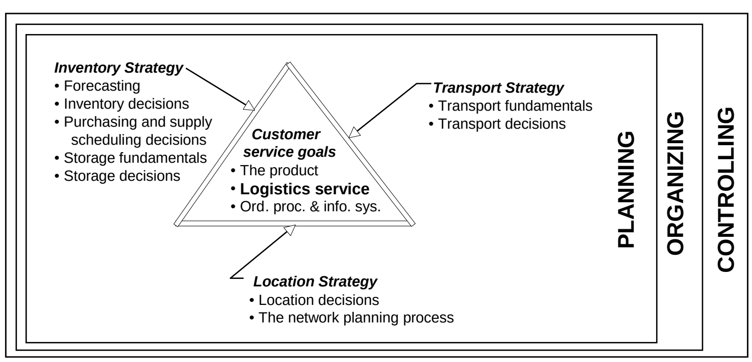
Logistics/Supply Chain Customer Service

"Logistics is no longer the 'last frontier of cost reduction,' it's the new frontier of demand generation."

4-1

Customer Service in Planning Triangle



4-2

Customer Service Defined

- Customer service is generally presumed to be a means by which companies attempt to differentiate their product, keep customers loyal, increase sales, and improve profits.
- Its elements are:
  - Price
  - Product quality
  - Service
- It is an integral part of the marketing mix of:
  - Price
  - Product
  - Promotion
  - Physical Distribution (Customer service here)
- Relative importance of service elements
  - Physical distribution variables dominate price, product, and promotional considerations as customer service considerations
  - *Product availability* and *order cycle time* are dominant physical distribution variables

4-3

Customer Service Elements

Customer service

Pretransaction elements
- Written statement of policy
- Statement in hands of customer
- Organizational structure
- System flexibility
- Technical services

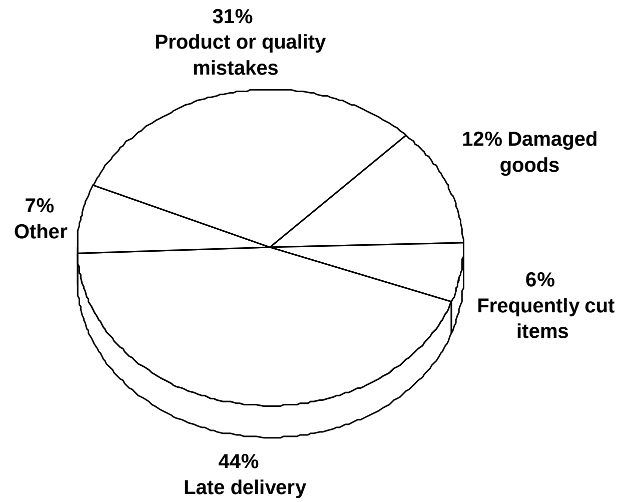
Transaction elements

Stockout level
- Ability to back order
- Elements of order cycle
- Time
- Transship
- System accuracy
- Order conveniences
- Product substitution

Posttransaction elements
- Installation, warranty alterations, repairs, parts
- Product tracking
- Customer claims, complaints
- Product packaging
- Temporary replacement of product during repairs

4-4

Common Customer Service Complaints



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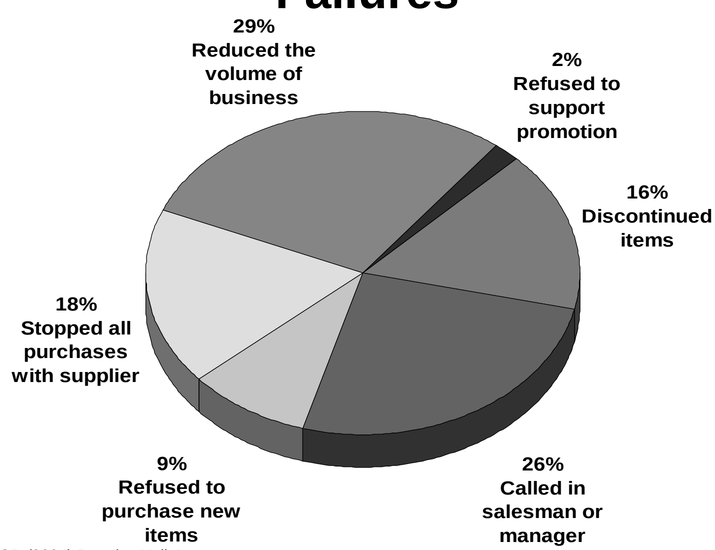
Penalties for Customer Service Failures



CR (2004) Prentice Hall, Inc.

4-6

Most Important Customer Service Elements

- On-time delivery
- Order fill rate
- Product condition
- Accurate documentation

4-7

Appraise This Measure of Logistics Customer Service

Percent of customer orders shipped by customer request date

Parker-Hannifin Corp.

4-8

Order Cycle Time

- Order cycle time contains the basic elements of customer service where logistics customer service is defined as:

the time elapsed between when a customer order, purchase order, or service request is placed by a customer and when it is received by that customer.

- Order cycle elements
  - Transport time
  - Order transmittal time
  - Order processing and assembly time
  - Production time
  - Stock availability
- Order cycle time is expressed as a bimodal frequency distribution
- Constraints on order cycle time
  - Order processing priorities
  - Order condition standards (e.g., damage and filling accuracy)
  - Order constraints (e.g., size minimum and placement schedule)

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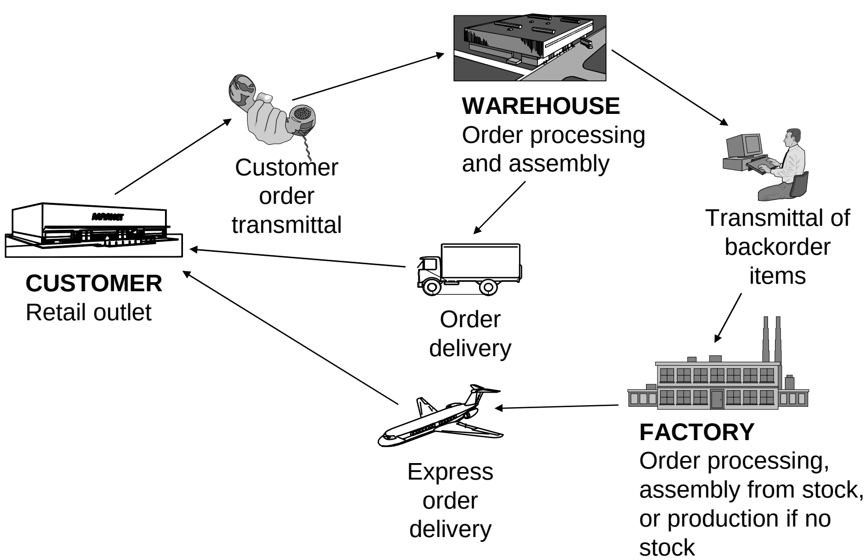
Components of a Customer Order Cycle



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Importance of Logistics Customer Service

- Service affects sales
  - From a GTE/Sylvania study:

    ...distribution, when it provides the proper levels of service to meet customer needs, can lead directly to increased sales, increased market share, and ultimately to increased profit contribution and growth.

  - Service differences have been shown to account for 5 to 6% variation in supplier sales
- Service affects customer patronage
  - Service plays a critical role in maintaining the customer base:

    On the average it is approximately 6 times more expensive to develop a new customer than it is to keep a current one.

4-11

Service Observations

- The dominant customer service elements are logistical in nature
- Late delivery is the most common service complaint and speed of delivery is the most important service element
- The penalty for service failure is primarily reduced patronage, i.e., lost sales
- The logistics customer service effect on sales is difficult to determine

4-12

Modeling a Sales-Service Relationship

- A mathematical expression of the level of service provided and the revenue generated
- It is needed to find the optimal service level
- A theoretical basis for the relationship
- Methods for determining the curve in practice
  - Two-points method
  - Before-after experiments
  - Game playing
  - Buyer surveys

Remember *Revenue* in ROLA

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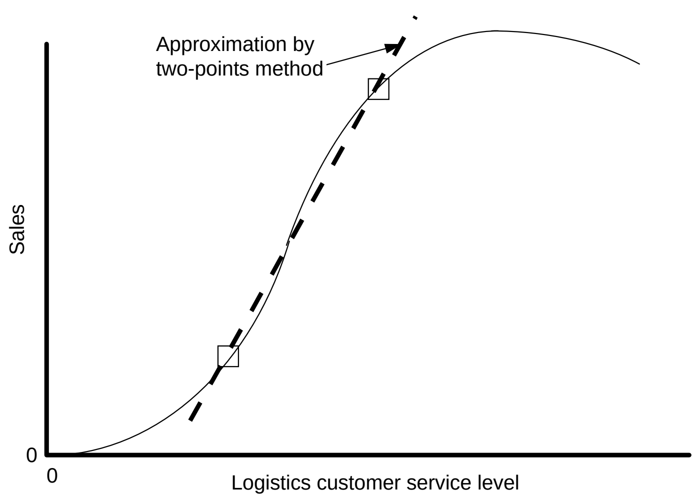
Sales-Service Relationship by the Two-Points Method



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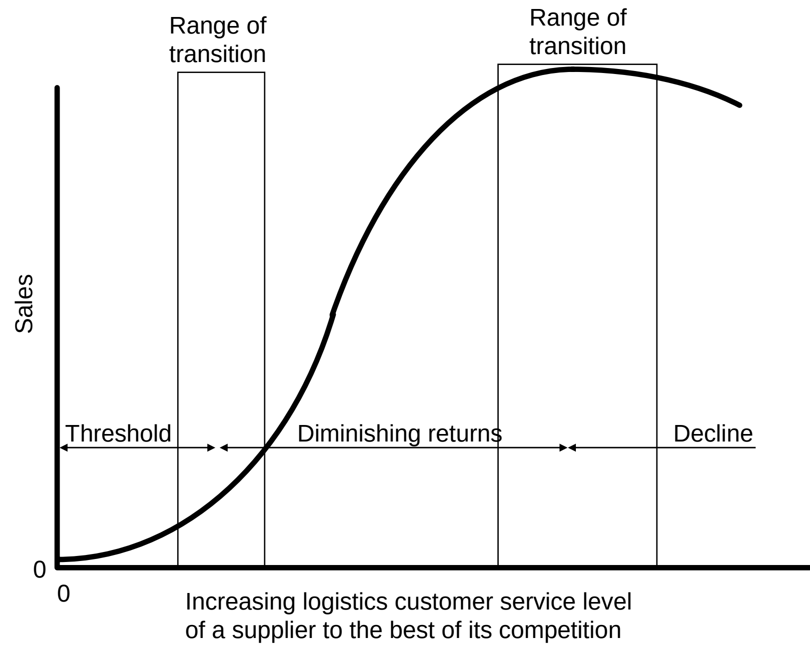
Sales-Service Relationship



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Determining Optimum Service Levels

- Cost vs. service
- Theory
  - –Optimum profit is the point where profit contribution equals marginal cost
- Practice
  - –For a constant rate,

    ΔP = trading margin × sales response rate × annual sales

    ΔC = annual carrying cost × standard product cost × demand standard deviation over replenishment lead-time × Δz

  Set $\Delta P = \Delta C$ and find Δz corresponding to a specific service level

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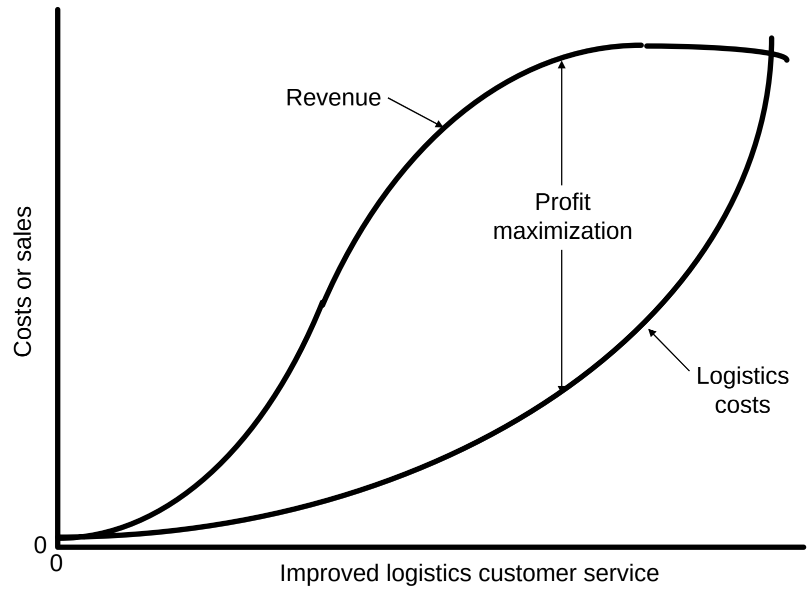
Generalized Cost-Revenue Tradeoffs



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Determining Optimum Service Levels
(Cont'd)

- **Example**
  - Given the following data for a particular product

Sales response rate = 0.15% change in revenue
for a 1% change in the
service level (fill rate)
Trading margin = $0.75 per case
Carrying cost = 25% per year
Annual sales through the warehouse = 80,000 cases
Standard product cost = $10.00
Demand standard deviation = 500 cases over LT
Lead time = 1 week

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Determining Optimum Service Levels (Cont'd)

Find ΔP

$\Delta P = 0.75 \times 0.0015 \times 80{,}000$

$= \$90.00$ per year

Find ΔC

$\Delta C = 0.25 \times 10.00 \times 500 \times \Delta z$

$= 1250\ \Delta z$

Set $\Delta P = \Delta C$ and solve for Δz, i.e., $90.00/1250 = \Delta z$

$\Delta z = 0.072$

For the change in z found in a normal distribution table, the optimal in-stock probability during the lead time (SL^*) is about 92%.

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ΔSL Levels in % for Various Δz Values

ΔSL (%) U L	z_U – z_L	=	Δz
87-86	1.125-1.08	=	0.045
88-87	1.17 -1.125	=	0.045
89-88	1.23 -1.17	=	0.05
90-89	1.28 -1.23	=	0.05
91-90	1.34 -1.28	=	0.06
92-91	1.41 -1.34	=	0.07 ⇐
93-92	**1.48 -1.41**	**=**	**0.07** ⇐
94-93	1.55 -1.48	=	0.07 ⇐
95-94	1.65 -1.55	=	0.10
96-95	1.75 -1.65	=	0.10
97-96	1.88 -1.75	=	0.13
98-97	2.05 -1.88	=	0.17
99-98	2.33 -2.05	=	0.28

*Developed from entries in a normal distribution table

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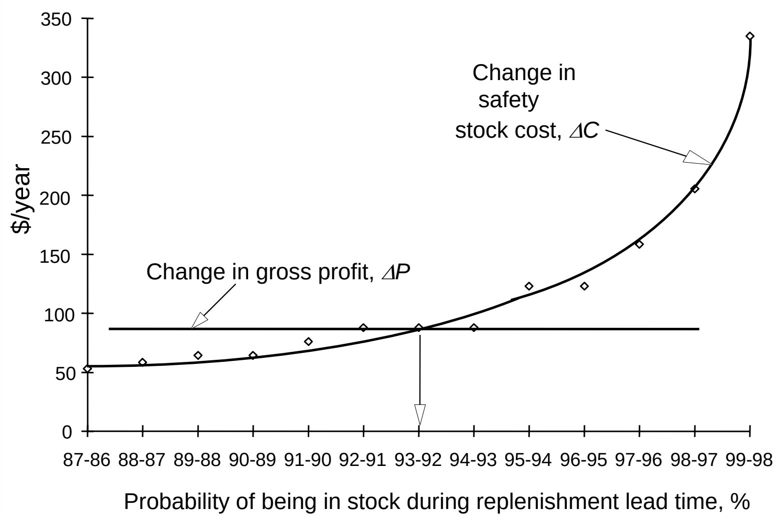
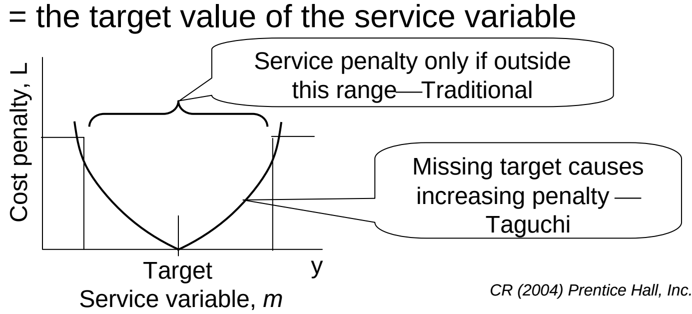
Graphically Setting the Service Level



Optimizing on Service Performance Variability

Setting service variability according to Taguchi

- A loss function of the form $L = k(y - m)^2$
  L = loss in $
  k = a constant to be determined
  y = value of the service variable
  m = the target value of the service variable



Optimizing on Service Performance Variability (Cont'd)

- Setting the allowable deviation from the target service level *m* is to optimize the sum of penalty cost for not meeting the service target and the cost of producing the service.

TC = service penalty cost + service delivery cost

If the service delivery cost is of the general form *DC* = *A* − *B(y-m)*, then find the optimum allowed deviation from the service target.

$$TC = k(y-m)^2 + A - B(y-m)$$

$$\frac{dTC}{d(y-m)} = 2k(y-m) + 0 - B = 0$$

$$y - m = \frac{B}{2k}$$

Marginal delivery cost = marginal penalty cost

If *m* is set to 0, *y* is the optimal deviation allowed from target

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Service Variability Example

Example Pizzas are to be delivered in 30 minutes (target.) Pizzas delivered more than 10 minutes late incur a penalty of \$3 off the pizza bill. Delivery costs are estimated at \$2, but ***decline*** at the rate of \$0.15 for each minute deviation from target. How much variation should be allowed in the delivery service?

Find *k*

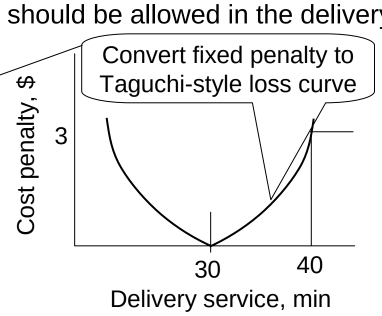
$$L = k(y-m)^2$$

$$3 = k(10-0)^2$$

$$k = \frac{3}{10^2} = 0.03$$

and *y* if m is taken as 0

$$y - 0 = \frac{0.15}{2(0.03)} = 2.5 \text{ minutes}$$



No more than 2.5 minutes should be allowed from the 30-minute delivery target to minimize cost.

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Setting Service Levels

- Service treated as a constraint on design
- Planning for service contingencies

Measuring Service Performance

- Percent of sales on backorder
- No. of stockouts
- Percent of on-time deliveries
- No. of inaccurate orders
- Order cycle time — Most comprehensive
- Fill rate--% of demand met, % of orders filled complete, etc.

4-25

Service Contingencies

System Breakdown Actions

- Insure the risk
- Plan for alternate supply sources
- Arrange alternate transportation
- Shift demand
- Build quick response to demand shifts
- Set inventories for disruptions

Product Recall Actions

- Establish a task force committee
- Trace the product
- Design a reverse logistics channel

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