

SNP: Optimizer: Feasible Solution for different Production Costs in Network



Applies to:

SCM 5.0 Supply Network Planning – Optimizer. For more information, visit the [Supply Chain Management homepage](#).

Summary

The SNP optimizer offers cost-based planning. This means that it searches through all feasible plans in an attempt to find the most cost-effective (in terms of total costs).

Total costs refers to the following:

- Production, procurement, storage, and transportation costs
- Costs for increasing the production capacity, storage capacity, transportation capacity, and handling capacity
- Costs for violating (falling below) the safety stock level
- Costs for late delivery
- Stockout (Non-delivery) costs

This Article covers deriving Feasible solution (Minimum Cost solution) for selected SNP Network during Optimizer Run, when

- Different Production Costs in MFG Locations
- Same Procurement Costs for Raw Material at MFG Locations
- Same Transportation Costs from MFG Locations to Distribution Center
- High Non-Delivery Costs to fulfill Sales Order at DC.

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Author Bio

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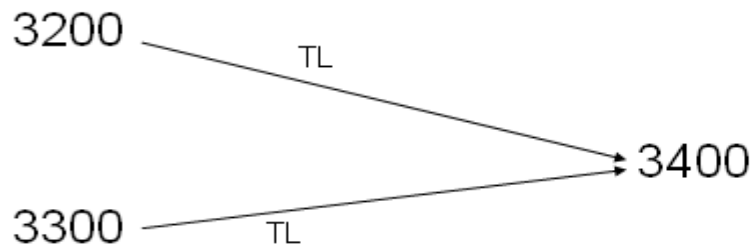
SNP Distribution Network Used for Optimizer scenario:

SNP Distribution Network has

- One Distribution Center (3400)
- Two Manufacturing Plants (3200, 3300)
- Transportation Lanes (TLs) exist between 3200, 3400 and 3300, 3400.
- Product OPT_FIN_1 exists in Locations 3200, 3300 and 3400
- Product OPT_FIN_1 is externally procured at DC 3400 and In-House produced at Manufacturing Plants 3200, 3300.
- Product OPT_RAW_1 is externally Procured at Manufacturing Plants 3200 and 3300.
- OPT_FIN_1 Product specific Transportation Lanes are created for Source Locations 3200, 3300 to Destination Location 3400.

Manufacturing
Plant

Distribution
Center (DC)



TL → Transportation Lane

- High No delivery Penalty Cost maintained for product OPT_FIN_1 at DC 3400.
- Production Costs are maintained in PPMs for Product OPT_FIN_1 for Manufacturing Locations 3200 and 3300.
- Transportation Costs are maintained in 'Means of Transport' for Product OPT_FIN_1 between Source Locations 3200, 3300 and Destination Location 3400.
- Procurement Costs are maintained for product OPT_RAW_1 in Product Master at Manufacturing Plant Locations 3200 and 3300.

Scenario Details: Different Production Costs at Manufacturing Plant Locations

In this scenario,

- High No delivery Penalty Cost maintained for product OPT_FIN_1 at DC 3400 so that Receipt element will be created for Sales Order for OPT_FIN_1 material at DC 3400.
- Different Production Costs are maintained at Manufacturing Plants 3200, 3300 for Product OPT_FIN_1 in PPMs.
- Same Procurement Costs are maintained for Product OPT_RAW_1 at Manufacturing Plants 3200, 3300 in Product Master.
- Same Transportation Costs are maintained for Product OPT_FIN_1 between Source Locations 3200, 3300 and Destination Location 3400 In the 'Means of Transport'.

High No Delivery Penalty Cost Maintenance:

No Del. Penalty cost is maintained for 'Customer Demand' so that During Optimizer runs, Receipt Elements are created.

The screenshot displays the SAP Product Master data for product OPT_FIN_1 at Location 3400. The 'Penalty Costs' section shows values for 'No Del. Penalty', 'Delay Penalty', and 'Maximum Delay' for 'For Customer Demand', 'For Demand Forecast', and 'For Corr. Demand Fcst'. The 'Location-Dependent Penalty Costs' section shows similar values for the same categories. A blue arrow points to the 'No Del. Penalty' field for 'For Customer Demand' in the 'Location-Dependent Penalty Costs' section, which is set to 10,000,000.000.

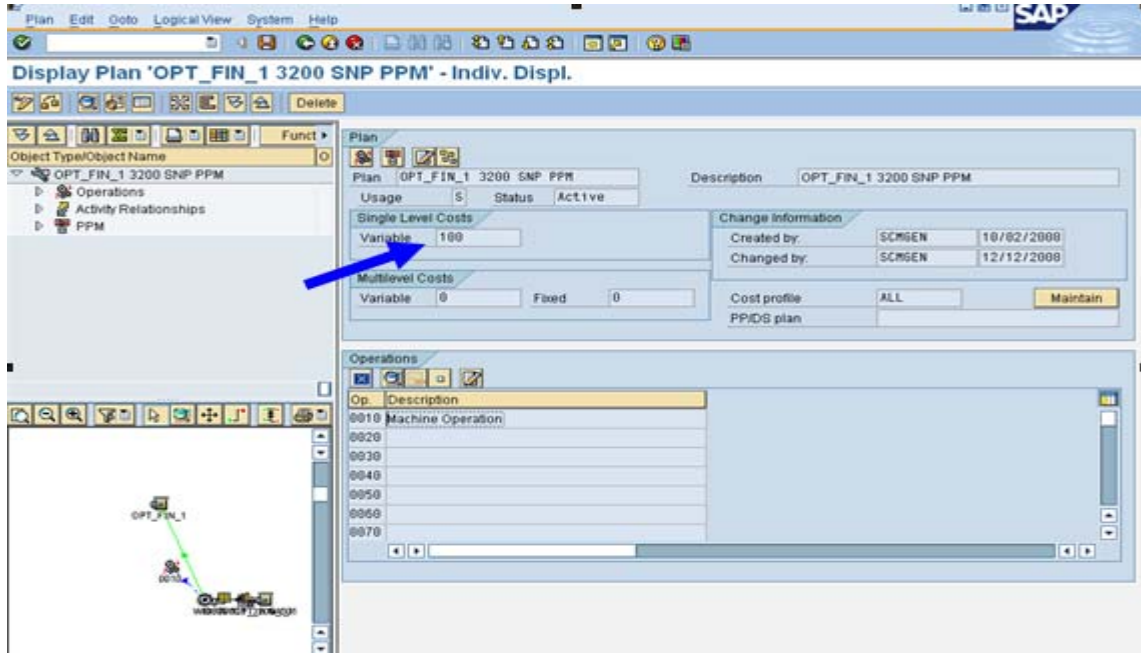
Penalty Costs			
	For Customer Demand	For Demand Forecast	For Corr. Demand Fcst
No Del. Penalty	0.000	0.000	0.000
Delay Penalty	0.000	0.000	0.000
Maximum Delay	0	0	0

Location-Dependent Penalty Costs			
	For Customer Demand	For Demand Forecast	For Corr. Demand Fcst
No Del. Penalty	10,000,000.000	0.000	0.000
Delay Penalty	0.000	0.000	0.000
Maximum Delay	0	0	0

Note: If 'No Delivery Penalty cost' is NOT maintained for 'Customer Demand', then during Optimizer Run, No receipt element get created against Sales Order as by non-delivering the sales Order, there is no penalty cost is incurred.

Production Costs Maintenance:

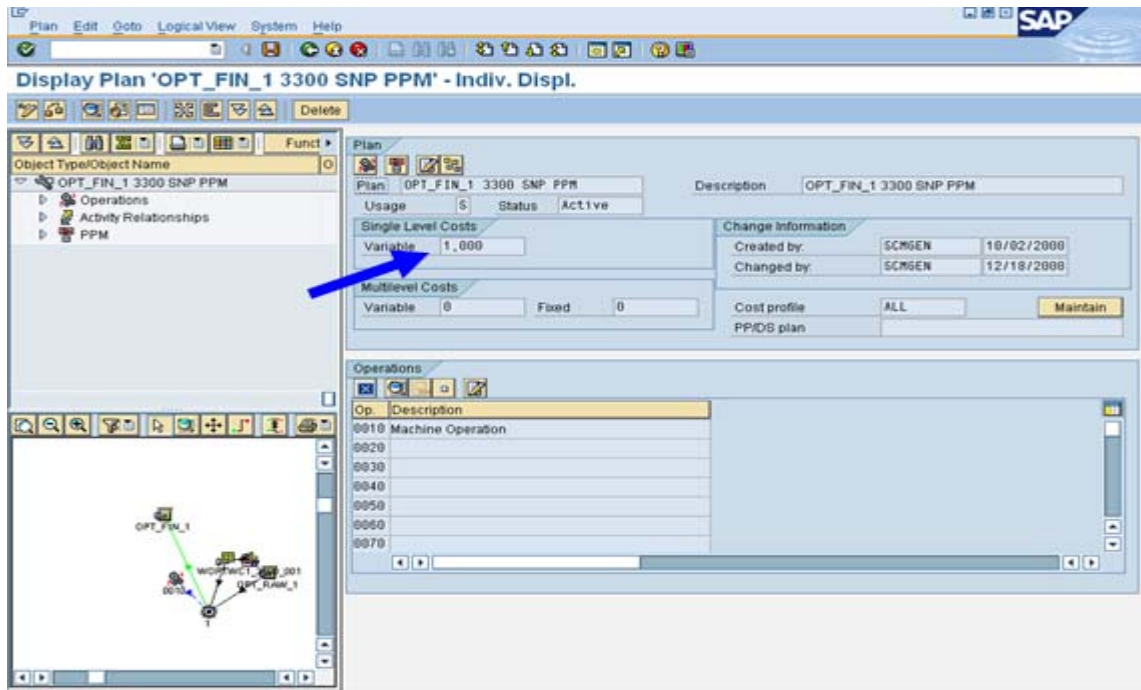
PPM details for OPT_FIN_1 material and Plant 3200



Production Cost is maintained as 100 per each. This cost is maintained against Variable as shown above.

So, Production Cost for Material OPT_FIN_1 in Plant 3200 = 100 (per EA)

PPM details for OPT_FIN_1 material and Plant 3300



Production Cost is maintained as 1000 per each. This cost is maintained against Variable as shown above.

So, Production Cost for Material OPT_FIN_1 in Plant 3300 = 1000 (per EA)

Transportation Costs Maintenance:

Transportation Lane details between Source Location 3200 (Mfg Location) and Destination Location 3400 (DC)

The screenshot displays the SAP 'Display of Transportation Lane 3200 -> 3400' interface. It is divided into several sections:

- Product-Specific Transportation Lane:** A table listing products and their validity dates.

Product	Product Short Description	Start date	End Date
H-4567890123	FERT - Ready to Deploy-Push Rule X	12/03/2008	12/31/08
OPT_FIN_1	OPTIMIZER Material 1	10/01/2008	12/31/08
OPT_FIN_11	OPTIMIZER Material 11	10/05/2008	12/31/08
OPT_FIN_2	OPTIMIZER Material 2	10/03/2008	12/31/08
OPT_FIN_22	OPTIMIZER Material 22	10/05/2008	12/31/08
- Means of Transport:** A table listing transport methods and their validity.

MTr	Mns/Transp	Start date	End Date	All Prods	Aggr. Ping	Deliv Ping
0001	Truck	09/05/2008	09/19/2008	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
	Truck	11/22/2008	01/04/2009	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
FTL TRUCK	FTL TRUCK	09/24/2008	12/31/9999	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
- Parameters:** A form containing various settings. The 'Transport Costs' field is highlighted with a blue arrow and set to 10.00 per EA.

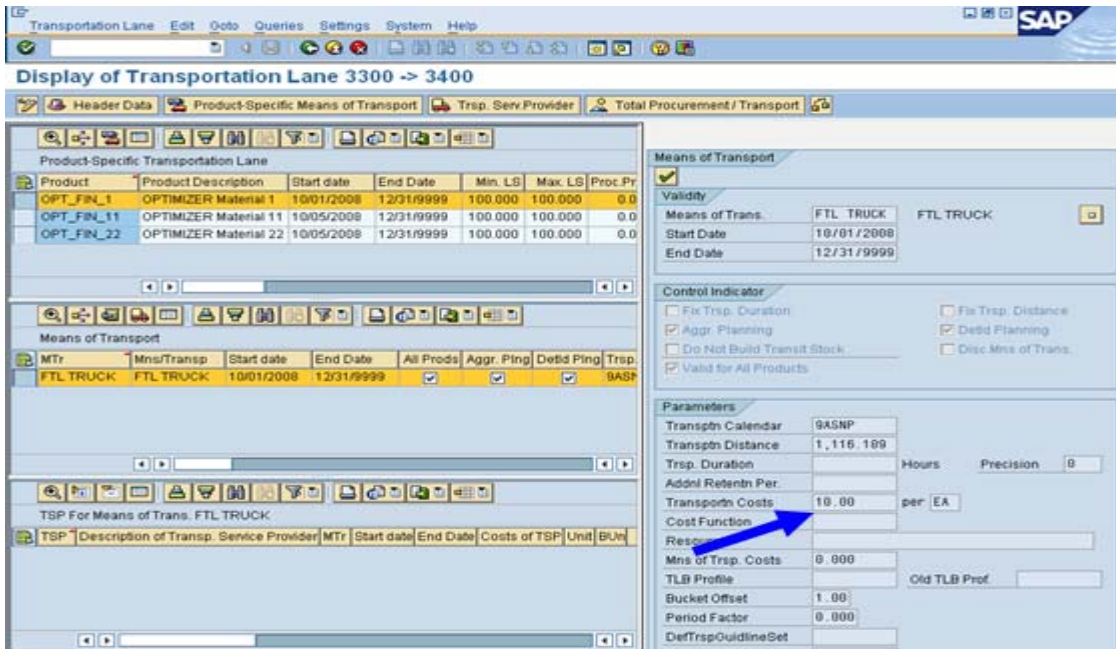
Transp Calendar	9ASNP
Transp Distance	3,519.888
Trsp. Duration	Hours Precision 0
Transport Costs	10.00 per EA
Mns of Trsp. Costs	0.800
TLB Profile	SNP_TLB_01 Old TLB Prof.
Bucket Offset	1.00
Period Factor	0.500

Transportation Costs are maintained as 10 per EA for Means of Transport 0001 as shown above. OPT_FIN_1 Product is added to this Transport Lane as displayed above.

Note: FTL TRUCK Transport Lane is maintained with High Transport Cost so that our scenario will not consider FTL Truck Means of Transport during Optimizer Run.

So, Transportation Costs from 3200 to 3400 = 10 (per EA).

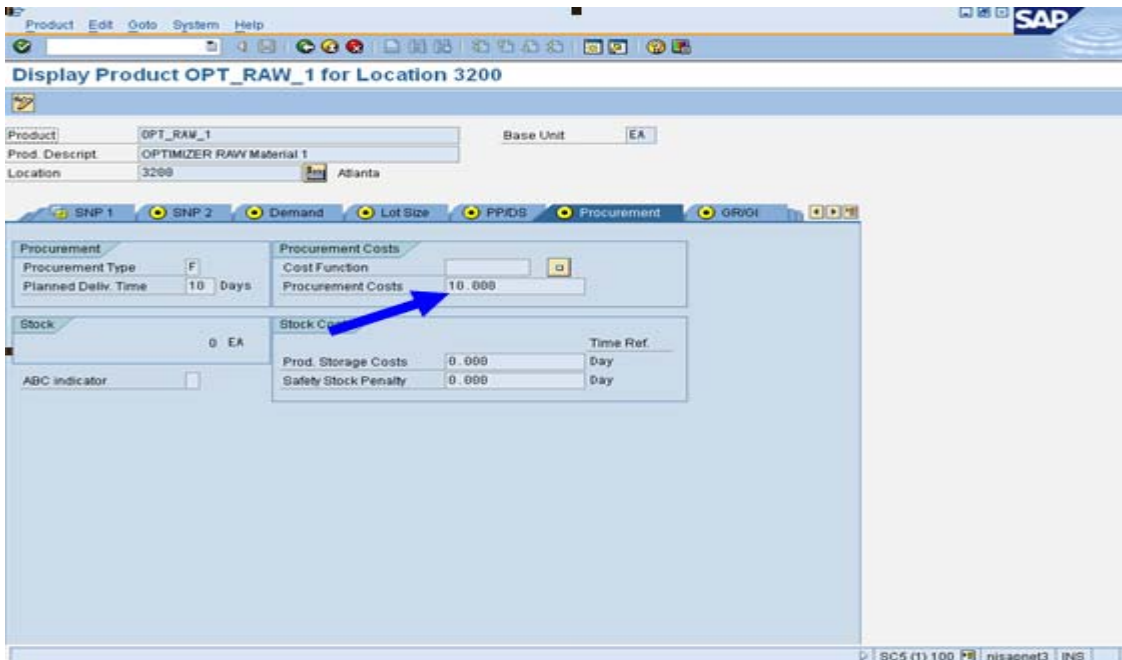
Transportation Lane details between Source Location 3300 (Mfg Location) and Destination Location 3400 (DC)



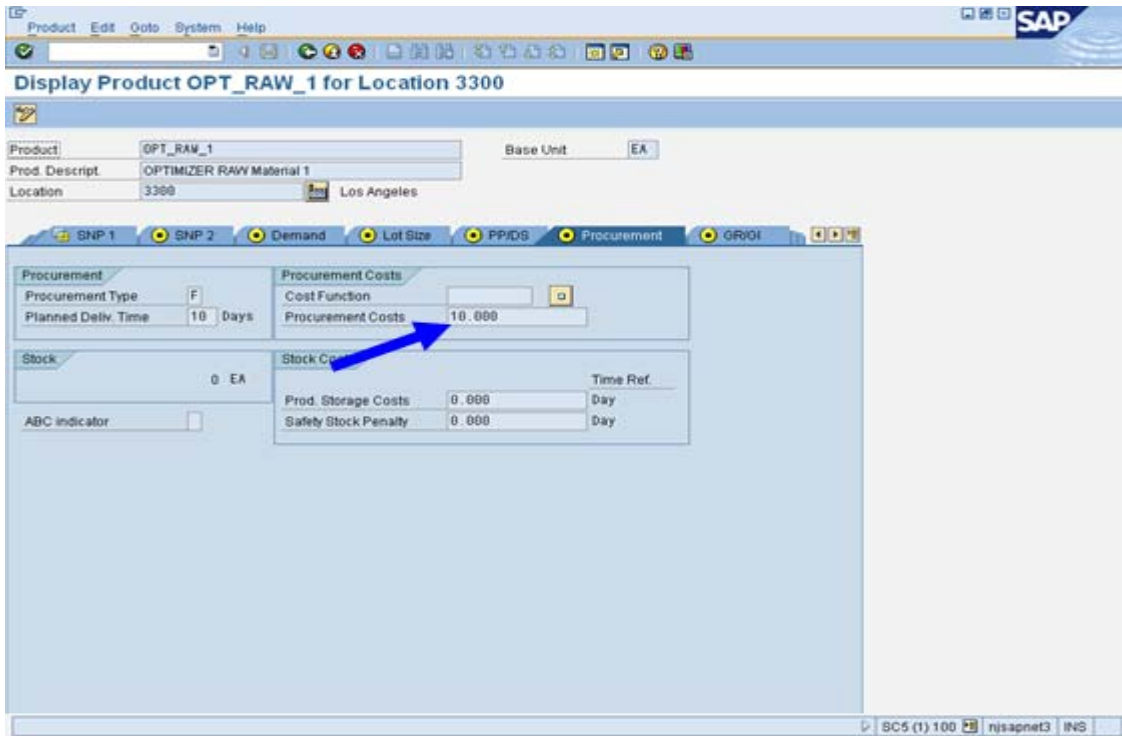
Transportation Costs are maintained as 10 per EA for Means of Transport FTL_TRUCK as shown above. OPT_FIN_1 Product is added to this Transport Lane as displayed above. So, Transportation Costs from 3300 to 3400 = 10 (per EA).

Procurement Costs Maintenance:

Procurement Costs details for Product OPT_RAW_1 at Location 3200



Procurement Costs are maintained as 10 (per EA) for Product OPT_RAW_1 at Location 3200. Procurement Costs details for Product OPT_RAW_1 at Location 3300



Procurement Costs are maintained as 10 (per EA) for Product OPT_RAW_1 at Location 3300.

Costs Summary:

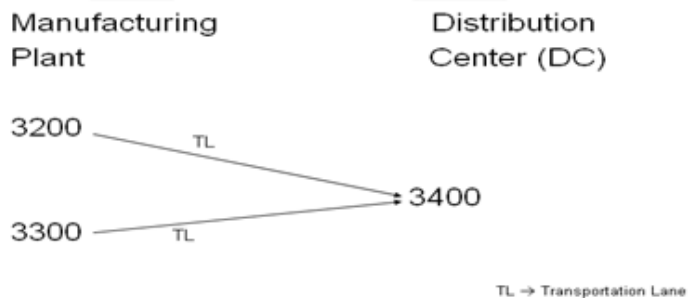
During Optimizer Run, system needs to choose Minimized Cost Solution. In this Scenario, There is Sales Order 100 EA for Product OPT_FIN_1 at DC Location 3400.

Scenario – Different Production Costs in PPMs

Costs maintained

- OPT_FIN_1 / 3400 – high 'No Del. Penalty'
- 3200 -- > 3400 TL Transportation Cost 10 per EA
- 3300 -- > 3400 TL Transportation Cost 10 per EA
- OPT_FIN_1/Plant 3200 Production Cost Cost 100 per EA
- OPT_FIN_1/Plant 3300 Production Cost 1000 per EA
- OPT_RAW_1 / Plant 3200 Procurement Cost 10 per EA
- OPT_RAW_1 /Plant 3300 Procurement Cost 10 per EA

- Total Costs ???
- Which Path Optimizer chooses???



As there are Two Paths of fulfilling this Sales Order requirement, there are TWO possible Solutions.

Solution1:

'Total Cost' Incurred for supply Network chosen between 3200 and 3400 to fulfill Sales Order of 100 quantity at DC 3400

= Transportation Costs from source Location 3200 to Destination Location 3400 for Product OPT_FIN_1 + Production Costs Incurred for Product OPT_FIN_1 at MFG Location 3200 + Procurement Costs Incurred for Product OPT_RAW_1 at MFG Location 3200

= 10 (Transportation Cost per EA) * 100 (sales Order Quantity) + 100 (Production Costs per EA) * 100 (sales Order Quantity) + 10 (Procurement Costs per EA) * 100 (sales Order Quantity)

= 1000 + 10000 + 1000

= 12000

Note: OPT_FIN_1 has a BOM Structure such that to produce one quantity of OPT_FIN_1, it needs one quantity of OPT_RAW_1 and hence The requirement quantity of Product OPT_RAW_1 will be equal to Sales Order quantity for Product OPT_FIN_1.

Solution2:

'Total Cost' Incurred for supply Network chosen between 3300 and 3400 to fulfill Sales Order of 100 quantity at DC 3400

= Transportation Costs from source Location 3300 to Destination Location 3400 for Product OPT_FIN_1 + Production Costs Incurred for Product OPT_FIN_1 at MFG Location 3300 + Procurement Costs Incurred for Product OPT_RAW_1 at MFG Location 3300

= 10 (Transportation Cost per EA) * 100 (sales Order Quantity) + 1000 (Production Costs per EA) * 100 (sales Order Quantity) + 10 (Procurement Costs per EA) * 100 (sales Order Quantity)

= 1000 + 100000 + 1000

= 102000

Feasible Solution:

Comparing the Solutions 1 and 2, The Solution 1 has lowest cost incurred and hence becomes the Feasible Solution.

Verification of Feasible Solution through Optimizer Run:

SNP Planning Book displayed with Sales Order of 100 Quantity is displayed with its details for Product OPT_FIN_1 at Location 3400 (DC). Now, Optimizer needs to fulfill this Sales Order requirement.

The screenshot shows the SAP SNP Interactive Planning / SNP PLAN interface. The main table displays demand and supply data for Product OPT_FIN_1 at Location 3400. A yellow callout box labeled 'Optimization Run' is positioned over the 'Sales Order' row, which has a quantity of 100. The table columns include Unit, 12/25/2008, 12/26/2008, 12/27/2008, 12/28/2008, 12/29/2008, and 12/30/2008. The 'Total Demand' row shows a quantity of 100 on 12/29/2008. The 'Total Receipts' row shows a quantity of 100 on 12/29/2008. The 'Sales Order' row is highlighted in yellow.

Order	Item No.	Sched. Ln. No.	Avail/ReqD	Rec/ReqQty	Conf. Q...	Total Qty	BU	Category	CatDscrptn	Product	Des
12471	000010	0001	12/29/2008	100	100	100	EA	BM	Sales order	OPT_FIN_1	000

Now select all Location Products in the Network and Click on 'Optimizer run' button.

The screenshot shows the SAP SNP Interactive Planning / SNP PLAN interface after selecting all Location Products in the Network. The main table displays demand and supply data for Product OPT_FIN_1 at Location 3400. A yellow callout box labeled 'Optimization Run' is positioned over the 'Sales Order' row, which has a quantity of 100. The table columns include Unit, 12/25/2008, 12/26/2008, 12/27/2008, 12/28/2008, 12/29/2008, and 12/30/2008. The 'Total Demand' row shows a quantity of 100 on 12/29/2008. The 'Total Receipts' row shows a quantity of 100 on 12/29/2008. The 'Sales Order' row is highlighted in yellow.

Order	Item No.	Sched. Ln. No.	Avail/ReqD	Rec/ReqQty	Conf. Q...	Total Qty	BU	Category	CatDscrptn	Product	Des
12471	000010	0001	12/29/2008	100	100	100	EA	BM	Sales order	OPT_FIN_1	000

Now, On the SNP Optimizer screen, Parameters are chosen for 'Optimization Profile' and Cost Profile as shown below and click on 'Start Optimization run' button

The screenshot shows the SAP SNP Optimizer interface. At the top, there is a menu bar with 'System' and 'Help'. Below it is a toolbar with various icons. The main area has three tabs: 'Optimization', 'Solutions', and 'Message Log'. Under the 'Optimization' tab, there are three dropdown menus: 'Optimization Profile' set to 'SAP_ALL', 'Cost Profile' set to 'DEFAULT', and 'Opt. Bound Profile' which is empty. Below these is a toolbar with icons for 'Start optimization run', 'Stop', 'Refresh', 'Help', and 'Print'. The 'Start optimization run' button is highlighted with a yellow box. To the right of this toolbar is a 'Messages' area. Below the toolbar, there are two main sections: 'Current Solution' and 'Solution Process'. The 'Current Solution' section contains a table:

Parameters	Value
Total Costs	0.00
Feasibility Violation	0.00

The 'Solution Process' section contains a graph with a y-axis ranging from 0.1 to 0.2. A legend indicates that a black square represents 'Total Cos' and a red square represents 'Feasibilit'.

Optimizer Statuses sequence are displayed on Left side and generated Messages are displayed on the right side. We can see the various Master data selected during Optimization run through Messages.

This screenshot shows the same SAP SNP Optimizer interface after the optimization run has started. The 'Start optimization run' button is no longer highlighted. The 'Status' section on the left now displays a sequence of steps:

- Starting optimization run
- Loading parameters
- Loading planning data
- Checking data consistency
- Starting primal simplex algorithm
- Writing results
- Completing optimization run

The 'Messages' section on the right displays the following information:

- Step 1: Data read and model creation started at 22:12:55 on 12/19/2008
- Total number of products: 2
- Total number of locations: 3
- Total number of location products: 5
- Total number of transportation lanes: 3
- Total number of PPMs/PDS: 2
- Total number of demands: 2

The 'Current Solution' table is updated with the following values:

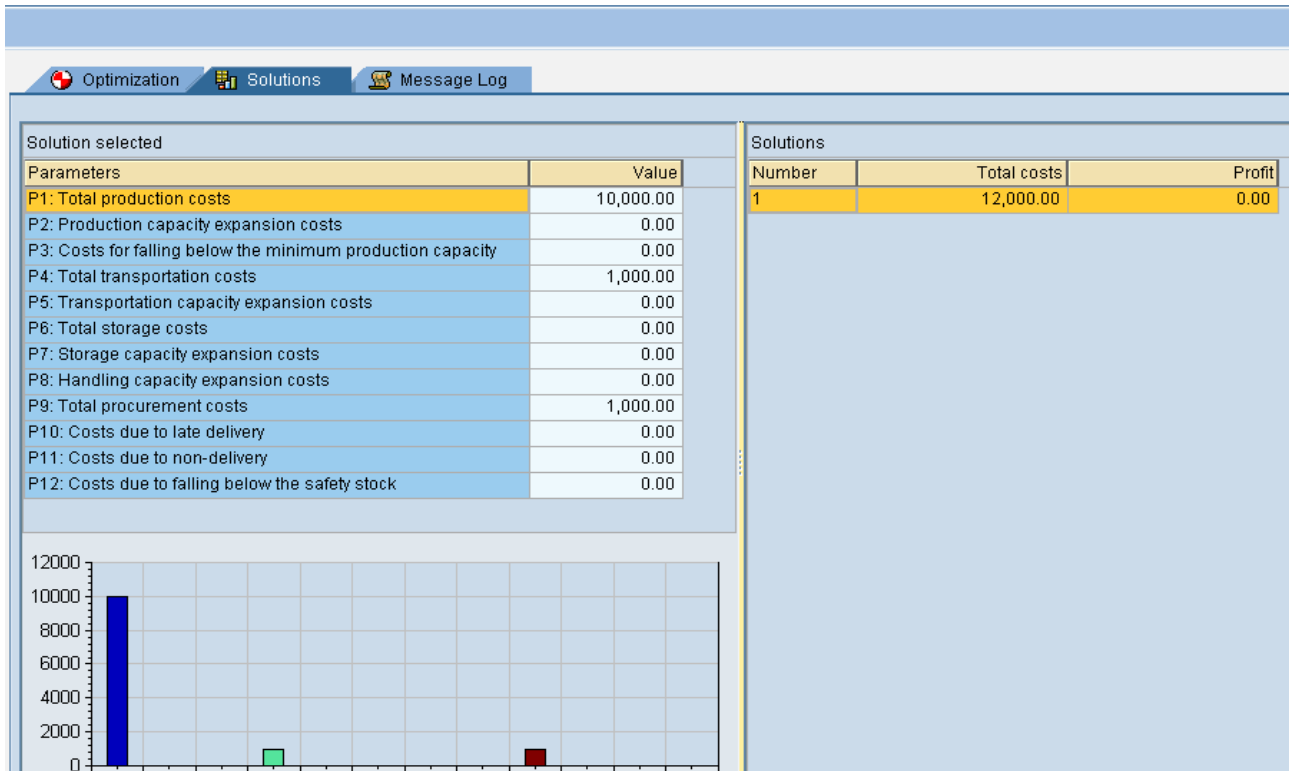
Parameters	Value
Total Costs	12,000.00
Feasibility Violation	0.00

The 'Solution Process' section now shows a graph with a y-axis ranging from 10000 to 15000. A single black square data point is visible at approximately 12,000.

Total Costs Incurred is displayed as 12000 as shown above which matches with Solution 1 result noted in page no: 9

Now, Click on 'Solutions' tab,

SNP Optimizer



The Above screenshot displays the various costs incurred to arrive at feasible solution (Minimized Cost Solution.). Total Cost Incurred is displayed as 12000 to fulfill the Sales Order 100 quantity at DC3400.

Click on Back Icon and Click on Save Icon to save the Optimizer run results.

Verification of Created Receipt Elements for selected Path (network):

Based on Minimized Cost Solution, System chosen Transportation Lane 3200 to 3400 and created one stock transfer requisition. Below screen shot displayed demand and supply situation at DC 3400.

Planning Book: [Live] SNP INTERACTIVE PLANNING / SNP PLAN

APO Location: 3400 | APO Product: OPT_FIN_1 | APO Resource:

Unit	12/26/2008	12/27/2008	12/28/2008	12/29/2008	12/30/2008	12/31/2008
Forecast						
Sales Order				100		
Distribution Demand (Planned)						
Distribution Demand (Confirmed)						
DistrDemand (TLB-Confirmed)						
Dependent Demand						
Total Demand				100		
Distribution Receipt (Planned)						
Distribution Receipt (Confirmed)				100		
Distribution Receipt (TLB-Confir...)						

Order Item: 8765 | Item No.: 000010 | Avail/ReqD: 12/29/2008 | Rec/ReqQty: 100 | BU: EA | Cat: AG | Category Description: Purchase Requisition | Product: OPT_FIN_1 | Source: 3200 | Destinat: 3400 | MTr: 0001

Now, below screen shows the created SNP Planned Order for Product OPT_FIN_1 at MFG Location 3200.

Planning Book: [Live] SNP INTERACTIVE PLANNING / SNP PLAN

APO Location: 3200 | APO Product: OPT_FIN_1 | APO Resource:

Unit	12/27/2008	12/28/2008	12/29/2008	12/30/2008	12/31/2008	01/01/2009
Distribution Demand (Planned)			100			
Distribution Demand (Confirmed)						
DistrDemand (TLB-Confirmed)						
Dependent Demand						
Total Demand			100			
Distribution Receipt (Planned)						
Distribution Receipt (Confirmed)						
Distribution Receipt (TLB-Confir...)						
In Transit						
Production (Planned)			100			

Order Item: 8767 | Avail/ReqD: 12/29/2008 | Rec/ReqQty: 100 | BU: EA | Category: EE | Category Description: SNP: Planned order | Product: OPT_FIN_1 | Dest./Srce: 3200 | Source of Supply: OPT_FIN_1 3200 SNP

Now, below screen displays the Purchase Requisition of 100 Quantity is created for Product OPT_RAW_1 at Location 3200.

Planning Edit Goto Settings System Help

Planning Book: [Live] SNP INTERACTIVE PLANNING / SNP PLAN

TLB View

APO Location 3200 APO Product OPT_RAW_1 APO Resource

Selected Objects

Product	Ty...	Locati...	Product Shor
OPT_RAW_1		3200	OPTIMIZER F
OPT_RAW_1		3300	OPTIMIZER F

Selection profile

- V2R HEURISTICS
- OPTIMIZER_CAPACITY
- OPTIMIZER_DEMANDS
- OPTIMIZER_TRANSPORT
- ZOPTIMIZER

Planning Book/Data View Description

- 9ASNP94
 - SNP94(1) SNP PLAN
 - SNP94(2) CAPACITY CHECI

SNP PLAN	Unit	12/27/2008	12/28/2008	12/29/2008	12/30/2008	12/31/2008	0
Forecast	EA						
Sales Order	EA						
Distribution Demand (Planned)	EA						
Distribution Demand (Confirmed)	EA						
DistrDemand (TLB-Confirmed)	EA						
Dependent Demand	EA			100			
Total Demand	EA			100			
Distribution Receipt (Planned)	EA			100			
Distribution Receipt (Confirmed)	EA						
Distribution Receipt (TLB-Confir...	EA						

Order	Avail/ReqD	Rec/ReqQty	BU	Category	Category Description	Product	Destinatn	Start Date
8766	12/29/2008	100	EA	AG	Purchase Requisition	OPT_RAW_1	3200	12/29/2008

Conclusion:

During Optimizer run, Feasible Cost Solution (Total Costs as 12000) is chosen and Path from MFG Location 3200 to DC 3400 is chosen to fulfill the Sales Order 100 quantity at DC 3400. During the Optimizer Run, system created following receipt elements to fulfill sales Order of 100 quantities

- Stock Transfer requisition of 100 Quantity with Source Location as 3200 and Destination Location as 3400 for Product OPT_FIN_1
- SNP Planned Order is created of 100 quantity at Location 3200 for Product OPT_FIN_1.
- Purchase Requisition of 100 quantity is created at Location 3200 for Product OPT_RAW_1.

Similarly, Change production Costs in opposite manner i.e., Production Costs for OPT_FIN_1 Product PPM at Location 3200 as 1000 per Ea and Production Costs for OPT_FIN_1 Product PPM at Location 3300 as 100 per Ea, then Optimizer would choose the Network/Path from 3300 to 3400 as feasible solution and creates receipt elements accordingly.

Related Content

SAP Help: www.help.sap.com

http://help.sap.com/saphelp_scm50/helpdata/en/1c/4d7a375f0dbc7fe10000009b38f8cf/frameset.htm for more information on Optimizer Based Planning.

http://help.sap.com/saphelp_scm50/helpdata/en/1c/4d7a375f0dbc7fe10000009b38f8cf/frameset.htm for execution of Optimizer run

<http://www50.sap.com/businessmaps/17BF49706CFF4156805807B25C8528F4.htm> for Supply Network Planning Main Process.

For more information, visit the [Supply Chain Management homepage](#).

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