



**PROJECT**

**REPORT**

# AGENDA

- 01 INTRO
- 02 OBJECTIVES
- 03 EXPLORATORY ANALYSIS
- 04 PESTE ANALYSIS
- 05 FUTURE DEMAND FORECAST
- 06 CENTER OF GRAVITY ANALYSIS
- 07 RESULTS AND RECOMMENDATIONS
- 08 LIMITATIONS



01

# INTRO

## About Reima

- Founded in 1944
- Children apparels and footwears
- Sustainability
- 1 central warehouse in Poland
- Made in China, Vietnam, India, Sri Lanka, Taiwan





02

## GOALS & OBJECTIVES

Evaluate current  
warehouse setup

1

Recommend changes  
to warehouse or new  
microwarehouses

2

Overall environmental  
and social impacts

4

Suggestions of inventory  
category

3

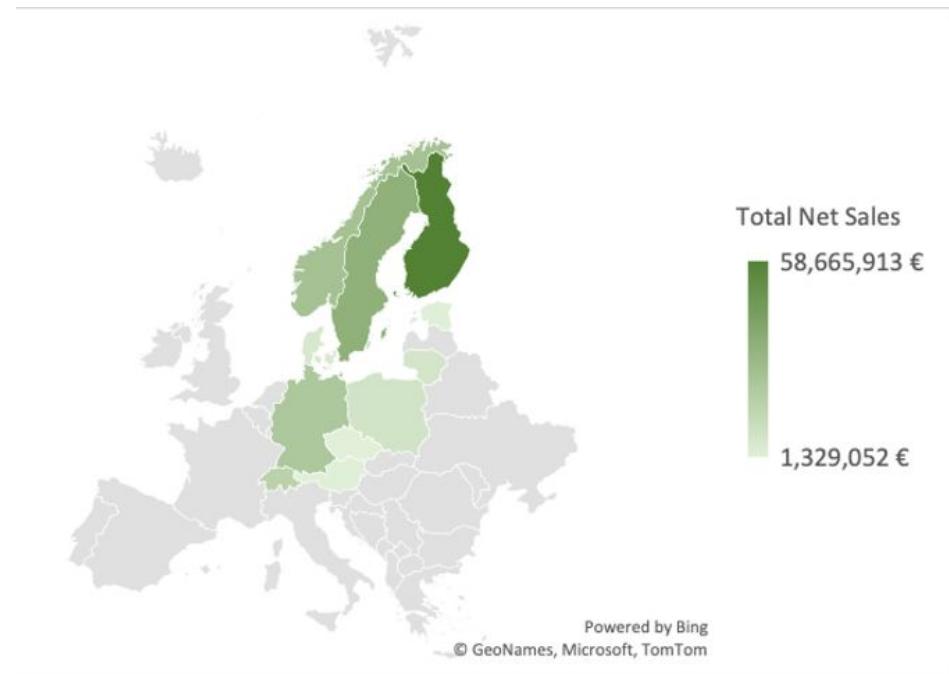
03

# EXPLORATORY ANALYSIS

Revenues generation per channel



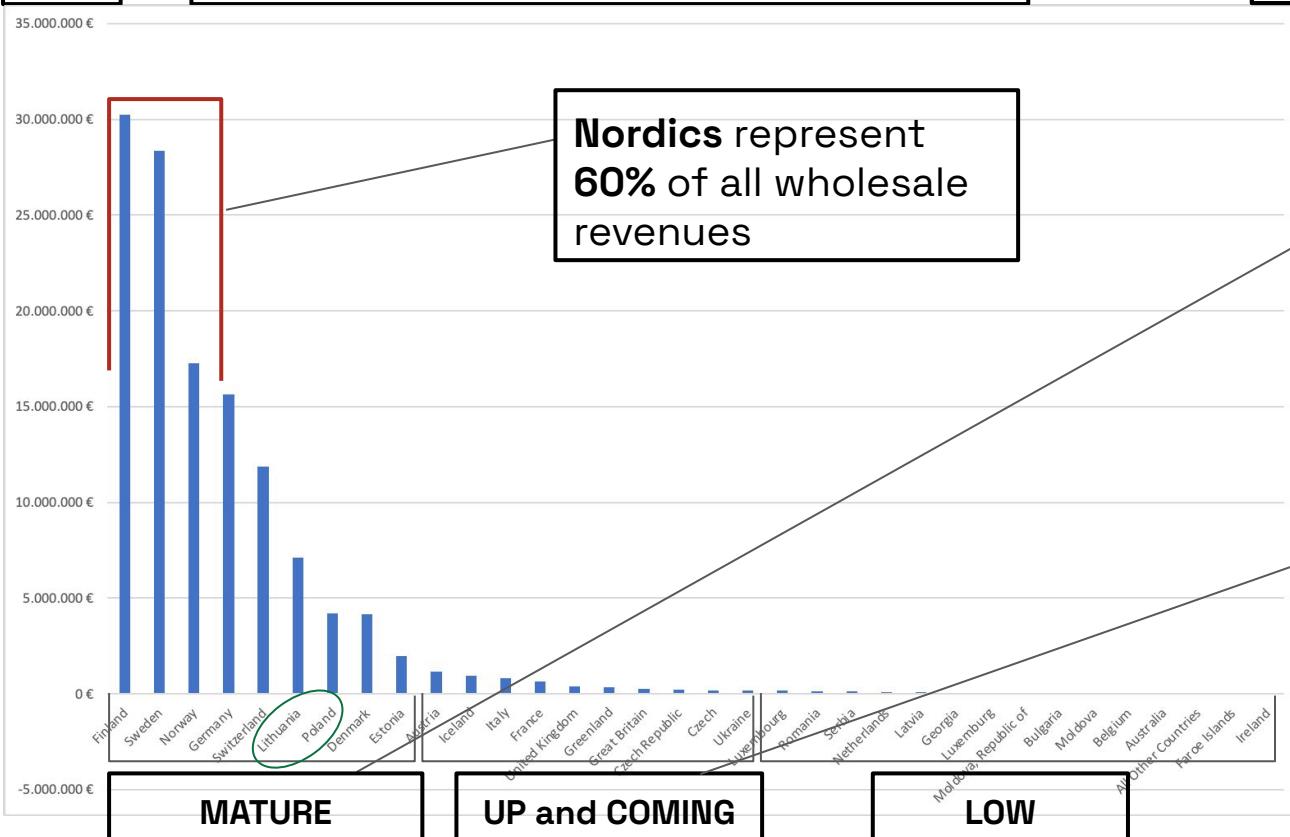
Top 10 most profitable countries



03

## EXPLORATORY ANALYSIS

## WHOLESALE



Nordics represent  
60% of all wholesale  
revenues

60%

Pre-orders  
account for 81%  
of wholesale  
revenues for  
mature markets

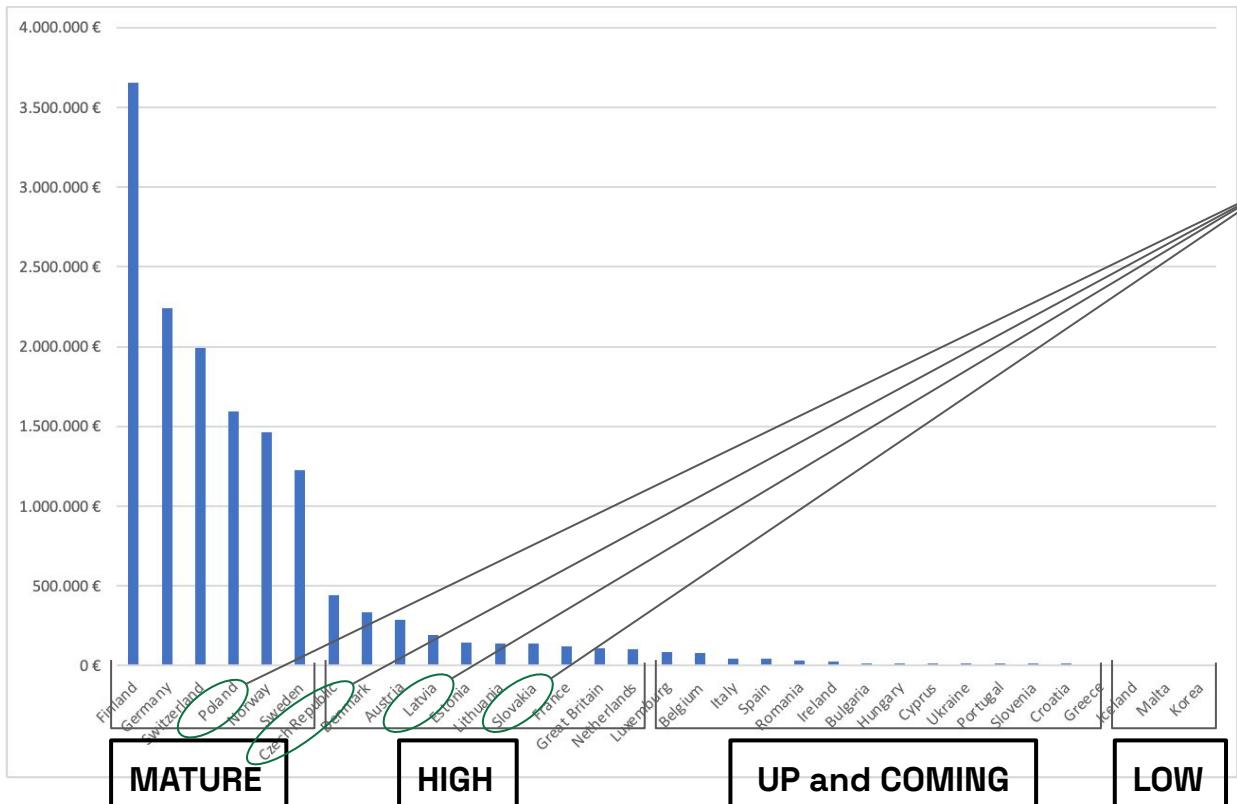
Up and coming  
markets register a  
**heavy imbalance**  
towards pre-orders  
compared to  
in-season

03

## EXPLORATORY ANALYSIS

## E-COMMERCE

25%



For these countries  
**e-commerce** has  
generated **more**  
**than 50%** of the  
whole revenues

Poland (51%)  
Czech Republic (100%)  
Latvia (96%)  
Slovakia (100%)

03

# EXPLORATORY ANALYSIS

RETAIL

15%

**Finland**

- 7 full price stores
- 5 outlet stores

**Sweden**

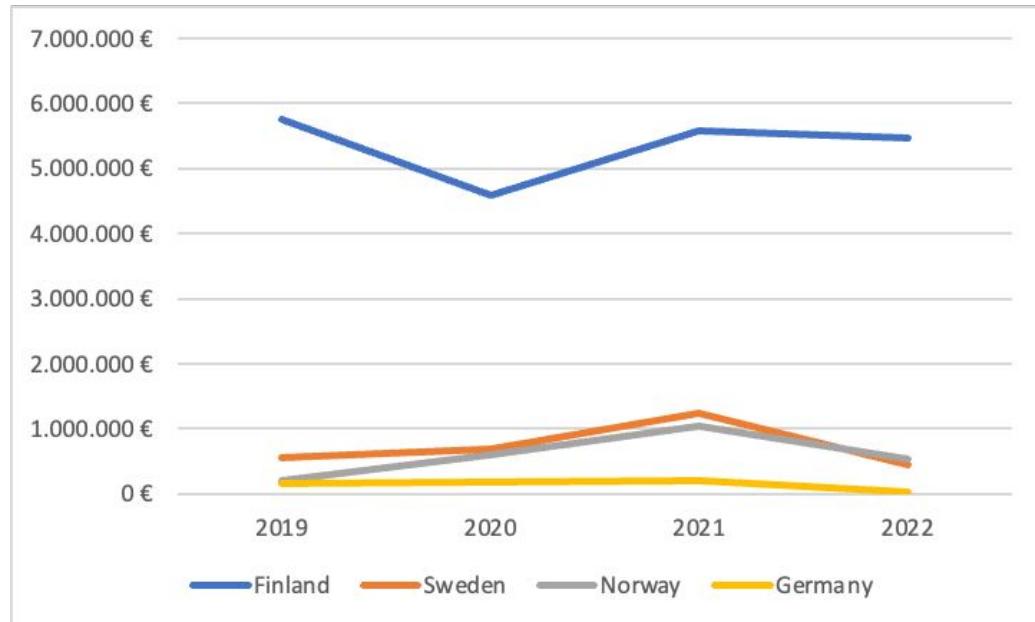
- 1 outlet store

**Norway**

- 1 outlet store

**Germany**

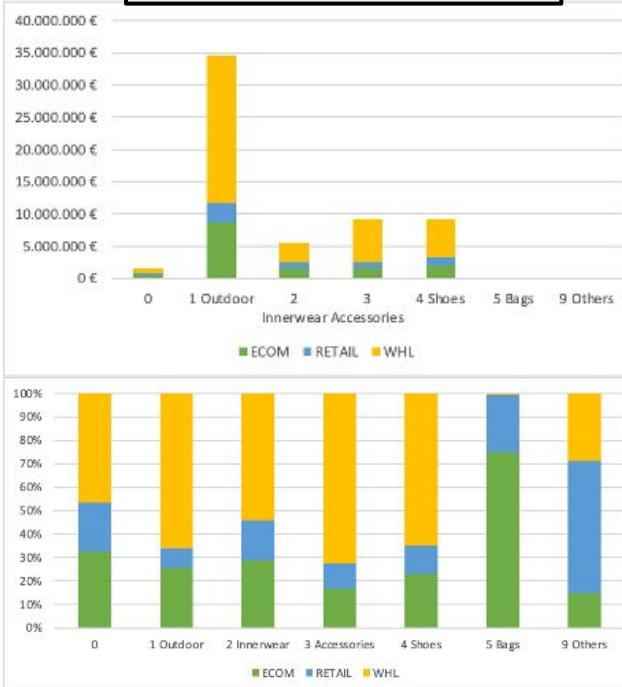
- Not available



03

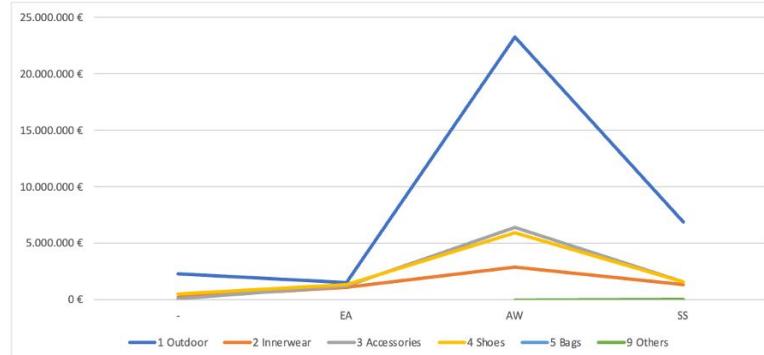
# EXPLORATORY ANALYSIS

## Distribution channels

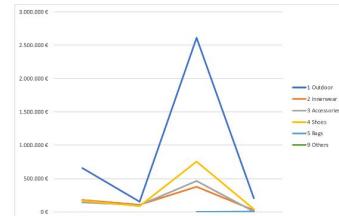


# PRODUCT CATEGORIES

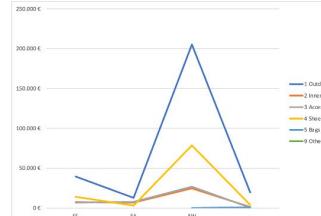
## Product Seasonality (2022)



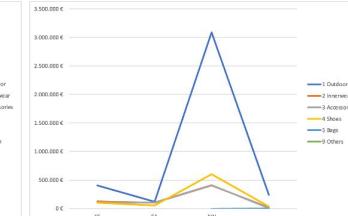
### Nordics



### Baltics



### Central Europe



# PESTE ANALYSIS



## POLITICAL

- Production in China during **Covid-19 outbreaks**
- EU response to **Russia's invasion** of Ukraine



## ECONOMICAL

- **Children's apparel sales** in Europe will increase at a **CAGR of 2.8%**
- **E-commerce** will represent almost **50% of total apparel sales** in Europe by 2025
- Sustainable apparel share will account for **8.4%** by 2026



## SOCIAL

- Average **fertility rate** is **1.55** children per woman in Europe
- Consumers' growing attention towards **recycled materials**



## TECHNOLOGICAL

- Consumer demands are changing **last-mile delivery**
- **AI, digitalisation and data management** in the supply chain



## ENVIRONMENTAL

- **EU strategy** for sustainable and circular textiles
- Reima commitment to **Science-Based Targets**



05

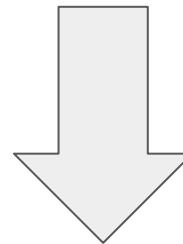
## DEMAND FORECAST

## FORECAST METHOD



FORECAST

ECOMMERCE DEMANDS



ESTIMATE

WHOLESALE DEMANDS



05

## DEMAND FORECAST

## DATA CATEGORIZATION

### High-tiered revenue drivers

4.2M - 125M€

- 0
- 1 Outdoors
- 2 Innerwear
- 3 Accessories
- 4 Shoes



### Low-tiered revenue drivers

(26 - 333K€)

- 5 Bag
- 9 Others
- Seasonal
- Non-seasonal



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## DEMAND FORECAST

## DATA CATEGORIZATION

MATURE

TOP

	ECOM				Trend
Row Labels	2019	2020	2021	2022	
MATURE	Finland	3,924,906 €	4,525,287 €	3,633,275 €	3,657,231 €
	Germany	1,547,791 €	1,889,133 €	2,356,328 €	2,242,701 €
	Norway	1,928,045 €	2,257,026 €	1,829,789 €	1,461,048 €
	Switzerland	571,540 €	1,745,480 €	2,002,228 €	1,991,689 €
	Sweden	1,106,285 €	1,382,341 €	1,331,580 €	1,225,947 €
	Poland	549,195 €	725,409 €	1,214,751 €	1,595,626 €
TOP	Denmark	345,459 €	478,340 €	462,984 €	336,786 €
	Czech Republic	178,912 €	263,152 €	378,799 €	441,006 €
	Austria	136,670 €	204,430 €	275,565 €	286,680 €
	Latvia	107,234 €	157,262 €	211,947 €	190,736 €
	Lithuania	54,388 €	68,710 €	132,333 €	138,759 €
	Great Britain	81,404 €	111,467 €	79,041 €	111,752 €
	Estonia	55,533 €	79,572 €	95,220 €	144,110 €
	France	36,044 €	53,477 €	80,859 €	123,415 €
	Netherlands	30,219 €	48,551 €	80,497 €	102,669 €
	Slovakia			109,875 €	136,528 €

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## DEMAND FORECAST

## ECOM DEMANDS

### AutoRegressive

Use historical time-series data as predictors

### Integrated

Make data "stationary"

### Moving Average

Use average of previous mistakes as predictors in the model

**`statsmodels.tsa.arima.model.ARIMA(order=(p,d,q))`**

(Package on Python)

### Model parameters:

- p: the number of lag observations contained in the model.
- d: the number of times the raw observations are differenced.
- q: the moving average window size

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## DEMAND FORECAST

## ECOM DEMANDS

Pre-defined set  
of parameters

p=[0, 1, 2, 4, 6, 8, 10]  
d=[0, 1, 2]  
q=[0, 1, 2]

Grid Search

Get all possible combinations of (p,d,q) and train the model, e.g:  
- 0,0,0  
- 0,0,1  
- 0,0,2  
- 0,1,0  
- etc.  
⇒ Total: 63 combinations

Calculate MSE

For each (p,d,q) combination:  
- apply to the model  
- divide 70train-30test  
- make 1 step forecast  
- calculate **Mean Squared Error** from the expected value

Apply and repeat

- The (p,d,q) with the lowest MSE will be applied to the final model.  
- Use forecast function to forecast the next 8 quarters  
- Repeat for all countries (15)/categories(5)

⇒ Total: 75 times

05

## DEMAND FORECAST

## WHOLESALE DEMANDS

Multiplier  
(m)

$$m = \text{WHL qty} / \text{ECOM qty}^*$$

\*historical data

Adjusted Multiplier  
(M)

If:

- Mature markets  
→ M = 0.8m

- Non-mature markets  
→ M = m

Estimate  
WHL demand

$$\text{WHL qty} = \text{ECOM qty} * M$$

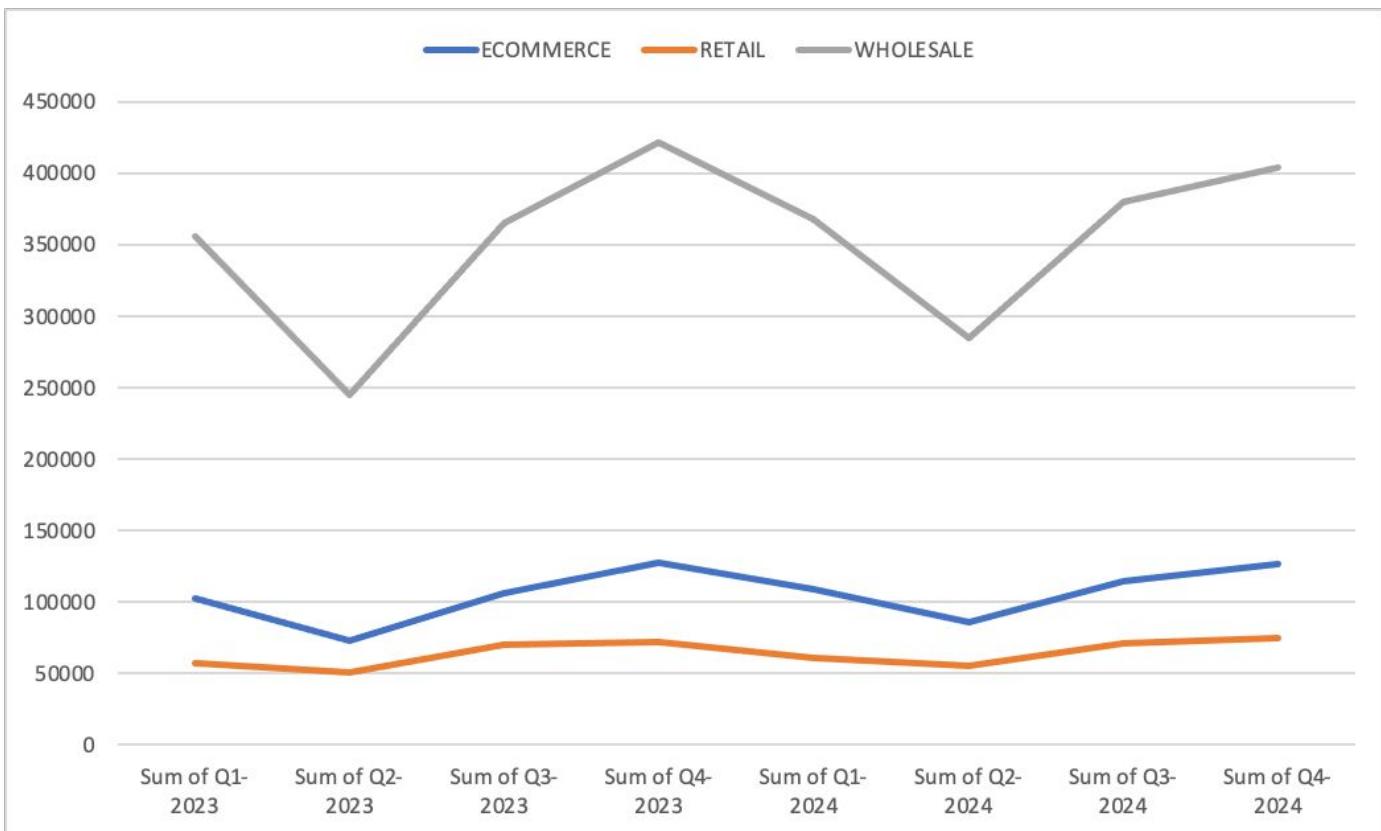
\*forecasted data

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## DEMAND FORECAST

## RESULTS

Forecasted  
Demands by  
**CHANNEL**

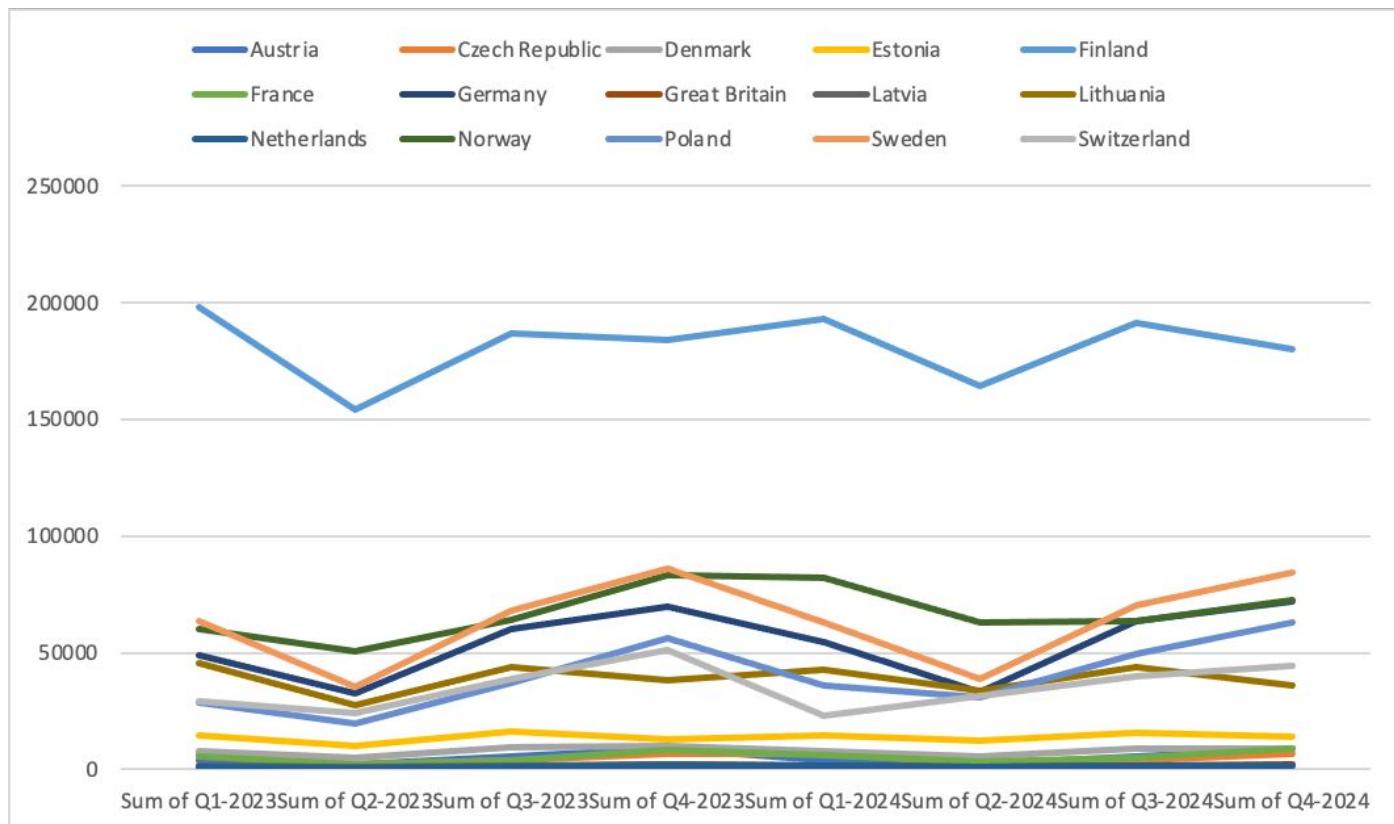


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## DEMAND FORECAST

## RESULTS

Forecasted  
Demands by  
**COUNTRY**

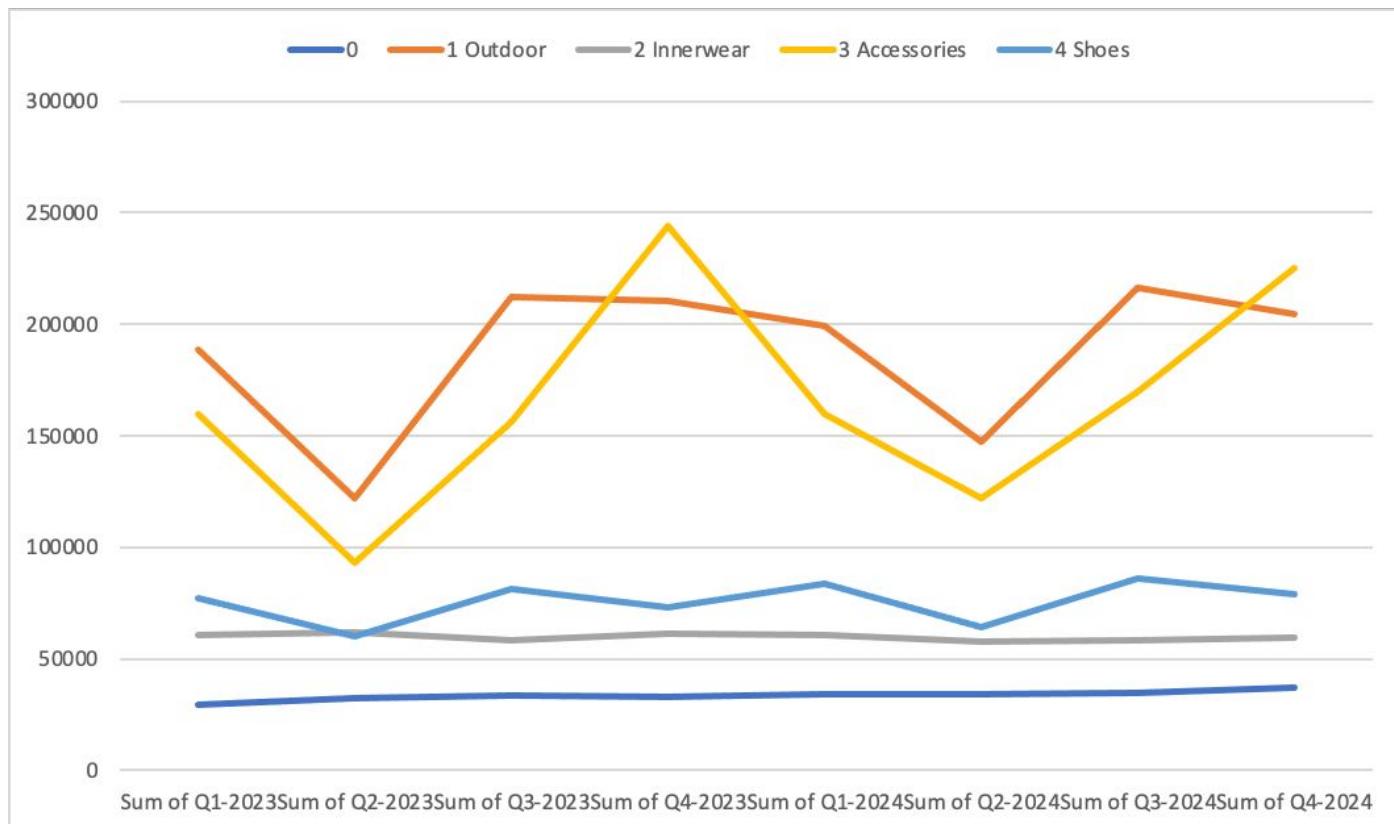


05

## DEMAND FORECAST

## RESULTS

Forecasted  
Demands by  
**PRODUCT CAT.**



ECOM/WHL weight

Last mile shipping costs:  
 $w = \text{ECOM}/\text{WHL} = 3.39X$

Weighted Total Demand

Weighted total demands:  
 $= \text{ECOM} * 3.39 + \text{WHL} + \text{RTL}$   
 \*assuming shipping costs for RTL and WHL is the same (bulk shipping)

Distance between 2 locations

$$D = \text{ArcCos}(\text{Cos}(\text{Radian}(90-X_2)) * \text{Cos}(\text{Radian}(90-X_1)) + \text{Sin}(\text{Radian}(90-X_2)) * \text{Sin}(\text{Radian}(90-X_1)) * \text{Cos}(\text{Radian}(Y_2-Y_1))) * 6371$$

(X<sub>1</sub>, Y<sub>1</sub>): coordinate of Optimal Location  
 (X<sub>2</sub>, Y<sub>2</sub>): coordinate of demand location (capital)  
 6371: radius of Earth in km (!)

Optimization

- Formulate into Excel
- **Constraint:** warehouse in north-east sphere
- X<sub>1</sub>>0
- Y<sub>1</sub>>0
- **Constraint:**  
 Y<sub>1</sub><62 (Jyväskylä)  
 X<sub>1</sub><36 (Russia)
- Solve with Excel Solver
- Method: **Revolutionary**

A	B	C	D	E	F	G	H	I	J	K	L	M	N
1				Ecom/WHL weight	3.39								
2	Country	City	Ecom volume in 2 years	WHL+Retail volume in 2 years	Total adjusted volume (V)	Longitude (Y2)	Latitude (X2)	Location Type	Distance km (D)				
3	1 Finland	Helsinki	234925	3519111	4315507	60.17	24.94	Demand	7026.34				
4	2 Germany	Berlin	111206	1422677	1799665	52.52	13.41	Demand	5972.11				
5	3 Norway	Oslo	123613	1581405	2000453	59.91	10.75	Demand	6726.29				
6	4 Switzerland	Geneva	65694	840433	1063136	46.2	6.14	Demand	5172.16				
7	5 Sweden	Stockholm	70814	905935	1145994	59.33	18.07	Demand	6781.98				
8	6 Poland	Warsaw	144033	1842644	2330916	52.23	21.01	Demand	6129.73				
9	7 Denmark	Copenhagen	14923	190908	241497	55.68	12.57	Demand	6295.01				
10	8 Czech Republic	Prague	24360	311636	394216	50.08	14.44	Demand	5735.24				
11	9 Austria	Vienna	12001	153536	194219	48.21	16.37	Demand	5587.97				
12	10 Latvia	Riga	10123	129502	163819	56.97	24.11	Demand	6889.87				
13	11 Lithuania	Vilnius	6645	85004	107531	54.69	25.28	Demand	6503.80				
14	12 Great Britain	London	3711	47475	60055	51.51	-0.13	Demand	5727.66				
15	13 Estonia	Tallinn	9266	118544	149956	59.44	24.75	Demand	6949.77				
16	14 France	Paris	7600	97231	122995	48.86	2.35	Demand	5437.66				
17	15 Netherlands	Amsterdam	5649	72264	91414	52.37	4.9	Demand	5841.21				
18													
19				Y1	X1								
20	Center of Gravity Optimal location					Objective fu	91334978692						

$y_1$        $x_1$

Objectives for

#### Center of Gravity Optimal location

## Constraints

### **Constraints**

Longitude  $\geq 0$

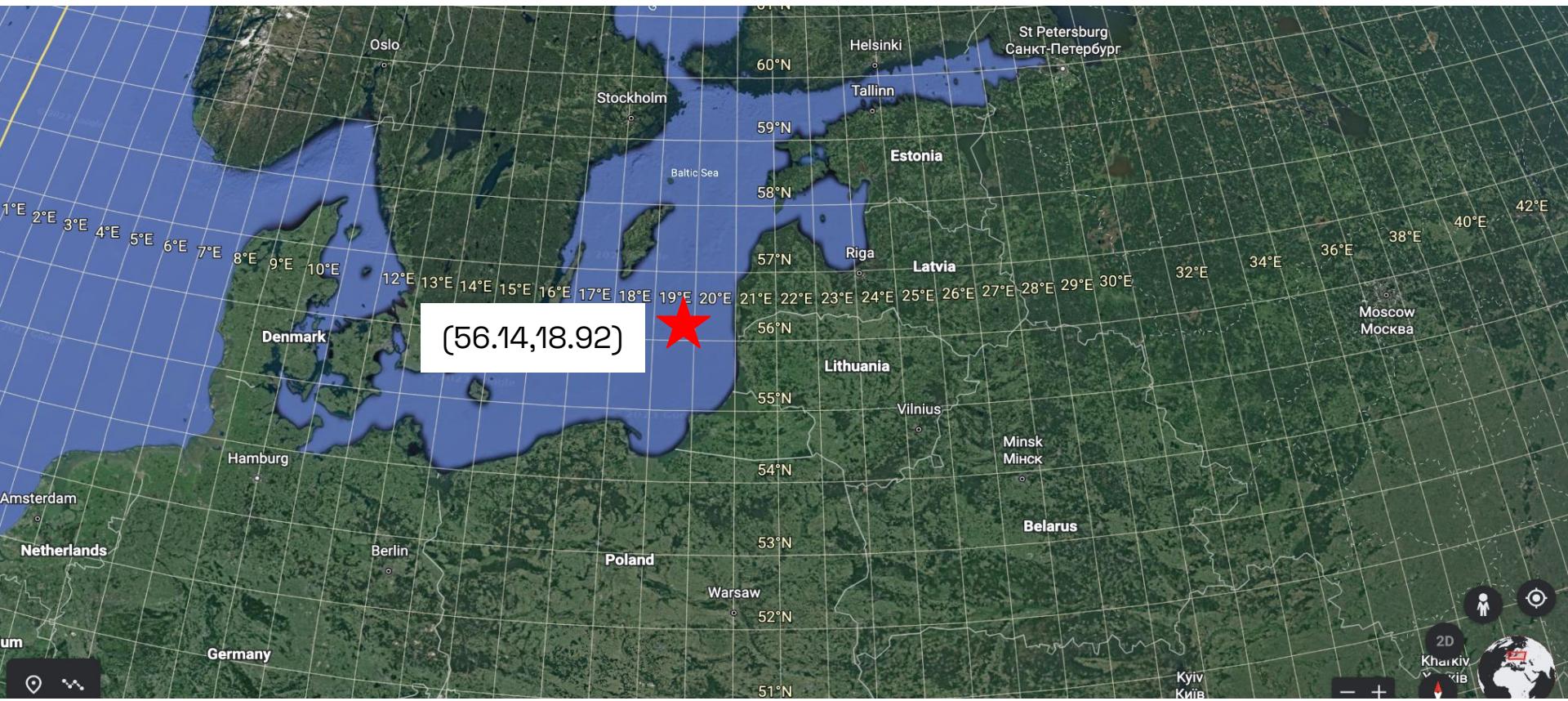
Latitude >= 0

Longitude <= 62 (jyvasky)

06

# CENTER OF GRAVITY ANALYSIS

# RESULTS



AutoSave

Sales Forecast

Home Insert Draw Page Layout Formulas Data Review View Tell me

Cut Copy Format Paste

Calibri (Body) 12 A A Wrap Text General Conditional Formatting as Table Normal Bold Good Neutral Insert Delete Format Auto-sum Filter Sort & Filter Find & Select Analyse Data

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R
1					Ecom/WHL weight	3.38												
2	Country	City	Ecom volume in 2 years	WHL RETAIL volume in 2 years	Total adjusted volume (V)		Longitude (Y2)	Latitude (X2)	Location Type	Distance km (D)								
3	1 Finland	Helsinki	234925	513670	1310066	60.17	24.94	Demand	7026.34									
4	3 Norway	Oslo	123613		419048	59.91	10.75	Demand	6726.29									
5	5 Sweden	Stockholm	70814		240059	59.33	18.07	Demand	6781.96									
6	7 Denmark	Copenhagen	14923		50589	55.68	12.57	Demand	6295.01									
7	10 Latvia	Riga	10123		34317	56.97	24.11	Demand	6689.87									
8	11 Lithuania	Vilnius	6645		22527	54.69	25.28	Demand	6503.80									
9	13 Estonia	Tallinn	9266		31412	59.44	24.75	Demand	6940.77									
10																		
11																		
12	Center of Gravity Optimal location		Y1	X1					Objective fun	14564532221								
13	Constraints																	
14	Longitude >= 0		1			0 >=				0								
15	Latitude >= 0			1		0 >=				0								
16	Longitude <= 62 (Jyväskylä)		1			0 <=				62								
17	Latitude <= 35 (Russia)			1		0 <=				35								
18																		
19																		
20																		
21																		
22																		
23	Only keep BALTICS + NORDICS regions																	
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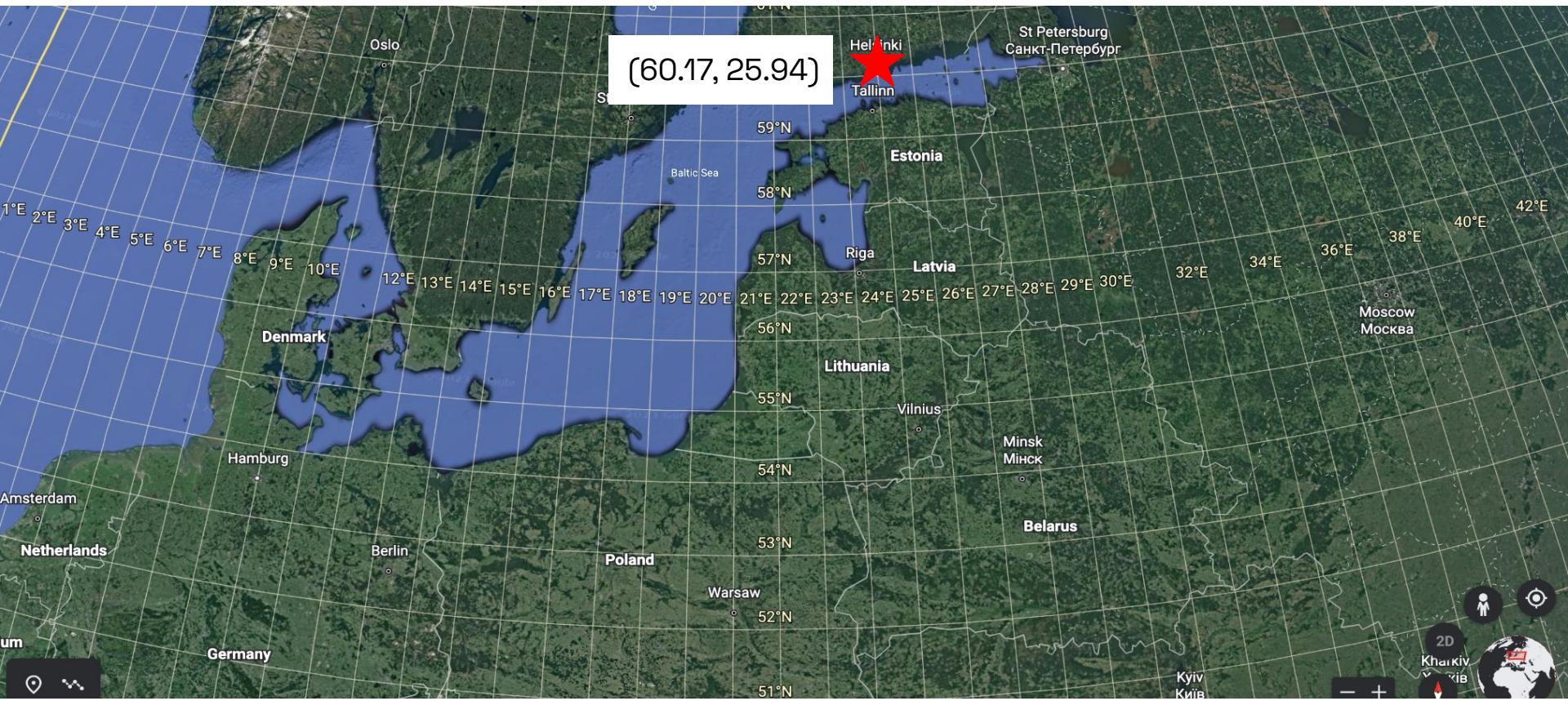
Finder



06

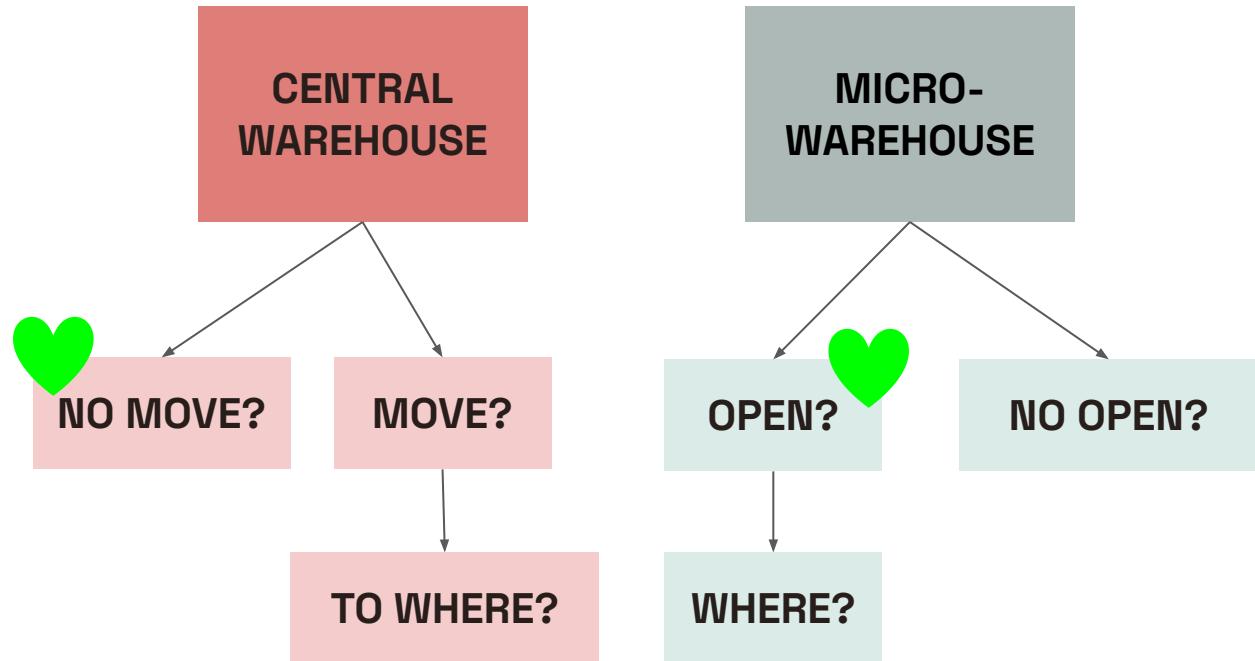
# CENTER OF GRAVITY ANALYSIS

# RESULTS



07

## RESULTS & RECOMMENDATIONS



## Last-mile Shipping costs

	To Finland (00100)	To Norway (00110)	To Sweden (11115)	To Denmark (1050)
From Finland (00100)	Zone 1 1-2 days or same day	Zone 5 125EUR 3-4 days	Zone 1 104EUR 1-2 days	Zone 1 104EUR 3-4 days
From Estonia (10001)	Zone 1 70 EUR 1-2 days	Zone 6 99.5EUR 4-5 days	Zone 2 87EUR 2-3 days	Zone 2 87EUR 2-3 days
From Latvia (1004)	Zone 1 94.5EUR 2-3 days	Zone 4 113EUR 5-6 days	Zone 1 94.5EUR 4-5 days	Zone 1 94.5EUR 4-5 days

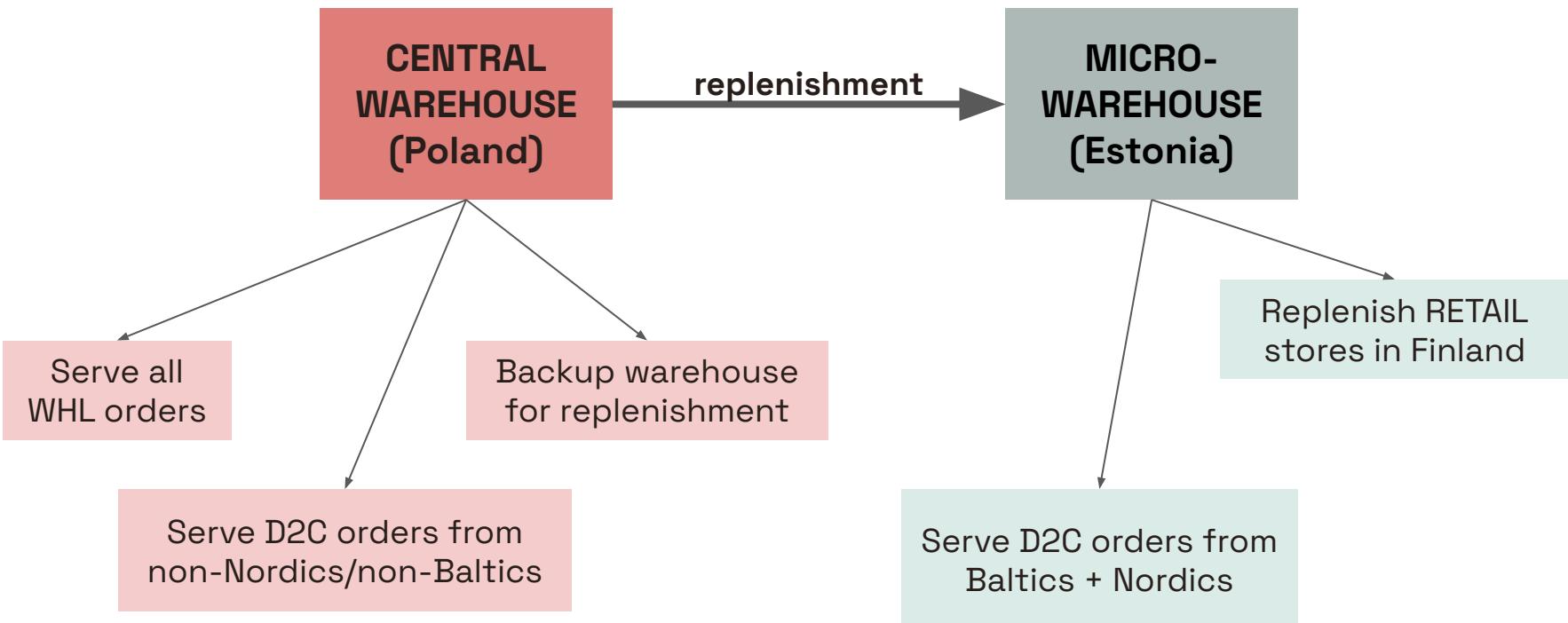
## Warehousing operating costs

	Finland	Estonia	Latvia
Labor costs (€/h)	30,6	11,1	7,7
Renting cost (€/sm/month) <5,000sm	10,3	4,8	4,7
Renting cost (€/sm/month) >5,000sm	8	4,5	4,1
Size of facilities (1,000sm)	175	8	6
Net prime yields (%)	3,9	6,9	6,9

07

## RESULTS & RECOMMENDATIONS

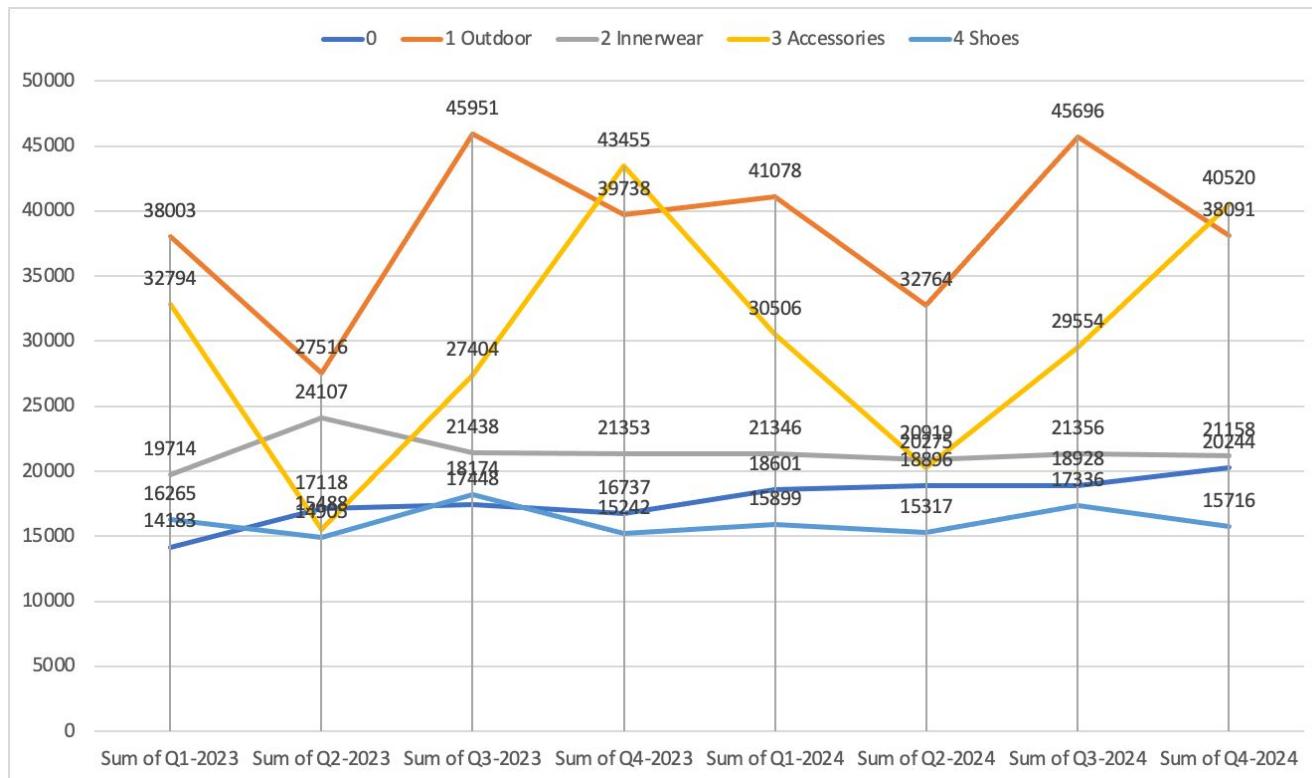
## INVESTMENT PLAN



07

# RESULTS & RECOMMENDATIONS

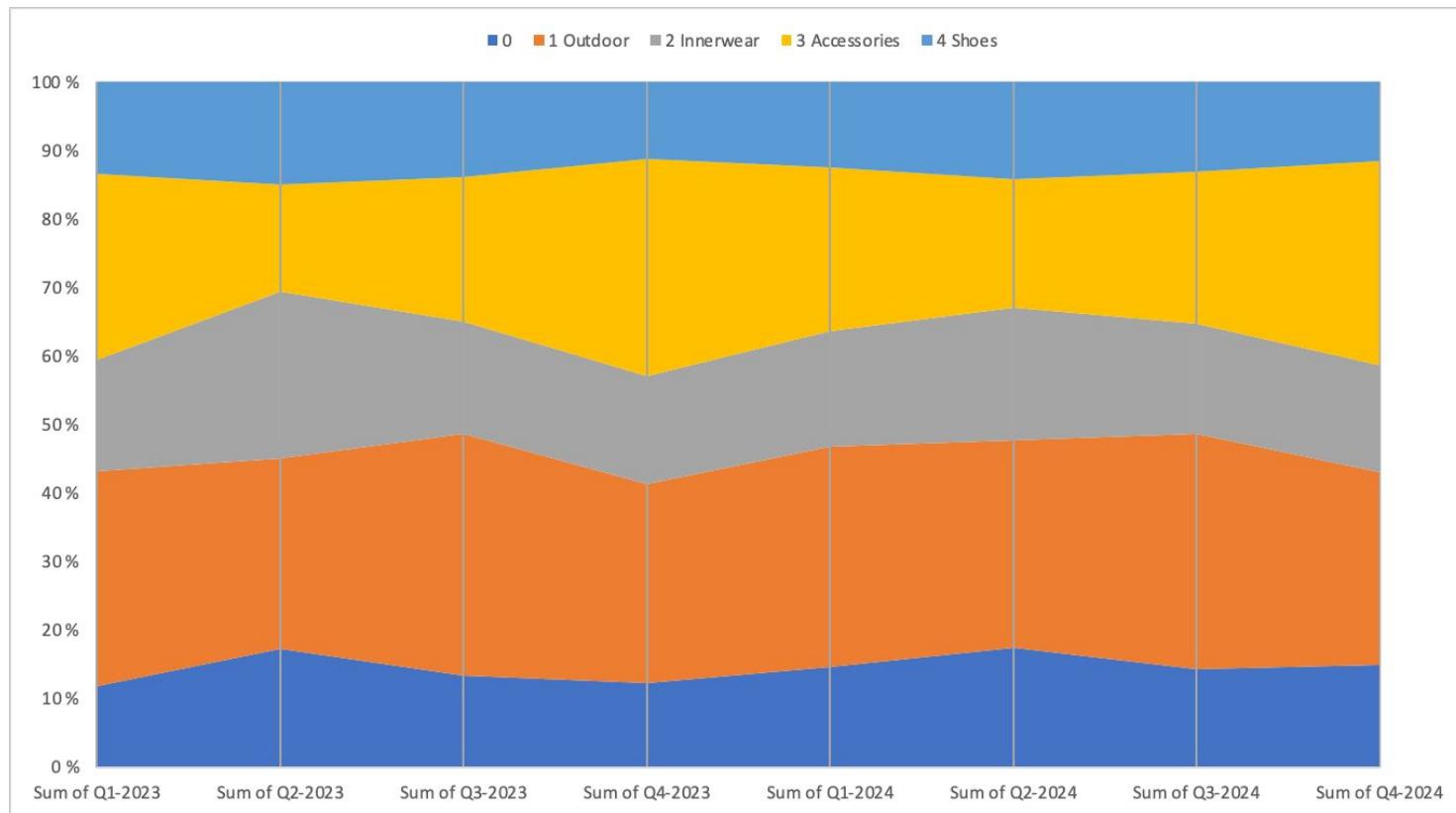
# PRODUCT



07

# RESULTS & RECOMMENDATIONS

# PRODUCT





07

## RESULTS & RECOMMENDATIONS

## BIZ IMPACTS

**REDUCE**

D2C shipping  
time

**REDUCE**

RETAIL  
replenishment  
time

**LOW**

warehousing  
& shipping  
costs

**GROW**

Market share

07

## RESULTS & RECOMMENDATIONS

## SUSTAINABILITY

### CURRENT SETUP

Poland central warehouse  
No microwarehouse

**752M**

Total distance in km that  
all ECOM products need  
to travel to meet  
demands

### RECOMMENDED SETUP

Poland central warehouse  
No microwarehouse

**541M**

Total distance in km that  
all ECOM products need  
to travel to meet  
demands

at least  
**-28%**

Reduction in  
CO2 emission

+

approx.  
**-10%**

Reduction in CO2  
emission from **returns**  
shipping

- Not all countries were included.
- **Product Group Desc.** instead of **Product Group**
- From ECOM to WHL: the use of multiplier is naive.
- Limited (p,d,q) values
- Bird-view distance was considered instead of road-based distance.
- DHL illustrative shipping costs is used as a reference, not real-time.





THANK

YOU