

HSLU: Data-driven Supply Chain Management and Logistics

Group assignment „Network modelling“

Lucerne, October 2025

Case study introduction

Our customer is a US based technology company. Until now, the company has shipped products directly from suppliers to customers, located in 17 different US States. Shipments are tendered to logistics service providers (LSPs) without consolidation using mostly less-than-truckload (LTL) services.

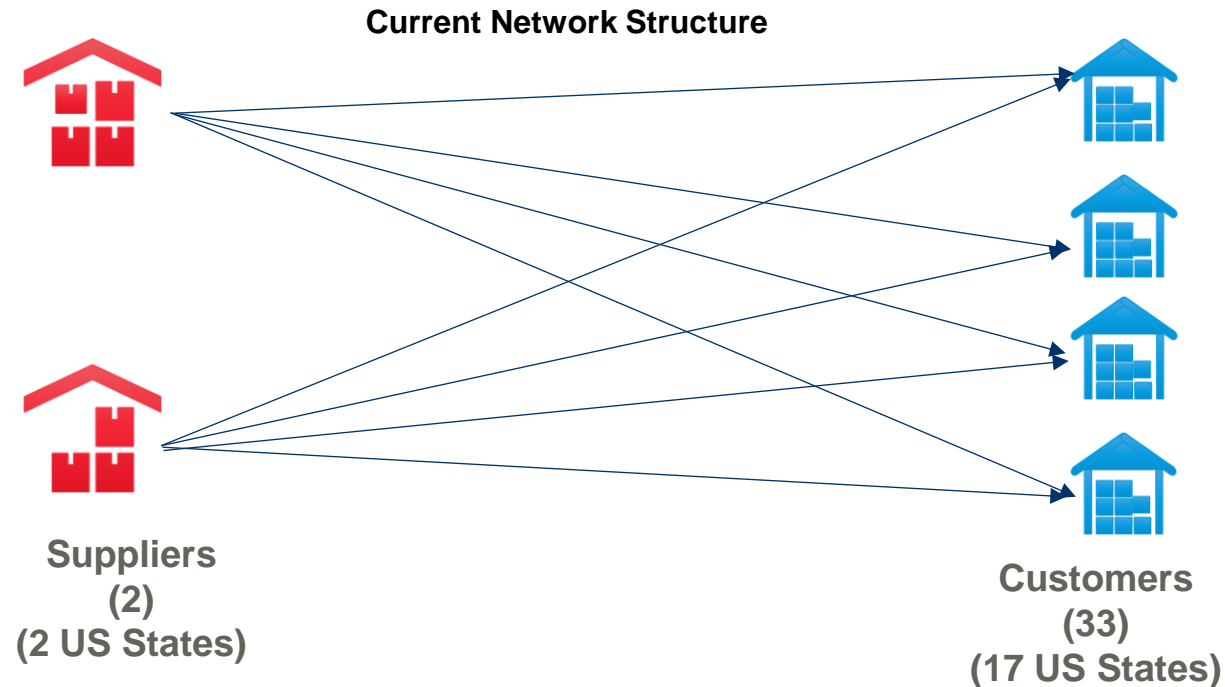
The company would like to evaluate the benefits of routing shipments from its suppliers to customers via a cross-dock and thus increase consolidation.

Your task is to determine the cost of the as-is network, to model a revised network in line with customer expectations and to determine the cost advantage of this network. In addition, you will need to identify additional, qualitative impacts of the proposed network adjustment (lead-times, reliability, risk etc.).

Your case concludes with a clear proposal to company management considering advantages and disadvantages of the updated network.



Case Study- Stalmart Inc.



Input

1. "ShipmentData" has current network & shipment level information
2. For Part1: Greenfield Study, Distance, Cost (Fixed and variable) and Capacity related information is shared on "Part1_Input"
3. For Part2 study, cost information is to be used from "Part2_Input"

Stalmart Inc. is aiming to redesign their distribution network by introducing cross-docks. They have selected 5 potential locations, but they do not know how many and which ones to be used.

1. Part1: Greenfield Study

Identify optimal network structure (number and location of cross-docks) based on approximate total cost including

1. Transportation cost (to and from cross-dock)
2. Inventory processing cost at cross-dock
3. One-off set-up cost per cross-dock

2. Part2: Brownfield Study

Based on Part1 output, determine the actual total cost of the new network, considering the aspects listed below:

1. Shipment consolidation (from supplier to cross-dock and from cross-dock to customer, based on same-day shipment) and use of suitable mode (FTL vs. LTL)
2. Cost reduction in year 2 vs. year 1 since set-up cost missing
3. Comparison of to-be cost with current cost

3. Part3: General Questions (Qualitative)

1. Does the introduction of cross-docks affect service levels (lead times, on-time performance)?
2. If number of cross-docks to be increased, how would Inventory be affected?
3. What other supply chain areas (which are not mentioned explicitly) will be impacted & how

Shipment data



As-Is Shipments								
ShipmentID	ShipDate	Origin Zip	Origin State	Origin	Destination	DestinationZip	DestinationState	Weight
1	02-Jan-23	30043	GA	GA30043	GA30303	30303	GA	420
2	02-Jan-23	30043	GA	GA30043	IN46228	46228	IN	730
3	02-Jan-23	30043	GA	GA30043	GA30303	30303	GA	690
4	02-Jan-23	30043	GA	GA30043	GA30303	30303	GA	1260
5	02-Jan-23	30043	GA	GA30043	CT6492	06492	CT	250
6	02-Jan-23	91720	CA	CA91720	GA30303	30303	GA	420
7	02-Jan-23	30043	GA	GA30043	CT6492	06492	CT	450
8	02-Jan-23	30043	GA	GA30043	GA30303	30303	GA	690
9	02-Jan-23	30043	GA	GA30043	FL32099	32099	FL	340
10	02-Jan-23	30043	GA	GA30043	GA30303	30303	GA	250
11	02-Jan-23	91720	CA	CA91720	GA30303	30303	GA	430
12	02-Jan-23	30043	GA	GA30043	IN46228	46228	IN	340
13	02-Jan-23	30043	GA	GA30043	GA30303	30303	GA	2150
14	02-Jan-23	30043	GA	GA30043	IN46228	46228	IN	1270
15	02-Jan-23	91720	CA	CA91720	MI48150	48150	MI	3810

Part1_Input

Distance in Km															Fixed Cost of Opening X-Dock (CAPEX)									
1 Supplier to Customer				2 Supplier to X-Dock				3 X-Dock to Customer																
				Supplier						X-Dock														
				GA30043	CA91720			GA30043	CA91720			NC27695	NY10006	TX75477	GA30113	IL61849								
Demand	GA30303			54	3.466	X-Dock	NC27695	575	4.058	Demand	GA30303			613	1.362	1.182	100	948	X-Dock		NC27695	\$	9.900.000	
	TX74134			1.302	2.276		NY10006	1.328	4.455		TX74134			1.841	2.156	332	1.166	953	NY10006	\$	6.689.000			
	IN46228			903	3.297		TX75477	1.238	2.320		IN46228			1.025	1.153	1.350	863	180	TX75477	\$	8.820.000			
	CT6492			1.474	4.591		GA30113	155	3.403		CT6492			933	152	2.529	1.612	1.470	GA30113	\$	10.820.000			
	TX78040			1.828	2.173		IL61849	977	3.222		TX78040			2.387	3.110	844	1.750	2.060	IL61849	\$	7.820.000			
	MO63101			923	2.897						MO63101			1.295	1.531	922	877	329	Variable Cost- Inventory Processing Cost (per kg)					
	AL35020			314	3.240						AL35020			874	1.571	927	211	878						
	MI49120			1.146	3.345						MI49120			1.203	1.130	1.555	1.107	363						
	TX77001			1.325	2.419						TX77001			1.884	2.607	530	1.247	1.573	X-Dock			NC27695	\$	1,89
	GA30005			38	3.509						GA30005			595	1.344	1.226	143	969	TX75477	\$	2,02			
	IL60164			1.156	3.191						IL60164			1.330	1.295	1.460	1.110	268	GA30113	\$	1,75			
	NC27602			569	4.057						NC27602			13	795	1.825	707	1.193	IL61849	\$	1,25			
	AL35040			328	3.279						AL35040			888	1.591	971	224	907						
	TX76102			1.366	2.186						TX76102			1.925	2.541	205	1.262	1.434						
	MS39501			695	3.057						MS39501			1.255	2.004	891	646	1.263						
	KY40391			623	3.552						KY40391			735	1.092	1.320	583	513	Variable Cost- Transportation (per kg per km)					
	MI48150			1.182	3.607						MI48150			1.086	995	1.790	1.143	587						
	IN46224			900	3.287						IN46224			1.022	1.150	1.340	861	171	\$			0,005		
	AL35601			380	3.156						AL35601			922	1.517	924	246	735						
	GA30026			14	3.509						GA30026			577	1.326	1.225	143	970						
TN37201			432	3.192						TN37201			868	1.423	960	386	551	Capacity constraints						
TN37912			380	3.481						TN37912			587	1.142	1.249	340	743	Max capacity supplier		US30043	5.000.000			
FL32099			579	3.801						FL32099			735	1.503	1.597	627	1.477	US91720		5.000.000				
NC28739			263	3.691						NC28739			392	1.141	1.459	401	939	Capacity X-Docks is unlimited						
AL36867			226	3.404						AL36867			786	1.535	1.162	193	1.079							
NY10007			1.328	4.454						NY10007			787	1	2.381	1.465	1.322							
SC29501			452	3.932						SC29501			243	1.011	1.648	566	1.262							
VA20170			944	4.231						VA20170			429	397	1.998	1.082	1.110							
AR72113			904	2.625						AR72113			1.442	1.998	411	767	890							
AR72703			1.187	2.441						AR72703			1.726	2.104	449	1.051	902							
IL62702			1.066	3.072						IL62702			1.346	1.476	1.084	1.020	177							
MO63026			957	2.869						MO63026			1.328	1.565	894	888	363							
MO63089			990	2.835						MO63089			1.362	1.598	860	927	396							

Part2_Input

LTL Rate Card (Per Kg per Km)							
Per Kg per Km		Weight					
Kilometers		0-500	500-1000	1000-2000	2000-5000	>5000	
	0-50	\$ 0.06	\$ 0.05	\$ 0.04	\$ 0.04	\$ 0.03	
	50-250	\$ 0.06	\$ 0.05	\$ 0.04	\$ 0.03	\$ 0.03	
	250-500	\$ 0.05	\$ 0.05	\$ 0.04	\$ 0.03	\$ 0.03	
	500-1000	\$ 0.05	\$ 0.04	\$ 0.04	\$ 0.03	\$ 0.03	
	1000-1500	\$ 0.05	\$ 0.04	\$ 0.03	\$ 0.03	\$ 0.03	
	>1500	\$ 0.05	\$ 0.04	\$ 0.03	\$ 0.03	\$ 0.02	
FTL Rate Card							
\$ 1.00	per Truck per Km.						
If weight of shipment is 75% utilized, it can be sent via FTL							
FTL Capacity: 7000kg							
5250							
*if Distance related information needed, can be used from "Part1 Input" sheet							

Case study deliverables

- Presentation of as-is network
 - Visualization of network structure
 - Descriptive statistics of shipment structure
 - As-is cost
- Presentation of proposed adjusted network
 - Visualization of network structure and key changes vs. as-is network
 - Descriptive statistics of shipment structure
 - To-be cost
- Recommendation towards company management regarding adjusted network considering
 - Financial aspects
 - Qualitative aspects

Scope group of 2



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