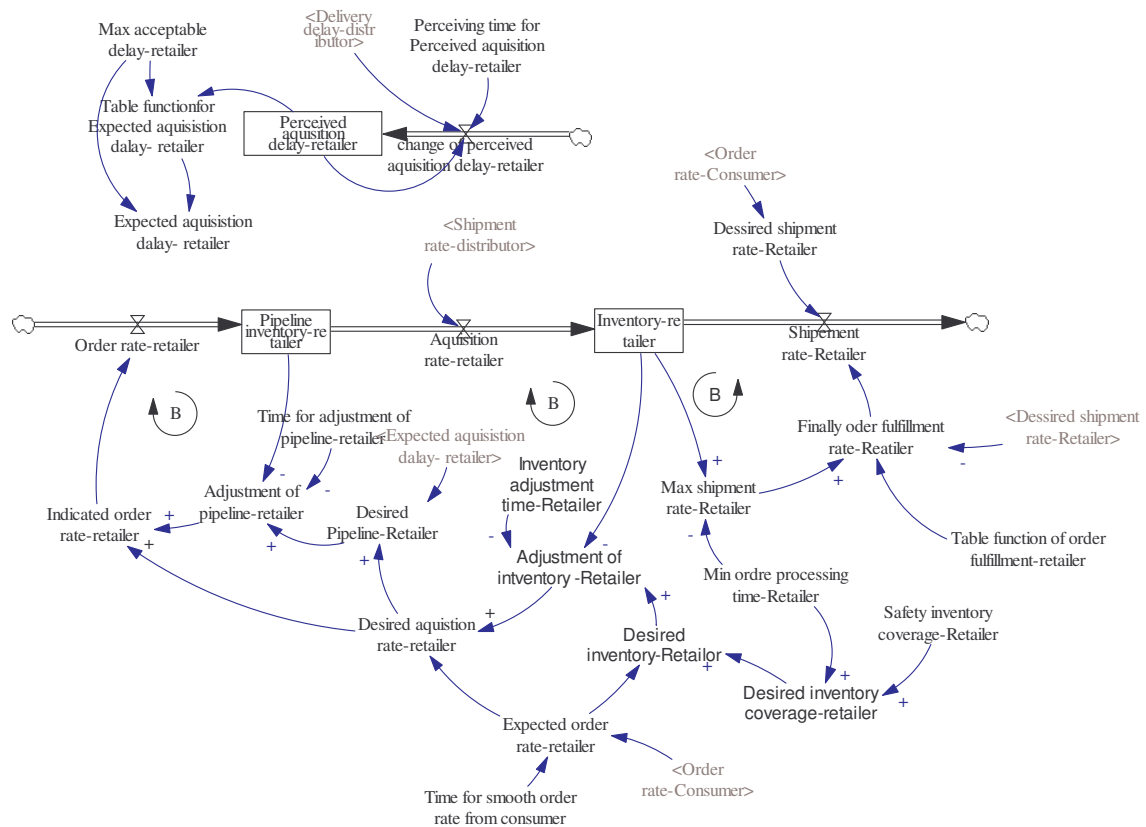
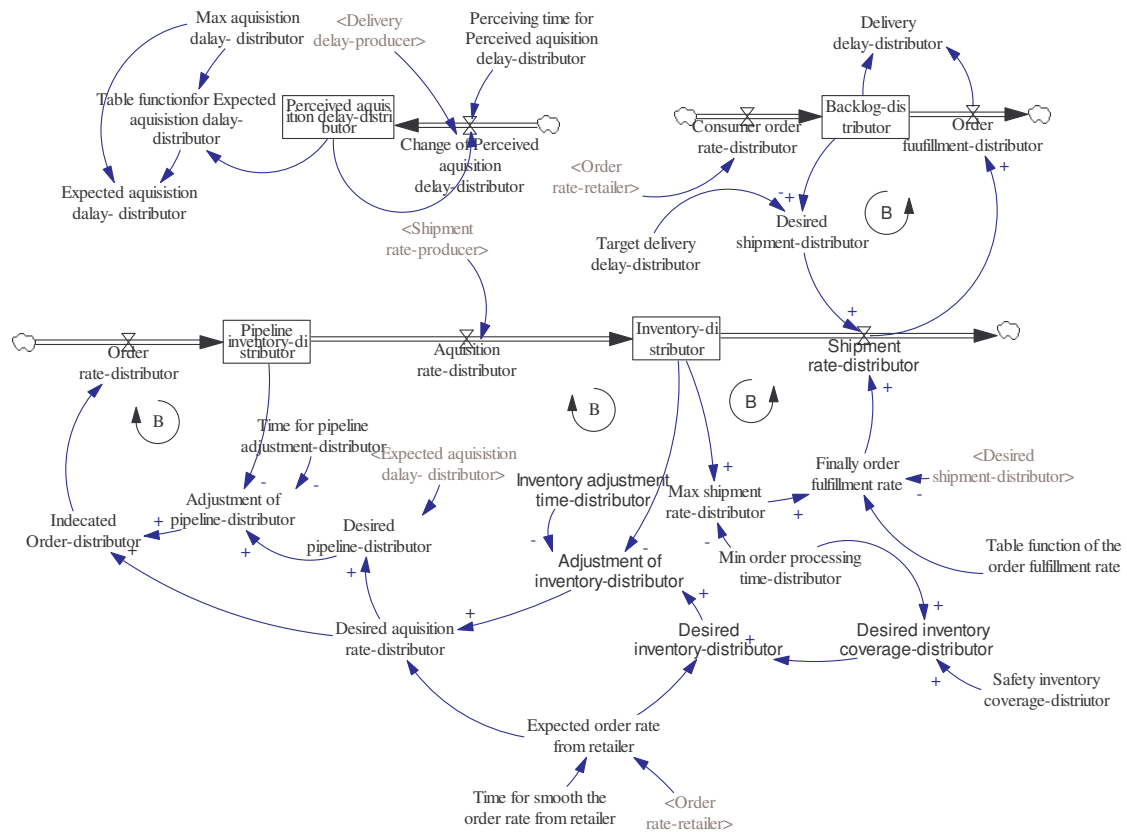
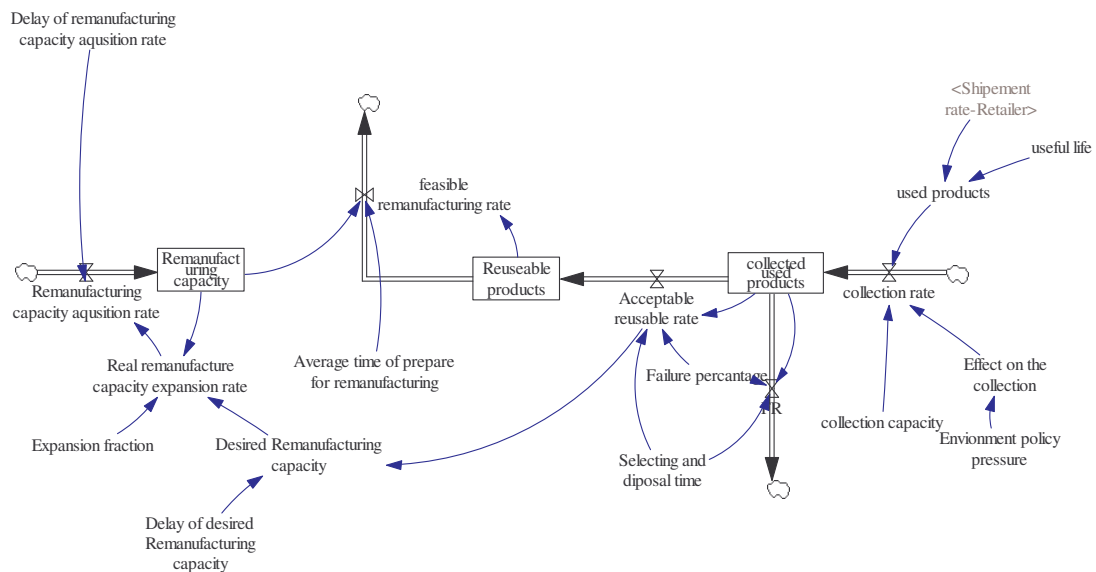


Model structure and equations of the closed loop supply chain.







Equations:

Acceptable reusable rate=

collected used products*(1-Failure percantage)/Selecting and diposal time

~ unit/Week

~ accepted for reuse

|

"Adjustment inventory-producer" = ("Desired inventory-producer" - "Inventory-producer")/

"Inventory adjustment time-producer"

~ unit/Week

~ The desired production rate is adjusted above or below the forecast based on the \ inventory position

of the plant. When desired inventory > inventory, desired production is \ increased (and

vice-versa). Inventory gaps are corrected over the inv. adj. \ time.

|

"Adjustment of intventory -Retailer" = ("Desired inventory-Retailer" - "Inventory-retailer")/

"Inventory adjustment time-Retailer"

~ unit/Week

~ The desired production rate is adjusted above or below the forecast based on the \ inventory position

of the plant. When desired inventory > inventory, desired production is \ increased (and

vice-versa). Inventory gaps are corrected over the inv. adj. \
time.

|

"Adjustment of inventory-distributor" = ("Desired inventory-distributor" - "Inventory-distributor")/
)/

"Inventory adjustment time-distributor"

~ unit/Week

~ The desired production rate is adjusted above or below the forecast based on the \
inventory position
of the plant. When desired inventory > inventory, desired production is \
increased (and
vice-versa). Inventory gaps are corrected over the inv. adj. \
time.

|

"Adjustment of pipeline -producer"=

("Desired pipeline inventory-producer" - Pipeline inventory-Remanufacture pipeline
product)

)/"Time for adjustment of pipeline -producer"

~ unit/Week

~ The order rate is adjusted to close any gap between the desired and actual \
supply line.

|

"Adjustment of pipeline-distributor"=

("Desired pipeline-distributor" - "Pipeline inventory-distributor")/"Time for pipeline
adjustment-distributor"

~ ,ö/ÖÜ

~ The order rate is adjusted to close any gap between the desired and actual \
supply line.

|

"Adjustment of pipeline-retailer"=

("Desired Pipeline-Retailer" - "Pipeline inventory-retailer")/"Time for adjustment of
pipeline-retailer"

~ unit/Week

~ The order rate is adjusted to close any gap between the desired and actual \
supply line.

|

"Aquisition rate-distributor"=

"Shipment rate-producer"

~ unit/Week

~ The acquisition rate is determined by the quantity on order and the average \
acquisition delay.

In this simple model, the acquisition delay is first-order, but in general can be any high-order process.

|

"Aquisition rate-producer"=

DELAY FIXED(Prodution start rate, Manufacturing cycle time, Prodution start rate)

~ unit/Week

~ The product acquisition rate is determined by the quantity on pipelin and \ the average acquisition delay.

|

"Aquisition rate-retailer"=

"Shipment rate-distributor"

~ unit/Week

~ The acquisition rate is determined by the quantity on order and the average \ acquisition delay.

In this simple model, the acquisition delay is first-order, but in general can be any high-order process.

|

Aquisiton from remanufacturing=

Remanufacturing production rate

~ unit/Week

~ Aquisiton from remanufacturing

|

Average time of prepare for remanufacturing=

1

~ Week

~ Avage Remanufaturing prepire time

|

"Backlog-distributor"= INTEG (

+"Consumer order rate-distributor"-"Order fuufillment-distributor",
8)

~ unit

~ The firm's backlog of unfilled orders

|

"Backlog-producer"= INTEG (

+"Consumer order rate-producer"-"Order fulfillment rate-producer",
8)

~ unit

~ The firm's backlog of unfilled orders

|

"Change of Perceived aquisition delay-distributor"=

$$\frac{(\text{"Delivery delay-producer"} - \text{"Perceived aquisition delay-distributor"})}{\text{"Perceiving time for Perceived aquisition delay-distributor"}}$$

~
~ |

$$\text{"change of perceived aquisition delay-retailer"} = \frac{(\text{"Delivery delay-distributor"} - \text{"Perceived aquisition delay-retailer"})}{\text{"Perceiving time for Perceived aquisition delay-retailer"}}$$

~
~ |

$$\text{collected used products} = \text{INTEG} (\text{INTEGER}(\text{+collection rate-Acceptable reusable rate-FR}), 2)$$

~ unit
~ collected product
|

$$\text{collection capacity} = 1000$$

~ unit/Week
~ collection capacity
|

$$\text{collection rate} = \text{MIN}(\text{collection capacity, Effect on the collection*used products})$$

~ unit/Week
~ collection rate
|

$$\text{"Consumer order rate-distributor"} = \text{"Order rate-retailer"}$$

~ unit/Week
~ The incoming order rate, equal to customer orders.
|

$$\text{"Consumer order rate-producer"} = \text{"Order rate-distributor"}$$

~ unit/Week
~ The incoming order rate, equal to customer orders.
|

$$\text{Delay of desired Remanufacturing capacity} = 4$$

~ Week
~ |

Delay of remanufacturing capacity acquisition rate=

24
~ Week
~ |

"Delivery delay-distributor"=

"Backlog-distributor"/"Order fulfillment-distributor"
~ Week
~ |

"Delivery delay-producer"=

"Backlog-producer"/"Order fulfillment rate-producer"
~ Week
~ |

"Desired acquisition rate-distributor"=

MAX(0, Expected order rate from retailer+"Adjustment of inventory-distributor")
~ unit/Week
~ The desired acquisition rate is expected losses.
|

"Desired acquisition rate-producer"=

MAX(0, Expected order rate from distributor+"Adjustment inventory-producer")
~ unit/Week
~ The desired acquisition rate is expected losses.
|

"Desired acquisition rate-retailer"=

MAX(0, "Expected order rate-retailer"+"Adjustment of inventory -Retailer")
~ unit/Week
~ The desired acquisition rate is expected losses.
|

"Desired inventory coverage-producer"=

"Min order processing time-producer" + "Safety inventory coverage-producer"
~ Week
~ Desired inventory coverage is the number of weeks of the demand forecast the

plant \

seeks to maintain
in inventory. This inventory coverage is required to maintain delivery \
reliability by
buffering the plant against unforeseen variations in demand or \
production. It consists of the normal order processing time plus an \
additional term representing the coverage desired to maintain safety \
stocks.

|

"Desired inventory coverage-distributor"=

"Min order processing time-distributor" + "Safety inventory coverage-distributor"

~ Week

~ Desired inventory coverage is the number of weeks of the demand forecast the plant \

seeks to maintain

in inventory. This inventory coverage is required to maintain delivery \ reliability by

buffering the plant against unforeseen variations in demand or \ production. It consists of the normal order processing time plus an \ additional term representing the coverage desired to maintain safety \ stocks.

|

"Desired inventory coverage-retailer"=

"Min order processing time-Retailer" + "Safety inventory coverage-Retailer"

~ Week

~ Desired inventory coverage is the number of weeks of the demand forecast the plant \

seeks to maintain

in inventory. This inventory coverage is required to maintain delivery \ reliability by

buffering the plant against unforeseen variations in demand or \ production. It consists of the normal order processing time plus an \ additional term representing the coverage desired to maintain safety \ stocks.

|

"Desired inventory-distributor"=

"Desired inventory coverage-distributor"*Expected order rate from retailer

~ ,ö

~ The desired inventory level sought by the plant. Experience suggests that to \ maintain customer

service by providing full and reliable deliveries, the plant must maintain a \ certain

coverage of throughput (demand), estimated by the demand forecast.

|

"Desired inventory-producer"=

"Desired inventory coverage-producer"*Expected order rate from distributor

~ unit

~ The desired inventory level sought by the plant. Experience suggests that to \ maintain customer

service by providing full and reliable deliveries, the plant must maintain a \ certain

coverage of throughput (demand), estimated by the demand forecast.

|

"Desired inventory-Retailor"=

"Desired inventory coverage-retailer"*"Expected order rate-retailer"

~ unit

~ The desired inventory level sought by the plant. Experience suggests that to \ maintain customer service by providing full and reliable deliveries, the plant must maintain a \ certain coverage of throughput (demand), estimated by the demand forecast.

|

"Desired pipeline inventory-producer"=

"Expected aquisition rate-producer"*"Desired aquisition rate-producer"

~ unit

~ The desired supply line maintains sufficient units on order to yield the desired acquisition rate.

|

"Desired pipeline-distributor"=

"Expected aquisition delay- distributor"*"Desired aquisition rate-distributor"

~ unit

~ The desired supply line maintains sufficient units on order to yield the desired acquisition rate.

|

"Desired Pipeline-Retailer"=

"Expected aquisition delay- retailer"*"Desired aquisition rate-retailer"

~ unit

~ The desired supply line maintains sufficient units on order to yield the desired acquisition rate.

|

Desired Remanufacturing capacity=

DELAY1I(Acceptable reusable rate, Delay of desired Remanufacturing capacity , 1)

~ unit/Week

~ desired remanufacturing capacity

|

"Desired shipment rate-producer"=

"Backlog-producer"/"Target delivery delay-producer"

~ unit/Week

~ The desired shipment rate is determined by the backlog and the target \ delivery delay.

|

"Desired shipment-distributor"=

"Backlog-distributor"/"Target delivery delay-distributor"

~ unit/Week
 ~ The desired shipment rate is determined by the backlog and the target \ delivery delay.
 |

"Dessired shipment rate-Retailer"=
 "Order rate-Consumer"
 ~ unit/Week
 ~ The desired shipment rate is determined by the backlog and the target \ delivery delay.
 |

Effect on the collection= WITH LOOKUP (
 Envionment policy pressure,
 ([(0,0)-(1,1)],(0,0.21),(0.1,0.25),(0.2,0.28),(0.3,0.34),(0.4,0.47),(0.5,0.7),(0.6,\ 0.82),(0.7,0.92),(0.8,0.97),(0.9,0.99),(1,1)))
 ~ Dimensionless
 ~ table function
 |

Envionment policy pressure=
 0.5
 ~ Dimensionless
 ~ colleccion percentage
 |

Expansion fraction=
 0.5
 ~
 ~ |

"Expected aquisition dalay- distributor"=
 "Table functionfor Expected aquisition dalay- distributor"*"Max aquisition dalay- distributor"
 ~ Week
 ~ |

"Expected aquisition dalay- retailer"=
 "Table functionfor Expected aquisition dalay- retailer"*"Max acceptable delay-retailer"
 ~ Week
 ~ |

"Expected aquisition rate-producer"=
 (Manufacturing cycle time+Remanufacturing cycle time)/2
 ~ Week
 ~ The expected delay between production start and acquisition of new units.
 Assumed \

in this simple model to equal the actual acquisition lag, but is modeled more realistically as an information delay of the actual value.

|

Expected order rate from distributor=

SMOOTH("Order rate-distributor", Time for smooth order rate from distributor)
 ~ unit/Week
 ~ |

Expected order rate from retailer=

SMOOTH("Order rate-retailer", Time for smooth the order rate from retailer)
 ~ unit/Week
 ~ |

"Expected order rate-retailer"=

SMOOTH("Order rate-Consumer", Time for smooth order rate from consumer)
 ~ unit/Week
 ~ |

Failure percantage=

0.2
 ~ Dimensionless
 ~ failure percantage
 |

feasible remanufacturing rate=

MIN(Remanufacturing capacity, Reuseable products/Average time of prepare for remanufacturing\
)
 ~ unit/Week
 ~ remanufacturing rate
 |

"Finally oder fulfillment rate-Reatiler"=

"Table function of order fulfillment-retailer"("Max shipment rate-Retailer"/"Dessired shipment rate-Retailer"\
)
 ~ Dimensionless
 ~ The Fraction of customer orders filled is determined by the ratio of the \
 normal shipment rate to the desired rate. The normal rate is the rate \
 current inventory permits under normal circumstances. Low inventory \
 availability reduces shipments below customer orders. Unfilled customer \
 orders are lost.
 |

"Finally Oderfulfiiment rate-producer"=

"Table function of order fulfillment rate-producer"("Max shipment rate-producer"/"Desired shipment rate-producer"\

-)
- ~ Dimensionless
- ~ The Fraction of customer orders filled is determined by the ratio of the \ normal shipment rate to the desired rate. The normal rate is the rate \ current inventory permits under normal circumstances. Low inventory \ availability reduces shipments below customer orders. Unfilled customer \ orders are lost.
- |

Finally order fulfillment rate=

Table function of the order fulfillment rate("Max shipment rate-distributor"/"Desired shipment-distributor"\

-)
- ~ Dimensionless
- ~ The Fraction of customer orders filled is determined by the ratio of the \ normal shipment rate to the desired rate. The normal rate is the rate \ current inventory permits under normal circumstances. Low inventory \ availability reduces shipments below customer orders. Unfilled customer \ orders are lost.
- |

FR=

- collected used products*Failure percentage/Selecting and disposal time
- ~ unit/Week
- ~ failure rate
- |

ICOR=

- 4
- ~ unit/Week
- ~ Initial value of customer orders, set to 4 widgets per week.
- |

"Indicated Order-distributor"=

- "Desired acquisition rate-distributor" + "Adjustment of pipeline-distributor"
- ~ unit/Week
- ~ Indicated orders are based on the expected loss rate, then adjusted for to close any gap between the desired and actual stock or supply line.
- |

Indicated production start rate=

- "Desired acquisition rate-producer" + "Adjustment of pipeline -producer"
- ~ unit/Week
- ~ Indicated orders are based on the expected loss rate, then adjusted for to close any gap between the desired and actual stock or supply line.

|

"Indicated order rate-retailer"=

"Desired acquisition rate-retailer" + "Adjustment of pipeline-retailer"

~ unit/Week

~ Indicated orders are based on the expected loss rate, then adjusted for to close any gap between the desired and actual stock or supply line.

|

Input=

1+STEP(Step Height,Step Time)+

(Pulse Quantity/TIME STEP)*PULSE(Pulse Time,TIME STEP)+

RAMP(Ramp Slope,Ramp Start Time,Ramp End Time)+

Sine Amplitude*SIN(2*3.14159*Time/Sine Period)

~ Dimensionless

~ Input is a dimensionless variable which provides a variety of test input patterns, \ including a step, pulse, sine wave, and random noise.

|

"Inventory adjustment time-distributor" = 8

~ Week

bring \ The inventory adjustment time is the time period over which the plant seeks to inventory in balance with the desired level. Initially set to 8 weeks.

|

"Inventory adjustment time-producer" = 8

~ Week

bring \ The inventory adjustment time is the time period over which the plant seeks to inventory in balance with the desired level. Initially set to 8 weeks.

|

"Inventory adjustment time-Retailer" = 8

~ Week

bring \ The inventory adjustment time is the time period over which the plant seeks to inventory in balance with the desired level. Initially set to 8 weeks.

|

"Inventory-distributor"= INTEG (

"Acquisition rate-distributor"- "Shipment rate-distributor",

"Desired inventory-distributor")

~ unit
 ~ The level of finished goods inventory in the plant. Increased by production and \ decreased by shipments. Initially set to the desired inventory level.

|

"Inventory-producer"= INTEG (
 Aquisition from remanufacturing+"Aquisition rate-producer"-"Shipment rate-producer",
 "Desired inventory-producer")
 ~ unit
 ~ The level of finished goods inventory in the plant. Increased by production and \ decreased by shipments. Initially set to the desired inventory level.

|

"Inventory-retailer"= INTEG (
 "Aquisition rate-retailer"-"Shipement rate-Retailer",
 "Desired inventory-Retailor")
 ~ unit
 ~ The level of finished goods inventory in the plant. Increased by production and \ decreased by shipments. Initially set to the desired inventory level.

|

Manufacturing cycle time=
 2
 ~ Week
 ~ The average delay between order and acquisition of new units.

|

"Max acceptable delay-retailer"=
 6
 ~ Week
 ~ Max acceptable delay

|

"Max aquisition dalay- distributor"=
 6
 ~ Week
 ~ Max acceptable delay

|

"Max shipment rate-distributor"=
 "Inventory-distributor"/"Min order processing time-distributor"
 ~ unit/Week
 ~ The maximum rate of shipments the firm can achieve given their current \ inventory level and the minimum order processing time.

|

"Max shipment rate-producer"=

"Inventory-producer"/"Min order processing time-producer"

~ unit/Week

~ The maximum rate of shipments the firm can achieve given their current \ inventory level and the minimum order processing time.

|

"Max shipment rate-Retailer"=

"Inventory-retailer"/"Min ordre processing time-Retailer"

~ unit/Week

~ The maximum rate of shipments the firm can achieve given their current \ inventory level and the minimum order processing time.

|

MB 0(

[(0,-0.15)-(1,0.15)],(0,-0.15),(0.5,0),(1,0.15))

~ Dimensionless

~

|

"Min order processing time-distributor"=

1

~ Week

~ The minimum time required to process and ship an order.

|

"Min order processing time-producer"=

1

~ Week

~ The minimum time required to process and ship an order.

|

"Min ordre processing time-Retailer"=

1

~ Week

~ The minimum time required to process and ship an order.

|

"Order fulfillment rate-producer"=

"Shipment rate-producer"

~ unit/Week

~ The order fulfillment rate is equal to the physical shipment rate.

|

"Order fuufillment-distributor"=

"Shipment rate-distributor"

~ unit/Week
 ~ The order fulfillment rate is equal to the physical shipment rate.
 |

"Order rate-Consumer"=
 Order rate0
 ~ unit/Week
 ~ |

"Order rate-distributor"=
 MAX(0, "Indecated Order-distributor")
 ~ unit/Week
 ~ |

"Order rate-Producer"=
 Remanufacturing start rate+Prodution start rate
 ~ unit/Week
 ~ |

"Order rate-retailer"=
 MAX("Indicated order rate-retailer", 0)
 ~ unit/Week
 ~ |

Order rate0=
 ICOR*Input
 ~ unit/Week
 ~ |

"Perceived aquisition delay-distributor"= INTEG (
 "Change of Perceived aquisition delay-distributor",
 2)
 ~ Week
 ~ Perceived_Aquisition_Delay of distributor
 |

"Perceived aquisition delay-retailer"= INTEG (
 "change of perceived aquisition delay-retailer",
 2)
 ~ Week
 ~ Perceived_Aquisition_Delay of distributor
 |

"Perceiving time for Perceived aquisition delay-distributor"=
 12
 ~ Week
 ~ Delivery Delay_Perception_Time

|

"Perceiving time for Perceived aquisition delay-retailer"=

12

~ Week

~ Delivery Delay_Perception_Time

|

Pipeline inventory= INTEG (

+Production start rate-"Aquisition rate-producer",

"Desired pipeline inventory-producer"/2)

~ unit

~ The quantity on order; what has been ordered but not yet received.

|

"Pipeline inventory-distributor"= INTEG (

+"Order rate-distributor"-"Aquisition rate-distributor",

"Desired pipeline-distributor")

~ .0

~ The quantity on order; what has been ordered but not yet received.

|

"Pipeline inventory-retailer"= INTEG (

+"Order rate-retailer"-"Aquisition rate-retailer",

"Desired Pipeline-Retailer")

~ unit

~ The quantity on order; what has been ordered but not yet received.

|

Production start rate=

MAX(0,Indecated production start rate-Remanufacturing start rate)

~ unit/Week

~ The podustion start rate is constrained to be nonnegative.

|

Pulse Quantity=

0

~ Dimensionless*Week

~ The quantity to be injected to customer orders, as a fraction of the base value of \ Input.

For example, to pulse in a quantity equal to 50% of the current value of \ input, set to

.50.

|

Pulse Time=5

~ Week

~ Time at which the pulse in Input occurs.
|

Ramp End Time=1e+009
~ Week
~ End time for the ramp input.
|

Ramp Slope=0
~ 1/Week
~ Slope of the ramp input, as a fraction of the base value (per week).
|

Ramp Start Time=5
~ Week
~ Start time for the ramp input.
|

Real remanufacture capacity expansion rate=
Expansion fraction*MAX(Desired Remanufacturing capacity-Remanufacturing capacity,
0\
)
~ unit/Week
~ capacity expansion rate
|

Remanufacture pipeline product= INTEG (
Remanufacturing start rate-Remanufacturing production rate,
"Desired pipeline inventory-producer"/2)
~ unit
~ remanufacturing pipe line
|

Remanufacturing capacity= INTEG (
Remanufacturing capacity aquisition rate,
10)
~ unit/Week
~ remanufacturing capacity
|

Remanufacturing capacity aquisition rate=
DELAY3(Real remanufacture capacity expansion rate, Delay of remanufacturing capacity
aquisition rate\
)
~ unit/Week/Week
~ capacity add rate
|

Remanufacturing cycle time=

2
~ Week
~ Remanufacturing production delay
|

Remanufacturing production rate=

DELAY FIXED(Remanufacturing start rate,Remanufacturing cycle time ,
Remanufacturing start rate\
)
~ unit/Week
~ |

Remanufacturing start rate=

MIN(feasible remanufacturing rate, MAX(0,Indecated production start rate))
~ unit/Week
~ |

Reuseable products= INTEG (

Acceptable reusable rate-feasible remanufacturing rate,
1.6)
~ unit
~ reusable products
|

"Safety inventory coverage-distriutor"=

1
~ Week
~ Safety stock coverage is the number of weeks of the expected order rate \
the firm would like to maintain in inventory over and above the normal \
order processing time. The safety stock provides a buffer against the \
possibility that unforeseen variations in demand will cause shipments to \
fall below orders.
|

"Safety inventory coverage-Retailer"=

1
~ Week
~ Safety stock coverage is the number of weeks of the expected order rate \
the firm would like to maintain in inventory over and above the normal \
order processing time. The safety stock provides a buffer against the \
possibility that unforeseen variations in demand will cause shipments to \
fall below orders.
|

"Saftey inventory coverage-producer"=

1
 ~ Week
 ~ Safety stock coverage is the number of weeks of the expected order rate \ the firm would like to maintain in inventory over and above the normal \ order processing time. The safety stock provides a buffer against the \ possibility that unforeseen variations in demand will cause shipments to \ fall below orders.
 |

Selecting and disposal time=

1
 ~ Week
 ~ time to selecting
 |

"Shipment rate-Retailer"=

"Desired shipment rate-Retailer"*"Finally order fulfillment rate-Retailer"
 ~ unit/Week
 ~ The shipment rate is the desired shipment rate multiplied by the fraction \ of orders filled (the order fulfillment ratio. Shipments fall below \ desired shipments when the feasible shipment rate falls below the desired \ rate, indicating that some products are unavailable.
 |

"Shipment rate-distributor"=

"Desired shipment-distributor"*"Finally order fulfillment rate"
 ~ unit/Week
 ~ The shipment rate is the desired shipment rate multiplied by the fraction \ of orders filled (the order fulfillment ratio. Shipments fall below \ desired shipments when the feasible shipment rate falls below the desired \ rate, indicating that some products are unavailable.
 |

"Shipment rate-producer"=

"Desired shipment rate-producer"*"Finally Orderfulfiiment rate-producer"
 ~ unit/Week
 ~ |

Sine Amplitude=0

~ Dimensionless
 ~ Amplitude of sine wave in customer orders (fraction of mean).
 |

Sine Period=50

~ Weeks
 ~ Period of sine wave in customer demand. Set initially to 50 weeks (1 \ year).
 |

|

Step Height=

0.5

~ Dimensionless

~ Height of step input to customer orders, as fraction of initial value.

|

Step Time=5

~ Week

~ Time for the step input.

|

"Table function of order fulfillment rate-producer"(
[(0,0)-(2,1)],(0,0),(0.2,0.2),(0.4,0.4),(0.6,0.58),(0.8,0.73),(1,0.85),(1.2,0.93),(1.4,

0.97),(1.6,0.99),(1.8,1),(2,1),(2,1))

~ Dimensionless

~ The ability to ship is constrained by inventory availability. As the inventory \ level drops, the fraction of customer orders that can be filled decreases. When inventory is \ zero, shipments cease. Unfilled customer orders are lost.\\!\\!

|

"Table function of order fulfillment-retailer"(
[(0,0)-(100,1)],(0,0),(0.2,0.2),(0.4,0.4),(0.6,0.58),(0.8,0.73),(1,0.85),(1.2,0.93),\

(1.4,0.97),(1.6,0.99),(1.8,1),(2,1),(2,1),(100,1))

~ Dimensionless

~ The ability to ship is constrained by inventory availability. As the inventory \ level drops, the fraction of customer orders that can be filled decreases. When inventory is \ zero, shipments cease. Unfilled customer orders are lost.\\!\\!

|

Table function of the order fulfillment rate(
[(0,0)-(2,1)],(0,0),(0.2,0.2),(0.4,0.4),(0.6,0.58),(0.8,0.73),(1,0.85),(1.2,0.93),(1.4,

0.97),(1.6,0.99),(1.8,1),(2,1),(2,1))

~ Dimensionless

~ The ability to ship is constrained by inventory availability. As the inventory \ level drops, the fraction of customer orders that can be filled decreases. When inventory is \ zero, shipments cease. Unfilled customer orders are lost.\\!\\!

|

"Table functionfor Expected aquisition dalay- distributor"= WITH LOOKUP (

"Max aquisition delay- distributor"/"Perceived aquisition delay-distributor",
([(0,0)-(10,1)],(0,1),(0.3,0.98),(0.6,0.93),(0.9,0.85),(1.2,0.7),(1.5,0.57),(1.8,0.46\,
(2.1,0.39),(2.4,0.35),(2.7,0.33333),(3,0.33333),(10,0.33)))

~

~ |

"Table functionfor Expected aquisition delay- retailer"= WITH LOOKUP (
"Max acceptable delay-retailer"/"Perceived aquisition delay-retailer",
([(0,0)-(10,1)],(0,1),(0.3,0.98),(0.6,0.93),(0.9,0.85),(1.2,0.7),(1.5,0.57),(1.8,0.46\,
(2.1,0.39),(2.4,0.35),(2.7,0.33333),(3,0.33333),(10,0.33)))

~

~ |

"Target delivery delay-distributor"=
2
~ Week
~ The firm's target for delivery time.
|

"Target delivery delay-producer"=
2
~ Week
~ The firm's target for delivery time.
|

"Time for adjustment of pipeline -producer"=
4
~ Week
~ The time period over which the gap between the desired and actual supply \
line is closed.
|

"Time for adjustment of pipeline-retailer"=
4
~ unit
~ The time period over which the gap between the desired and actual supply \
line is closed.
|

"Time for pipeline adjustment-distributor"=
4
~ Week
~ The time period over which the gap between the desired and actual supply \
line is closed.
|

Time for smooth order rate from consumer=

4
~ Week
~ |

Time for smooth order rate from distributor=

4
~ Week
~ |

Time for smooth the order rate from retailer=

4
~ Week
~ |

used products=

DELAY3("Shipment rate-Retailer", useful life)
~ unit/Week
~ used products
|

useful life=

78
~ Week
~ USE LIFE
|

.Control

*****~

Simulation Control Parameters

|

FINAL TIME = 100

~ Week
~ The final time for the simulation.
|

INITIAL TIME = 0

~ Week
~ The initial time for the simulation.
|

SAVEPER = 1

~ Week [0,?]
~ The frequency with which output is stored.
|

TIME STEP = 0.25

~ Week [0,?]

~ The time step for the simulation.

|

\\---// Sketch information - do not modify anything except names

V300 Do not put anything below this section - it will be ignored

*View 1

\$192-192-192,0,Times New Roman|12||0-0-0|0-0-0|0-0-255|-1--1--1|-1--1--1|96,96,100

10,1,"Inventory-retailer",610,52,40,20,3,3,0,0,0,0,0

12,2,48,911,44,10,8,0,3,0,34,-1,0,0,0,-1--1--1,0-0-0,Helvetica|12||0-0-0

10,3,"Adjustment of inventory -Retailer",547,263,68,18,8,3,0,32,0,0,0,0,-1--1--1,0-0-

0,Helvetica|12||0-0-0

10,4,"Desired inventory-Retailer",623,332,64,18,8,3,0,32,0,0,0,0,-1--1--1,0-0-0,Helvetica|12||0-0-0

10,5,"Inventory adjustment time-Retailer",532,189,47,27,8,3,0,32,0,0,0,0,-1--1--1,0-0-0,Helvetica|12||0-0-0

10,6,"Desired inventory coverage-retailer",763,384,64,18,8,3,0,32,0,0,0,0,-1--1--1,0-0-0,Helvetica|12||0-0-0

10,7,"Finally order fulfillment rate-Retailer",817,147,69,19,8,3,0,0,0,0,0,0

10,8,"Table function of order fulfillment-retailer",957,247,73,19,8,3,0,0,0,0,0,0

12,9,0,678,109,20,20,5,4,0,34,0,0,0,0,-1--1--1,0-0-0,Helvetica|12||0-0-0

B

12,10,0,682,158,50,11,8,0,0,0,0,0,0

1,11,5,3,2,0,45,0,0,192,0,-1--1--1,,1|(493,239)|

1,12,1,3,2,0,45,0,0,192,0,-1--1--1,,1|(598,179)|

1,13,4,3,2,0,43,0,0,192,0,-1--1--1,,1|(615,281)|

1,14,6,4,2,0,43,0,0,0,0,-1--1--1,,1|(673,337)|

1,15,8,7,1,0,0,0,0,0,0,-1--1--1,,1|(839,202)|

10,16,"Desired shipment rate-Retailer",731,-30,58,19,8,3,0,0,0,0,0,0

10,17,"Max shipment rate-Retailer",672,201,45,19,8,3,0,0,0,0,0,0

10,18,"Min order processing time-Retailer",732,279,68,19,8,3,0,0,0,0,0,0

1,19,1,17,1,0,43,0,0,192,0,-1--1--1,,1|(662,152)|

1,20,17,7,1,0,43,0,0,192,0,-1--1--1,,1|(762,184)|

1,21,18,17,1,0,45,0,0,192,0,-1--1--1,,1|(675,247)|

1,22,18,6,1,0,43,0,0,192,0,-1--1--1,,1|(782,327)|

10,23,"Safety inventory coverage-Retailer",877,313,57,19,8,3,0,0,0,0,0,0

1,24,23,6,1,0,43,0,0,192,0,-1--1--1,,1|(839,371)|

10,25,"Desired shipment rate-Retailer",997,138,63,19,8,2,0,3,-1,0,0,0,128-128-128,0-0-0,|12||128-128-128

1,26,25,7,1,0,45,0,0,192,0,-1--1--1,,1|(933,155)|

10,27,"Pipeline inventory-retailer",295,53,40,20,3,3,0,0,0,0,0,0

1,28,29,27,100,0,0,22,0,0,0,-1--1--1,,1|(391,50)|

11,29,700,453,50,6,8,34,3,0,0,1,0,0,0

10,30,"Acquisition rate-retailer",453,69,37,19,40,3,0,0,-1,0,0,0

10,31,"Indicated order rate-retailer",128,225,49,19,8,3,0,0,0,0,0,0

10,32,"Adjustment of pipeline-retailer",264,205,49,19,8,3,0,0,0,0,0,0

10,33,"Desired Pipeline-Retailer",381,223,53,19,8,3,0,0,0,0,0
 1,34,32,31,1,0,43,0,0,64,0,-1--1--1,,1|(203,227)|
 1,35,33,32,1,0,43,0,0,192,0,-1--1--1,,1|(319,243)|
 1,36,27,32,1,0,45,0,0,192,0,-1--1--1,,1|(297,108)|
 12,37,0,196,126,20,20,4,4,0,0,-1,0,0,0
 B
 12,38,0,533,117,20,20,4,4,0,0,-1,0,0,0
 B
 12,39,0,193,164,50,11,8,0,0,0,-1,0,0,0
 12,40,0,576,155,50,11,8,0,0,0,-1,0,0,0
 10,41,"Time for adjustment of pipeline-retailer",337,138,72,19,8,3,0,0,0,0,0,0
 1,42,41,32,1,0,45,0,0,192,0,-1--1--1,,1|(318,190)|
 10,43,"Desired aquistion rate-retailer",411,323,55,19,8,3,0,0,0,0,0,0
 1,44,43,33,1,0,43,0,0,192,0,-1--1--1,,1|(379,271)|
 1,45,29,1,4,0,0,22,0,0,0,-1--1--1,,1|(514,50)|
 1,46,3,43,1,0,43,0,2,64,0,-1--1--1,1|2||0-0-0,1|(502,306)|
 1,47,43,31,1,0,43,0,2,64,0,-1--1--1,1|2||0-0-0,1|(281,306)|
 10,48,"Expected order rate-retailer",535,413,50,19,8,3,0,0,0,0,0,0
 1,49,48,43,1,0,0,0,0,64,0,-1--1--1,,1|(475,391)|
 1,50,48,4,1,0,0,0,0,64,0,-1--1--1,,1|(576,388)|
 10,51,Time for smooth order rate from consumer,486,478,72,19,8,3,0,0,0,0,0,0
 1,52,51,48,1,0,0,0,0,64,0,-1--1--1,,1|(517,454)|
 12,53,48,60,46,10,8,0,3,0,0,-1,0,0,0
 1,54,56,27,4,0,0,22,0,0,0,-1--1--1,,1|(211,46)|
 1,55,56,53,100,0,0,22,0,0,0,-1--1--1,,1|(113,46)|
 11,56,48,162,46,6,8,34,3,0,0,1,0,0,0
 10,57,"Order rate-retailer",162,65,58,11,40,3,0,0,-1,0,0,0
 1,58,31,57,1,0,0,0,0,64,0,-1--1--1,,1|(127,161)|
 1,59,61,2,4,0,0,22,0,0,0,-1--1--1,,1|(841,44)|
 1,60,61,1,100,0,0,22,0,0,0,-1--1--1,,1|(709,44)|
 11,61,1244,775,44,6,8,34,3,0,0,1,0,0,0
 10,62,"Shipement rate-Retailer",775,63,40,19,40,3,0,0,-1,0,0,0
 1,63,7,62,1,0,0,0,0,64,0,-1--1--1,,1|(806,96)|
 1,64,16,61,1,0,0,0,0,64,0,-1--1--1,,1|(740,3)|
 10,65,"Order rate-Consumer",691,-97,53,19,8,2,0,3,-1,0,0,0,128-128-128,0-0-0,1|2||128-128-128
 1,66,65,16,1,0,0,0,0,64,0,-1--1--1,,1|(712,-66)|
 10,67,"Order rate-Consumer",662,453,53,19,8,2,0,3,-1,0,0,0,128-128-128,0-0-0,1|2||128-128-128
 1,68,67,48,1,0,0,0,0,64,0,-1--1--1,,1|(622,424)|
 10,69,"Shipment rate-distributor",468,-34,73,26,8,2,0,3,-1,0,0,0,128-128-128,0-0-0,1|2||128-128-128
 1,70,69,29,1,0,0,0,0,64,0,-1--1--1,,1|(433,-20)|
 10,71,"Perceived aquistion delay-retailer",319,-124,62,20,3,3,0,0,0,0,0,0
 12,72,48,557,-121,10,8,0,3,0,0,-1,0,0,0
 1,73,75,71,4,0,0,22,0,0,0,-1--1--1,,1|(415,-124)|
 1,74,75,72,100,0,0,22,0,0,0,-1--1--1,,1|(504,-124)|
 11,75,48,455,-124,6,8,34,3,0,0,1,0,0,0
 10,76,"change of perceived aquistion delay-retailer",455,-105,73,19,40,3,0,0,-1,0,0,0

10,77,"Perceiving time for Perceived aquisition delay-retailer",465,-202,64,28,8,3,0,0,0,0,0
1,78,77,75,1,0,0,0,0,64,0,-1--1--1,,1l(476,-167)l
1,79,71,75,1,0,0,0,0,64,0,-1--1--1,,1l(373,-73)l
10,80,"Max acceptable delay-retailer",176,-208,52,19,8,3,0,0,0,0,0
10,81,"Table functionfor Expected aquisition dalay- retailer",180,-130,65,28,8,3,0,0,0,0,0
1,82,71,81,1,0,0,0,0,64,0,-1--1--1,,1l(239,-164)l
1,83,80,81,1,0,0,0,0,64,0,-1--1--1,,1l(174,-163)l
10,84,"Expected aquisition dalay- retailer",203,-36,65,19,8,3,0,0,0,0,0
1,85,80,84,1,0,0,0,0,64,0,-1--1--1,,1l(131,-156)l
1,86,81,84,1,0,0,0,0,64,0,-1--1--1,,1l(204,-98)l
10,87,"Delivery delay-distributor",342,-217,34,21,8,2,0,3,-1,0,0,0,128-128-128,0-0-0,128-128-128
1,88,87,75,1,0,0,0,0,64,0,-1--1--1,,1l(363,-186)l
10,89,"Delivery delay-producer",1176,-278,62,14,8,2,0,3,-1,0,0,0,128-128-128,0-0-0,128-128-128
10,90,"Expected aquisition dalay- retailer",441,155,70,19,8,2,0,3,-1,0,0,0,128-128-128,0-0-0,128-128-128
1,91,90,33,1,0,0,0,0,64,0,-1--1--1,,1l(430,194)l
1,94,4,1,0,0,0,0,0,0,1,-1--1--1,,1l(616,199)l
1,95,33,27,0,0,0,0,0,0,1,-1--1--1,,1l(341,144)l

\\---// Sketch information - do not modify anything except names

V300 Do not put anything below this section - it will be ignored

*View 2

\$192-192-192,0,Times New Romanl12l0-0-0l0-0-0l0-0-255l-1--1--1l-1--1--1l96,96,100

10,1,"Inventory-distributor",680,31,40,20,3,3,0,0,0,0,0

12,2,48,981,23,10,8,0,3,0,34,-1,0,0,0,-1--1--1,0-0-0,Helvetica12l0-0-0

11,3,48,850,28,6,8,34,3,0,0,1,0,0,0

10,4,"Shipment rate-distributor",850,46,54,18,40,3,0,32,0,0,0,0,-1--1--1,0-0-0,Helvetica12l0-0-0

10,5,"Adjustment of inventory-distributor",619,242,71,18,8,3,0,32,0,0,0,0,-1--1--1,0-0-0,Helvetica12l0-0-0

10,6,"Desired inventory-distributor",709,304,71,18,8,3,0,32,0,0,0,0,-1--1--1,0-0-0,Helvetica12l0-0-0

10,7,"Inventory adjustment time-distributor",604,168,73,18,8,3,0,32,0,0,0,0,-1--1--1,0-0-0,Helvetica12l0-0-0

10,8,"Desired inventory coverage-distributor",904,304,80,18,8,3,0,32,0,0,0,0,-1--1--1,0-0-0,Helvetica12l0-0-0

10,9,Finally order fulfillment rate,844,154,44,19,8,3,0,0,0,0,0,0

10,10,Table function of the order fulfillment rate,1023,228,65,19,8,3,0,0,0,0,0,0

12,11,0,748,88,20,20,5,4,0,34,0,0,0,0,-1--1--1,0-0-0,Helvetica12l0-0-0

B

1,12,3,2,4,0,0,22,0,0,0,-1--1--1,,1l(913,28)l

1,13,3,1,100,0,0,22,0,0,0,-1--1--1,,1l(782,28)l

1,14,7,5,2,0,45,0,0,192,0,-1--1--1,,1l(565,218)l

1,15,1,5,2,0,45,0,0,192,0,-1--1--1,,1l(668,158)l

1,16,6,5,2,0,43,0,0,192,0,-1--1--1,,1l(685,260)l

1,17,8,6,2,0,43,0,0,0,0,-1--1--1,,1l(743,316)l

1,18,9,4,2,0,43,0,0,192,0,-1--1--1,,1l(859,95)l

1,19,10,9,1,0,0,0,0,0,0,-1--1--1,,1|(880,213)|
10,20,"Desired shipment-distributor",794,-66,64,19,8,3,0,0,0,0,0,0
10,21,"Max shipment rate-distributor",715,179,48,19,8,3,0,0,0,0,0,0
10,22,"Min order processing time-distributor",783,239,68,19,8,3,0,0,0,0,0,0
1,23,1,21,1,0,43,0,0,192,0,-1--1--1,,1|(712,132)|
1,24,21,9,1,0,43,0,0,192,0,-1--1--1,,1|(792,175)|
1,25,22,21,1,0,45,0,0,192,0,-1--1--1,,1|(727,219)|
1,26,22,8,1,0,43,0,0,192,0,-1--1--1,,1|(875,226)|
10,27,"Safety inventory coverage-distributor",1016,350,60,19,8,3,0,0,0,0,0,0
1,28,27,8,1,0,43,0,0,192,0,-1--1--1,,1|(955,350)|
10,29,"Backlog-distributor",852,-170,40,20,3,3,0,0,0,0,0,0
12,30,48,688,-171,10,8,0,3,0,0,-1,0,0,0
1,31,33,29,4,0,0,22,0,0,0,-1--1--1,,1|(781,-171)|
1,32,33,30,100,0,0,22,0,0,0,-1--1--1,,1|(718,-171)|
11,33,48,744,-171,6,8,34,3,0,0,1,0,0,0
10,34,"Consumer order rate-distributor",744,-152,53,19,40,3,0,0,-1,0,0,0
12,35,48,1009,-173,10,8,0,3,0,0,-1,0,0,0
1,36,38,35,4,0,0,22,0,0,0,-1--1--1,,1|(977,-173)|
1,37,38,29,100,0,0,22,0,0,0,-1--1--1,,1|(917,-173)|
11,38,48,949,-173,6,8,34,3,0,0,1,0,0,0
10,39,"Order fulfillment-distributor",949,-154,67,19,40,3,0,0,-1,0,0,0
1,40,20,3,1,0,43,0,0,64,0,-1--1--1,,1|(802,-25)|
1,41,29,20,1,0,43,0,0,192,0,-1--1--1,,1|(810,-134)|
1,42,3,39,1,0,43,0,0,192,0,-1--1--1,,1|(969,-59)|
10,43,"Target delivery delay-distributor",652,-46,53,19,8,3,0,0,0,0,0,0
1,44,43,20,1,0,45,0,0,192,0,-1--1--1,,1|(724,-105)|
12,45,0,871,-83,20,20,5,4,0,34,0,0,0,0,-1--1--1,0-0-0,Helvetica|12||0-0-0

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10,46,"Desired shipment-distributor",977,147,68,19,8,2,0,3,-1,0,0,0,128-128-128,0-0-0,112||128-128-128
1,47,46,9,1,0,45,0,0,192,0,-1--1--1,,1|(930,157)|
10,48,"Pipeline inventory-distributor",308,34,40,20,3,3,0,0,0,0,0,0
1,49,50,48,100,0,0,22,0,0,0,-1--1--1,,1|(415,31)|
11,50,604,489,31,6,8,34,3,0,0,1,0,0,0
10,51,"Acquisition rate-distributor",489,50,48,19,40,3,0,0,-1,0,0,0
10,52,"Indecated Order-distributor",141,206,55,19,8,3,0,0,0,0,0,0
10,53,"Adjustment of pipeline-distributor",277,186,60,19,8,3,0,0,0,0,0,0
10,54,"Desired pipeline-distributor",401,210,60,19,8,3,0,0,0,0,0,0
1,55,53,52,1,0,43,0,0,64,0,-1--1--1,,1|(216,208)|
1,56,54,53,1,0,43,0,0,192,0,-1--1--1,,1|(334,231)|
1,57,48,53,1,0,45,0,0,192,0,-1--1--1,,1|(310,89)|
12,58,0,209,107,20,20,4,4,0,0,-1,0,0,0

B

12,59,0,605,96,20,20,4,4,0,0,-1,0,0,0

B

10,60,"Time for pipeline adjustment-distributor",350,119,70,19,8,3,0,0,0,0,0,0
1,61,60,53,1,0,45,0,0,192,0,-1--1--1,,1|(331,171)|

10,62,"Desired aquisition rate-distributor",424,304,57,19,8,3,0,0,0,0,0
 1,63,62,54,1,0,43,0,0,192,0,-1--1--1,,1|(398,254)|
 1,64,50,1,4,0,0,22,0,0,0,-1--1--1,,1|(567,31)|
 1,65,5,62,1,0,43,0,2,64,0,-1--1--1,1|12||0-0-0,1|(515,287)|
 1,66,62,52,1,0,43,0,2,64,0,-1--1--1,1|12||0-0-0,1|(294,287)|
 10,67,Expected order rate from retailer,605,392,64,19,8,3,0,0,0,0,0
 1,68,67,62,1,0,0,0,0,64,0,-1--1--1,,1|(486,372)|
 1,69,67,6,1,0,0,0,0,64,0,-1--1--1,,1|(654,367)|
 10,70,Time for smooth the order rate from retailer,556,457,72,19,8,3,0,0,0,0,0
 1,71,70,67,1,0,0,0,0,64,0,-1--1--1,,1|(587,433)|
 12,72,48,87,34,10,8,0,3,0,0,-1,0,0,0
 1,73,75,48,4,0,0,22,0,0,0,-1--1--1,,1|(228,34)|
 1,74,75,72,100,0,0,22,0,0,0,-1--1--1,,1|(136,34)|
 11,75,48,182,34,6,8,34,3,0,0,1,0,0,0
 10,76,"Order rate-distributor",182,53,48,19,40,3,0,0,-1,0,0,0
 1,77,52,76,1,0,0,0,0,64,0,-1--1--1,,1|(127,132)|
 10,78,"Order rate-retailer",607,-116,42,19,8,2,0,3,-1,0,0,0,128-128-128,0-0-0,1|2||128-128-128
 10,79,"Order rate-retailer",692,462,42,19,8,2,0,3,-1,0,0,0,128-128-128,0-0-0,1|2||128-128-128
 1,80,78,34,1,0,0,0,0,64,0,-1--1--1,,1|(683,-100)|
 1,81,79,67,1,0,0,0,0,64,0,-1--1--1,,1|(648,417)|
 10,82,"Shipment rate-producer",463,-60,57,19,8,2,0,3,-1,0,0,0,128-128-128,0-0-0,1|2||128-128-128
 1,83,82,51,1,0,0,0,0,0,0,-1--1--1,,1|(504,-19)|
 10,84,"Delivery delay-distributor",872,-247,53,19,8,3,0,0,0,0,0
 1,85,29,84,1,0,0,0,0,64,0,-1--1--1,,1|(852,-213)|
 10,86,"Perceived aquisition delay-distributor",373,-170,51,20,3,3,0,0,0,0,0
 12,87,48,563,-164,10,8,0,3,0,0,-1,0,0,0
 1,88,90,86,4,0,0,22,0,0,0,-1--1--1,,1|(455,-163)|
 1,89,90,87,100,0,0,22,0,0,0,-1--1--1,,1|(525,-163)|
 11,90,48,492,-163,6,8,34,3,0,0,1,0,0,0
 10,91,"Change of Perceived aquisition delay-distributor",492,-126,82,29,40,3,0,0,-1,0,0,0
 10,92,"Delivery delay-producer",401,-249,54,19,8,2,0,3,-1,0,0,0,128-128-128,0-0-0,1|2||128-128-128
 10,93,"Perceiving time for Perceived aquisition delay-distributor",548,-241,64,28,8,3,0,0,0,0,0
 1,94,92,91,1,0,0,0,0,64,0,-1--1--1,,1|(445,-209)|
 1,95,93,90,1,0,0,0,0,64,0,-1--1--1,,1|(514,-214)|
 1,96,86,90,1,0,0,0,0,64,0,-1--1--1,,1|(413,-86)|
 10,97,"Max aquisition dalay- distributor",290,-251,55,19,8,3,0,0,0,0,0
 10,98,"Table functionfor Expected aquisition dalay- distributor",235,-168,86,28,8,3,0,0,0,0,0
 1,99,86,98,1,0,0,0,0,64,0,-1--1--1,,1|(312,-120)|
 1,100,97,98,1,0,0,0,0,64,0,-1--1--1,,1|(252,-208)|
 10,101,"Expected aquisition dalay- distributor",183,-92,65,19,8,3,0,0,0,0,0
 1,102,97,101,1,0,0,0,0,64,0,-1--1--1,,1|(210,-246)|
 1,103,98,101,1,0,0,0,0,64,0,-1--1--1,,1|(226,-131)|
 10,104,"Expected aquisition dalay- distributor",468,145,70,19,8,2,0,3,-1,0,0,0,128-128-128,0-0-0,1|2||128-128-128
 1,105,104,54,1,0,0,0,0,64,0,-1--1--1,,1|(445,195)|

1,106,38,84,1,0,0,0,0,64,0,-1--1--1,,1|(947,-202)|
 1,107,6,1,0,0,0,0,0,1,-1--1--1,,1|(695,175)|
 1,108,54,48,0,0,0,0,0,1,-1--1--1,,1|(357,128)|
 \\---// Sketch information - do not modify anything except names
 V300 Do not put anything below this section - it will be ignored
 *View 3
 \$192-192-192,0,Times New Roman|12||0-0-0|0-0-0-255|-1--1--1|-1--1--1|96,96,100
 10,1,"Inventory-producer",746,349,40,20,3,3,0,0,0,0,0
 10,2,"Adjustment inventory-producer",685,560,68,18,8,3,0,32,0,0,0,0,-1--1--1,0-0-0,Helvetica|12||0-0-0
 10,3,"Desired inventory-producer",726,635,68,18,8,3,0,32,0,0,0,0,-1--1--1,0-0-0,Helvetica|12||0-0-0
 10,4,"Inventory adjustment time-producer",670,476,52,27,8,3,0,32,0,0,0,0,-1--1--1,0-0-0,Helvetica|12||0-0-0
 10,5,"Desired inventory coverage-producer",890,639,70,18,8,3,0,32,0,0,0,0,-1--1--1,0-0-0,Helvetica|12||0-0-0
 10,6,"Finally Oderfulfiiment rate-producer",910,472,69,19,8,3,0,0,0,0,0,0
 10,7,"Table function of order fulfillment rate-producer",1018,543,76,19,8,3,0,0,0,0,0,0
 12,8,0,814,406,20,20,5,4,0,34,0,0,0,0,-1--1--1,0-0-0,Helvetica|12||0-0-0
 B
 1,9,4,2,2,0,45,0,0,192,0,-1--1--1,,1|(631,536)|
 1,10,1,2,2,0,45,0,0,192,0,-1--1--1,,1|(734,476)|
 1,11,3,2,2,0,43,0,0,192,0,-1--1--1,,1|(751,578)|
 1,12,5,3,2,0,43,0,0,0,0,-1--1--1,,1|(809,634)|
 1,13,7,6,1,0,0,0,0,0,0,-1--1--1,,1|(931,508)|
 10,14,"Desired shipment rate-producer",898,267,55,19,8,3,0,0,0,0,0,0
 10,15,"Max shipment rate-producer",762,498,45,19,8,3,0,0,0,0,0,0
 10,16,"Min order processing time-producer",849,557,68,19,8,3,0,0,0,0,0,0
 1,17,1,15,1,0,43,0,0,192,0,-1--1--1,,1|(765,452)|
 1,18,15,6,1,0,43,0,0,192,0,-1--1--1,,1|(851,497)|
 1,19,16,15,1,0,45,0,0,192,0,-1--1--1,,1|(780,546)|
 1,20,16,5,1,0,43,0,0,192,0,-1--1--1,,1|(893,591)|
 10,21,"Saftey inventory coverage-producer",1036,607,61,19,8,3,0,0,0,0,0,0
 1,22,21,5,1,0,43,0,0,192,0,-1--1--1,,1|(976,657)|
 10,23,"Backlog-producer",918,148,40,20,3,3,0,0,0,0,0,0
 12,24,48,754,147,10,8,0,3,0,0,-1,0,0,0
 1,25,27,23,4,0,0,22,0,0,0,-1--1--1,,1|(848,140)|
 1,26,27,24,100,0,0,22,0,0,0,-1--1--1,,1|(785,140)|
 11,27,48,813,140,6,8,34,3,0,0,1,0,0,0
 10,28,"Consumer order rate-producer",813,161,53,19,40,131,0,0,-1,0,0,0
 12,29,48,1075,145,10,8,0,3,0,0,-1,0,0,0
 1,30,32,29,4,0,0,22,0,0,0,-1--1--1,,1|(1043,145)|
 1,31,32,23,100,0,0,22,0,0,0,-1--1--1,,1|(983,145)|
 11,32,48,1015,145,6,8,34,3,0,0,1,0,0,0
 10,33,"Order fulfillment rate-producer",1015,164,52,19,40,3,0,0,-1,0,0,0
 1,34,23,14,1,0,43,0,0,192,0,-1--1--1,,1|(890,197)|
 10,35,"Target delivery delay-producer",808,223,49,19,8,3,0,0,0,0,0,0

1,36,35,14,1,0,45,0,0,192,0,-1--1--1,,1|(869,224)|
 12,37,0,962,227,20,20,5,4,0,34,0,0,0,0,-1--1--1,0-0-0,Helvetica|12||0-0-0
 B
 10,38,"Desired shipment rate-producer",1091,453,60,19,8,2,0,3,-1,0,0,0,128-128-128,0-0-0,12||128-128-128
 1,39,38,6,1,0,45,0,0,192,0,-1--1--1,,1|(1028,474)|
 10,40,Pipeline inventory,374,352,40,20,3,3,0,0,0,0,0,0
 12,41,48,155,351,10,8,0,3,0,0,-1,0,0,0
 1,42,44,40,4,0,0,22,0,0,0,-1--1--1,,1|(289,352)|
 1,43,44,41,100,0,0,22,0,0,0,-1--1--1,,1|(198,352)|
 11,44,48,238,352,6,8,34,3,0,0,1,0,0,0
 10,45,Production start rate,238,371,47,19,40,3,0,0,-1,0,0,0
 1,46,47,40,100,0,0,22,0,0,0,-1--1--1,,1|(481,349)|
 11,47,796,555,349,6,8,34,3,0,0,1,0,0,0
 10,48,"Aquisition rate-producer",555,368,45,19,40,3,0,0,-1,0,0,0
 10,49,Indecated production start rate,227,532,65,19,8,3,0,0,0,0,0,0
 10,50,"Adjustment of pipeline -producer",347,499,59,19,8,3,0,0,0,0,0,0
 10,51,"Desired pipeline inventory-producer",454,529,61,19,8,3,0,0,0,0,0,0
 1,52,50,49,1,0,43,0,0,64,0,-1--1--1,,1|(294,525)|
 1,53,51,50,1,0,43,0,0,192,0,-1--1--1,,1|(401,539)|
 1,54,40,50,1,0,45,0,0,192,0,-1--1--1,,1|(377,405)|
 12,55,0,287,425,20,20,4,4,0,0,-1,0,0,0
 B
 12,56,0,671,414,20,20,4,4,0,0,-1,0,0,0
 B
 10,57,"Time for adjustment of pipeline -producer",445,426,72,19,8,3,0,0,0,0,0,0
 1,58,57,50,1,0,45,0,0,192,0,-1--1--1,,1|(421,493)|
 10,59,"Expected aquisition rate-producer",552,489,65,19,8,3,0,0,0,0,0,0
 1,60,59,51,1,0,43,0,0,192,0,-1--1--1,,1|(524,543)|
 10,61,"Desired aquisition rate-producer",490,622,57,19,8,3,0,0,0,0,0,0
 1,62,61,51,1,0,43,0,0,192,0,-1--1--1,,1|(456,575)|
 1,63,47,1,4,0,0,22,0,0,0,-1--1--1,,1|(633,349)|
 1,64,2,61,1,0,43,0,2,64,0,-1--1--1,12||0-0-0,1|(581,605)|
 1,65,61,49,1,0,43,0,2,64,0,-1--1--1,12||0-0-0,1|(370,605)|
 10,66,Manufacturing cycle time,539,268,46,19,8,3,0,0,0,0,0,0
 1,67,66,47,1,0,0,0,0,64,0,-1--1--1,,1|(548,307)|
 10,68,Manufacturing cycle time,554,419,50,19,8,2,0,3,-1,0,0,0,128-128-128,0-0-0,12||128-128-128
 1,69,68,59,1,0,0,0,0,64,0,-1--1--1,,1|(560,445)|
 10,70,Expected order rate from distributor,671,710,64,19,8,3,0,0,0,0,0,0
 1,71,70,61,1,0,0,0,0,64,0,-1--1--1,,1|(552,690)|
 1,72,70,3,1,0,0,0,0,64,0,-1--1--1,,1|(697,684)|
 10,73,Time for smooth order rate from distributor,644,779,72,19,8,3,0,0,0,0,0,0
 1,74,73,70,1,0,0,0,0,64,0,-1--1--1,,1|(664,750)|
 10,75,"Order rate-distributor",636,75,53,19,8,2,0,3,-1,0,0,0,128-128-128,0-0-0,12||128-128-128
 10,76,"Order rate-distributor",778,760,53,19,8,2,0,3,-1,0,0,0,128-128-128,0-0-0,12||128-128-128
 1,77,75,28,1,0,0,0,0,64,0,-1--1--1,,1|(713,103)|

1,78,76,70,1,0,0,0,0,64,0,-1--1--1,,1|(761,713)|
 12,79,48,1010,342,10,8,0,3,0,0,-1,0,0,0
 1,80,82,79,4,0,0,22,0,0,0,-1--1--1,,1|(953,345)|
 1,81,82,1,100,0,0,22,0,0,0,-1--1--1,,1|(840,345)|
 11,82,48,900,345,6,8,34,3,0,0,1,0,0,0
 10,83,"Shipment rate-producer",900,364,45,19,40,3,0,0,-1,0,0,0
 1,84,14,82,0,0,0,0,0,64,0,-1--1--1,,1|(898,305)|
 1,85,82,33,1,0,0,0,0,64,0,-1--1--1,,1|(978,307)|
 1,86,6,83,1,0,0,0,0,64,0,-1--1--1,,1|(928,409)|
 10,87,Remanufacture pipeline product,402,737,58,19,3,3,0,0,0,0,0,0
 12,88,48,218,740,10,8,0,3,0,0,-1,0,0,0
 1,89,91,87,4,0,0,22,0,0,0,-1--1--1,,1|(311,741)|
 1,90,91,88,100,0,0,22,0,0,0,-1--1--1,,1|(247,741)|
 11,91,48,273,741,6,8,34,3,0,0,1,0,0,0
 10,92,Remanufacturing start rate,273,760,53,19,40,3,0,0,-1,0,0,0
 12,93,48,575,735,10,8,0,3,0,0,-1,0,0,0
 1,94,117,93,4,0,0,22,0,0,0,-1--1--1,,1|(546,736)|
 1,95,87,50,1,0,0,0,0,64,0,-1--1--1,,1|(358,626)|
 1,96,44,47,1,0,0,0,0,64,0,-1--1--1,,1|(408,312)|
 1,97,49,45,1,0,0,0,0,64,0,-1--1--1,,1|(228,498)|
 1,98,49,91,1,0,0,0,0,64,0,-1--1--1,,1|(261,611)|
 1,99,91,45,1,0,0,0,0,64,0,-1--1--1,,1|(216,648)|
 10,100,Remanufacturing cycle time,486,859,53,19,8,3,0,0,0,0,0,0
 12,101,48,737,206,10,8,0,3,0,0,-1,0,0,0
 1,102,104,1,4,0,0,22,0,0,0,-1--1--1,,1|(740,305)|
 1,103,104,101,100,0,0,22,0,0,0,-1--1--1,,1|(740,241)|
 11,104,48,740,275,8,6,33,3,0,0,4,0,0,0
 10,105,Aquisition from remanufacturing,798,275,50,19,40,3,0,0,-1,0,0,0
 10,106,feasible remanufacturing rate,243,842,69,19,8,2,0,3,-1,0,0,0,128-128-128,0-0-0,1121128-128-128
 1,107,106,92,0,0,0,0,0,0,0,-1--1--1,,1|(254,807)|
 10,108,Remanufacturing cycle time,568,559,58,19,8,2,0,3,-1,0,0,0,128-128-128,0-0-0,1121128-128-128
 1,109,108,59,1,0,0,0,0,64,0,-1--1--1,,1|(569,529)|
 10,110,"Order rate-Producer",93,542,45,19,8,3,0,0,0,0,0,0
 1,111,45,110,1,0,0,0,0,64,0,-1--1--1,,1|(150,420)|
 1,112,91,110,1,0,0,0,0,64,0,-1--1--1,,1|(223,723)|
 10,113,"Delivery delay-producer",958,66,49,19,8,3,0,0,0,0,0,0
 1,114,23,113,1,0,0,0,0,64,0,-1--1--1,,1|(907,111)|
 1,115,32,113,1,0,0,0,0,64,0,-1--1--1,,1|(1017,123)|
 1,116,117,87,100,0,0,22,0,0,0,-1--1--1,,1|(488,736)|
 11,117,1020,522,736,6,8,34,3,0,0,1,0,0,0
 10,118,Remanufacturing production rate,522,763,53,19,40,3,0,0,-1,0,0,0
 1,119,100,118,1,0,0,0,0,64,0,-1--1--1,,1|(523,817)|
 1,120,92,118,1,0,0,0,0,64,0,-1--1--1,,1|(313,801)|
 10,121,Remanufacturing production rate,606,206,58,19,8,2,0,3,-1,0,0,0,128-128-128,0-0-0,1121128-128-128

1,122,121,104,1,0,0,0,0,64,0,-1--1--1,,1|(669,249)|
 1,126,3,1,0,0,0,0,0,1,-1--1--1,,1|(735,499)|
 1,127,51,40,0,0,0,0,0,1,-1--1--1,,1|(417,447)|
 1,128,51,87,0,0,0,0,0,1,-1--1--1,,1|(429,626)|
 \\---/// Sketch information - do not modify anything except names
 V300 Do not put anything below this section - it will be ignored
 *View 4
 \$192-192-192,0,Times New Roman|12||0-0-0|0-0-0|0-0-255|-1--1--1|-1--1--1|96,96,100
 10,1,ICOR,198,242,22,11,8,3,0,48,0,0,0,0,-1--1--1,0-0-0,Helvetica|12|B|0-0-0
 10,2,"Order rate-Consumer",522,199,96,11,8,3,0,0,0,0,0,0
 10,3,Order rate0,346,198,38,11,8,3,0,0,0,0,0,0
 1,4,1,3,1,0,0,0,0,64,0,-1--1--1,,1|(261,246)|
 1,5,3,2,1,0,0,0,0,64,0,-1--1--1,,1|(388,188)|
 10,6,Input,314,370,18,11,0,3,0,0,-1,0,0,0
 10,7,TIME STEP,764,27,50,11,0,2,0,3,-1,0,0,0,128-128-128,0-0-0,|12|B|128-128-128
 10,8,Pulse Quantity,402,331,46,11,0,3,0,1,-1,0,0,0,128-128-128,0-0-0,|12|B|0-0-0
 10,9,Pulse Time,409,367,35,11,0,3,0,1,-1,0,0,0,128-128-128,0-0-0,|12|B|0-0-0
 10,10,Ramp End Time,250,459,51,11,0,3,0,1,-1,0,0,0,128-128-128,0-0-0,|12|B|0-0-0
 10,11,Ramp Slope,214,401,40,11,0,3,0,1,-1,0,0,0,128-128-128,0-0-0,|12|B|0-0-0
 10,12,Ramp Start Time,212,431,54,11,0,3,0,1,-1,0,0,0,128-128-128,0-0-0,|12|B|0-0-0
 10,13,Sine Amplitude,419,395,48,11,0,3,0,1,-1,0,0,0,128-128-128,0-0-0,|12|B|0-0-0
 10,14,Sine Period,406,433,37,11,0,3,0,1,-1,0,0,0,128-128-128,0-0-0,|12|B|0-0-0
 10,15,Step Height,319,474,38,11,0,3,0,1,-1,0,0,0,128-128-128,0-0-0,|12|B|0-0-0
 10,16,Step Time,372,454,33,11,0,3,0,1,-1,0,0,0,128-128-128,0-0-0,|12|B|0-0-0
 10,17,Time,210,352,26,11,0,2,0,3,-1,0,0,0,128-128-128,0-0-0,|12|B|128-128-128
 10,18,TIME STEP,210,377,50,11,0,2,0,3,-1,0,0,0,128-128-128,0-0-0,|12|B|128-128-128
 1,19,8,6,0,0,0,0,0,0,0,-1--1--1,,1|(361,349)|
 1,20,9,6,0,0,0,0,0,0,0,-1--1--1,,1|(359,368)|
 1,21,10,6,0,0,0,0,0,0,0,-1--1--1,,1|(277,420)|
 1,22,11,6,0,0,0,0,0,0,0,-1--1--1,,1|(265,384)|
 1,23,12,6,0,0,0,0,0,0,0,-1--1--1,,1|(257,403)|
 1,24,13,6,1,0,0,0,0,0,0,-1--1--1,,1|(349,381)|
 1,25,14,6,0,0,0,0,0,0,0,-1--1--1,,1|(365,405)|
 1,26,15,6,0,0,0,0,0,0,0,-1--1--1,,1|(316,428)|
 1,27,16,6,0,0,0,0,0,0,0,-1--1--1,,1|(347,417)|
 1,28,17,6,0,0,0,0,0,0,0,-1--1--1,,1|(259,359)|
 1,29,18,6,0,0,0,0,0,0,0,-1--1--1,,1|(271,373)|
 10,30,Input,239,141,27,11,8,2,0,3,-1,0,0,0,128-128-128,0-0-0,|12||128-128-128
 1,31,30,3,1,0,0,0,0,64,0,-1--1--1,,1|(295,169)|
 12,32,0,1018,149,150,150,3,44,0,0,1,0,0,0
 INVENTORY_IN_EVERY_STAGE
 12,33,0,1024,461,150,150,3,44,0,0,1,0,0,0
 ORDERS_OF_EVERY_STAGE
 \\---/// Sketch information - do not modify anything except names
 V300 Do not put anything below this section - it will be ignored
 *View 5
 \$192-192-192,0,Times New Roman|12||0-0-0|0-0-0|0-0-255|-1--1--1|-1--1--1|96,96,100

10,1,collected used products,849,334,44,19,3,3,0,0,0,0,0
 10,2,Reuseable products,612,339,40,20,3,3,0,0,0,0,0
 10,3,Remanufacturing capacity,324,331,40,20,3,3,0,0,0,0,0
 12,4,48,1014,335,10,8,0,3,0,0,-1,0,0,0
 1,5,7,1,4,0,0,22,0,0,0,-1--1--1,,1|(919,333)|
 1,6,7,4,100,0,0,22,0,0,0,-1--1--1,,1|(981,333)|
 11,7,48,952,333,6,8,34,3,0,0,1,0,0,0
 10,8,collection rate,952,352,44,11,40,3,0,0,-1,0,0,0
 1,9,11,2,4,0,0,22,0,0,0,-1--1--1,,1|(693,339)|
 1,10,11,1,100,0,0,22,0,0,0,-1--1--1,,1|(775,339)|
 11,11,1148,740,339,6,8,34,3,0,0,1,0,0,0
 10,12,Acceptable reusable rate,740,366,41,19,40,3,0,0,-1,0,0,0
 1,13,14,1,100,0,0,22,0,0,0,-1--1--1,,1|(845,392)|
 11,14,204,845,439,6,8,34,3,0,0,1,0,0,0
 10,15,FR,845,458,12,11,40,3,0,0,-1,0,0,0
 1,16,17,2,100,0,0,22,0,0,0,-1--1--1,,1|(473,339)|
 11,17,1164,473,262,8,6,33,3,0,0,4,0,0,0
 10,18,feasible remanufacturing rate,546,262,65,19,40,3,0,0,-1,0,0,0
 12,19,48,164,333,10,8,0,3,0,0,-1,0,0,0
 1,20,22,3,4,0,0,22,0,0,0,-1--1--1,,1|(254,333)|
 1,21,22,19,100,0,0,22,0,0,0,-1--1--1,,1|(193,333)|
 11,22,48,219,333,6,8,34,3,0,0,1,0,0,0
 10,23,Remanufacturing capacity aquisition rate,219,360,71,19,40,3,0,0,-1,0,0,0
 10,24,Desired Remanufacturing capacity,413,500,80,19,8,3,0,0,0,0,0,0
 10,25,Real remanufacture capacity expansion rate,296,428,74,19,8,3,0,0,0,0,0,0
 10,26,Expansion fraction,225,492,58,11,8,3,0,0,0,0,0,0
 10,27,Failure percentage,786,428,58,11,8,3,0,0,0,0,0,0
 10,28,collection capacity,946,471,58,11,8,3,0,0,0,0,0,0
 10,29,Envionment policy pressure,1053,494,58,19,8,3,0,0,0,0,0,0
 10,30,Effect on the collection,1058,427,41,19,8,3,0,0,0,0,0,0
 10,31,used products,1002,261,45,11,8,3,0,0,0,0,0,0
 1,32,25,23,1,0,0,0,0,64,0,-1--1--1,,1|(286,404)|
 1,33,3,25,1,0,0,0,0,64,0,-1--1--1,,1|(320,379)|
 1,34,24,25,1,0,0,0,0,64,0,-1--1--1,,1|(360,464)|
 1,35,26,25,1,0,0,0,0,64,0,-1--1--1,,1|(264,469)|
 1,36,28,8,1,0,0,0,0,64,0,-1--1--1,,1|(949,428)|
 1,37,30,8,1,0,0,0,0,64,0,-1--1--1,,1|(1005,386)|
 1,38,29,30,1,0,0,0,0,64,0,-1--1--1,,1|(1044,466)|
 1,39,31,7,1,0,0,0,0,64,0,-1--1--1,,1|(970,294)|
 1,40,1,14,1,0,0,0,0,64,0,-1--1--1,,1|(866,391)|
 1,41,1,12,1,0,0,0,0,64,0,-1--1--1,,1|(794,371)|
 1,42,27,12,1,0,0,0,0,64,0,-1--1--1,,1|(752,397)|
 1,43,27,14,1,0,0,0,0,64,0,-1--1--1,,1|(820,429)|
 1,44,12,24,1,0,0,0,0,64,0,-1--1--1,,1|(589,491)|
 1,45,3,17,1,0,0,0,0,64,0,-1--1--1,,1|(422,319)|
 10,46,"Shipement rate-Retailer",1045,175,45,19,8,2,0,3,-1,0,0,0,128-128-128,0-0-0,112||128-128-128

1,47,46,31,1,0,0,0,0,64,0,-1--1--1,,1l(1016,209)l
10,48,useful life,1110,220,30,11,8,3,0,0,0,0,0
1,49,48,31,1,0,0,0,0,64,0,-1--1--1,,1l(1056,237)l
10,50,Delay of desired Remanufacturing capacity,323,581,53,28,8,3,0,0,0,0,0
10,51,Delay of remanufacturing capacity aquisition rate,225,111,79,19,8,3,0,0,0,0,0
1,52,50,24,1,0,0,0,0,64,0,-1--1--1,,1l(357,537)l
10,53,Selecting and diposal time,745,514,43,19,8,3,0,0,0,0,0
1,54,53,12,1,0,0,0,0,64,0,-1--1--1,,1l(720,429)l
1,55,53,14,1,0,0,0,0,64,0,-1--1--1,,1l(771,511)l
12,56,48,851,531,10,8,0,3,0,0,-1,0,0,0
1,57,14,56,4,0,0,22,0,0,0,-1--1--1,,1l(845,485)l
10,58,Average time of prepare for remanufacturing,482,424,78,19,8,3,0,0,0,0,0
1,59,58,17,1,0,0,0,0,64,0,-1--1--1,,1l(489,338)l
1,60,2,18,1,0,0,0,0,64,0,-1--1--1,,1l(581,269)l
12,61,48,477,178,10,8,0,3,0,0,-1,0,0,0
1,62,17,61,4,0,0,22,0,0,0,-1--1--1,,1l(473,221)l
1,63,51,23,1,0,0,0,0,64,0,-1--1--1,,1l(216,181)l