 100% match with on truck scan date
        df = df.drop("pickup date", axis=1)



    return df
```