OPTIMIZING THE SAP TM OPTIMIZER FOR RETAIL

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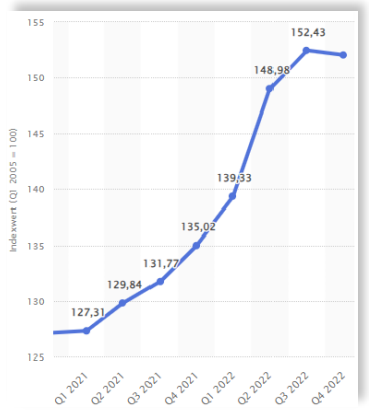
The Challenge

European **road transport prices broke new records** in 2022



+13%

in Europe

+18%

in Germany

Increasing demands of customers and retail stores regarding **service level and delivery frequency**

Sources:
2022 Road Freight Market Insights Report, Sennder
Price index freight rates Germany 2021-2022, Statista Research Department

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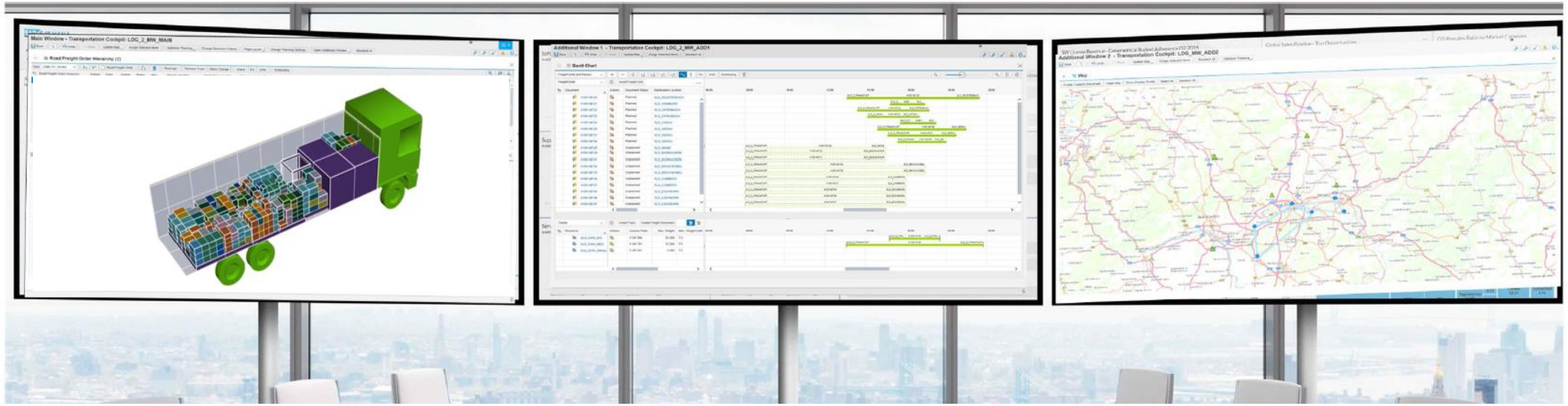
KPS

Optimizing Retail Store Delivery with the SAP TM Optimizer

- Overcome the challenge of high transport costs and rising customer demands with SAP Transportation Management (SAP TM), **SAPs state of the art transportation management system** (TMS), rated as a leading TMS by Gartner and ARC Advisory Group
- SAP TM comes with a multitude of features for all transport modes, cargo, industries and scenarios.
  For planning, an **optimization engine** can dynamically create optimal tours, minimizing overall costs while considering all relevant constraints.



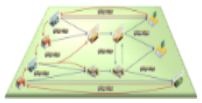
Sources:
Leader's Quadrant of Gartner Magic Quadrant 2023

Optimizing Retail Store Delivery with the SAP TM Optimizer

Input

Transport demands

Transport capacities

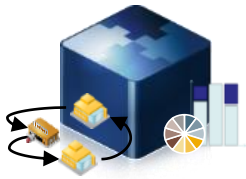


Master data & network

Planning settings

SAP TM Optimizer

Optimizer



Calculate optimal tours based on costs and constraints such as

- Store delivery time windows
- Driving time regulations
- City center restrictions
- Availability of resources
- Public holidays
- …

Output

Optimized tour plan

as basis for

Optimization potentials and cost efficient delivery of stores

Information and visibility for supply chain partners

KPS

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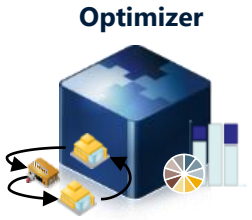
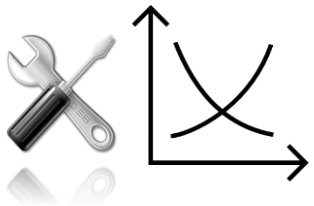
Why Do We Need to Optimize the Optimizer?



The SAP TM optimizer is a flexible **heuristic algorithm** working based on **internal planning costs**.

- The **quality** of the planning result heavily depends on precise setup of the planning cost model and settings.



- Finetuning and optimizing those settings can bring considerable further improvements and up to 5% reduction of transport costs.[1]

[1] 5% reduction of transport costs achieved in previous KPS projects.

How Do We Optimize the Optimizer?

1. **Analysis of as-is & identify pain points**
2. **Conduct simulation runs**
3. **Analyze results & implement improvements**

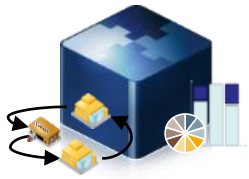
Analyze as-is transportation **planning process**

Check current **optimizer settings**, **constraints** and **planning costs**

Evaluate current **quality of planning result**
(compare optimizer result with manual changes and actual execution of tours)

Identify planning **weaknesses** and **pain points**

How Do We Optimize the Optimizer?



1 **Analysis of as-is & identify pain points**

2 **Conduct simulation runs**

3 **Analyze results & implement improvements**

Conduct optimizer simulation runs based on **realistic data from production**, adjusting **planning parameters** and assessing **impact on KPIs**

Input							Output													
Nr	Description	Max nr processes	Max runtime	Max nr of stops	Costs per interm. stop	Blackboard parameter	Total costs	Used vehicles	FOs created	Duration [h]	Distance [km]	StopOffs	% of stores w/ 2 stops	Average utilization [M3]	Initial Solution	Best init. solution after	Best solution after	Nr of generations	Total generations	Comments
0	Original run 11.08.21	2	1200	4, 5			21814	49	61	270	[illegible]	119	24%	93%	22925	36	15,1	848	1696	
0	Manually updated transportation plan								62		[illegible]	117								
1	Local run, original data	2	1200	4, 5			21814	49	61	270	[illegible]	119	24%		22925	38	14,1	827	1654	
2	Local run, original data, 6 parallel processes	6	1200	4, 5			21698	49	62	270	[illegible]	120	25%	92%	22925	38	15,1	575	3450	
3	Local run, original data, 6 parallel processes, no max stops	6	1200	Unlimited		Neighbour-hood size 20	20985	49	59	267	[illegible]	122	27%	94%	22925	37	10,1	536	3216	Max number of stores was 4
4	Local run, original data, 6 parallel processes, no max stops, 1 hour runtime	6	3600	Unlimited		Neighbour-hood size 20	20759	48	60	270	[illegible]	118	23%	95%	22925		44,8	1487	8922	Max number of stores was 4
5	Local run, original data, 6 parallel processes, max stops + 1	6	1200	5, 6			21806	49	60	269	[illegible]	123	28%		22925	41	16,0	558	3348	
6	Local run, original data, 6 parallel processes, RearrangeDeliveriesInOpt	6	1200	4, 5		RearrangeDeliveriesInOpt	22364	52	61	272	[illegible]	119	24%		22925	38	1,7	39	234	
7	Local run, original data, 6 parallel processes, RearrangeDeliveriesInOpt	6	3600	4, 5		RearrangeDeliveriesInOpt	22337	50	61	274	[illegible]	124	29%		22925	36	33,2	127	762	
8	Local run, original data, 6 parallel processes, default max neighborhoodsize (10)	6	1200	4, 5		Removed Neighbour-hood size 20	22126	49	62	275	[illegible]	121	26%		23455	37	9,9	537	3222	
9	Local run, original data, 6 parallel processes, higher stop off costs (*1,5)	6	1200	4, 5	x 1,5		25052	49	62	272	[illegible]	113	18%		26211		8,6	534	3204	
10	Local run, original data, 6 parallel processes, higher stop off costs (*2)	6	1200	4, 5	x 2		28391	51	62	273	[illegible]	118	23%	92%	28575		10,1	505	3030	
11	Local run, original data, 6 parallel processes, higher stop off costs (*2), no max nr of stops	6	1200	Unlimited	x 2		27737	49	61	271	[illegible]	116	21%	93%	28575	38	16,1	548	3288	
12	Local run, original data, 6 parallel processes, higher stop off costs (*3)	6	1200	4, 5	x 3		33640	50	61	271	[illegible]	115	20%	93%	34223		16,5	471	2826	
13	Local run, original data, 6 parallel processes, higher stop off costs (*10)	6	1200	4, 5	x 10		72978	50	63	271	[illegible]	110	15%	90%	73769		2,9	511	3066	
14	Local run, original data, 6 parallel processes, higher stop off costs (*3), RearrangeDeliveriesInOpt	6	1200	4, 5	x 3	RearrangeDeliveriesInOpt	34091	53	63	273	[illegible]	110	15%		34223		0,8	38	228	
15	Local run, original data, 6 parallel processes, no max stops, RearrangeDeliveriesInOpt	6	1200	Unlimited		RearrangeDeliveriesInOpt	21935	51	61	271	[illegible]	120	25%		22925		3,0	49	294	
16	Local run, original data, 6 parallel processes, no max stops, higher stop off costs (*10)	6	1200	Unlimited	x 10		34521	51	62	273	[illegible]	110	15%		22754		5,2	421	698	
17	Local run, original data, 6 parallel processes, no max stops, higher stop off costs (*3)	6	1200	Unlimited	x 3		32084	50	62	273	[illegible]	113	18%		21356		6,0	231	764	

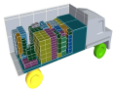
Result:

After 17 simulation runs transport costs could be **reduced by ~5%**

How Do We Optimize the Optimizer?

1. **Analysis of as-is & identify pain points**
2. **Conduct simulation runs**
3. **Analyze results & implement improvements**

KPS customer example:

KPI	Action taken	Improvements
 **Total transportation costs**	• Increase number of parallel processes for optimizer to improve optimization runs	5% overall cost reduction
 **Number of trucks used**	• Remove maximum number of stops • Include store returns in planning	4% of trucks saved
 **Total distance**	• Increase distance planning costs	Total distance shortened by 3%
 **Average truck utilization**	• Increase fixed planning costs per tour • Include store returns in planning	Average truck utilization increased by 3%
 **On-time delivery in peak weeks**	• Activate blackboard parameter to adjust and relax store delivery time windows in peak weeks	On-time delivery in peak weeks increased by 2%

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LET’S OPTIMIZE TRANSPORTATION

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