

# MGT 528 – OPERATIONS: ECONOMICS & STRATEGY

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## 3. *Strategic/Tactical/Operational Decisions*

Autumn 2022

École Polytechnique Fédérale de Lausanne  
College of Management of Technology

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## AGENDA

**Production and Cost Functions: Some Basic Economics**

**Critical Components of Distribution Design**

**Standard Design Options**

**Practical Issues**

**Key Concepts to Remember**

## PRODUCTION FUNCTION

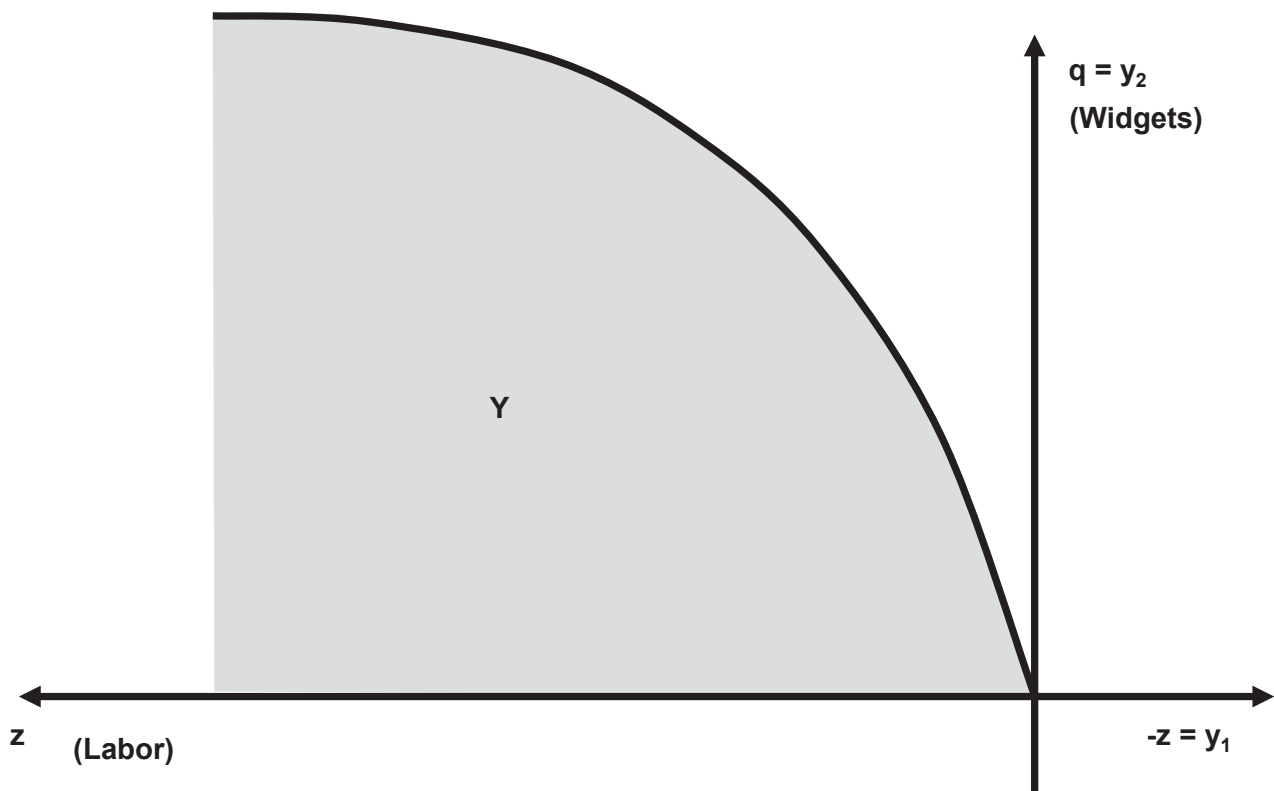
Assume that a firm can clearly distinguish between its **input**  $z$  (a vector with  $L-1$  nonnegative entries) and its (scalar) **output**  $q$

Then it is possible to represent the firm's production possibilities set  $Y$  ("**production set**") as subset of an  $L$ -dimensional commodity space,

$$Y = \{(-z, q) \in \mathbb{R}^L : q \leq F(z)\}$$

where  $F(z)$  is called the firm's **production function**.

## PRODUCTION SET: EXAMPLE



## COST FUNCTION

**Question.** Given an increasing production function  $F(z)$ , **determine the firm's cost function**  $C(q)$ , i.e., the firm's minimum cost to produce a (feasible) output vector  $q \geq 0$ .

**Answer:** Given a feasible vector  $q$  of outputs, the firm solves the *expenditure minimization problem* (or '*cost minimization problem*' in this context)

$$\min_{y=(-z,q) \in Y} \{w(z) \cdot z\} = \min_{z:F(z) \geq q} \{w(z) \cdot z\}$$

where  $w(z)$  is the vector of (positive) input prices. The firm's **cost function**  $C(q)$  is its minimal expenditure,

$$C(q) = \min_{z:F(z) \geq q} \{w(z) \cdot z\} = \min \{w(z) \cdot z : F(z) \geq q\}$$

## COST FUNCTION: EXAMPLE

**Problem Set.** Find the cost function  $C(q)$  implied by the production set

$$Y = \left\{ (-z_1, -z_2, q) : (z_1, z_2, q) \in \mathbb{R}_+^3, z_1^\alpha z_2^\beta \geq q \right\}$$

where  $\alpha$  and  $\beta$  are positive constants with  $\alpha + \beta < 1$ .

## ECONOMIES/DISECONOMIES OF SCALE

A **cost function**  $C(q)$  with a **scalar output**  $q > 0$  exhibits **economies of scale** if the **average cost** decreases in  $q > 0$ , i.e.,

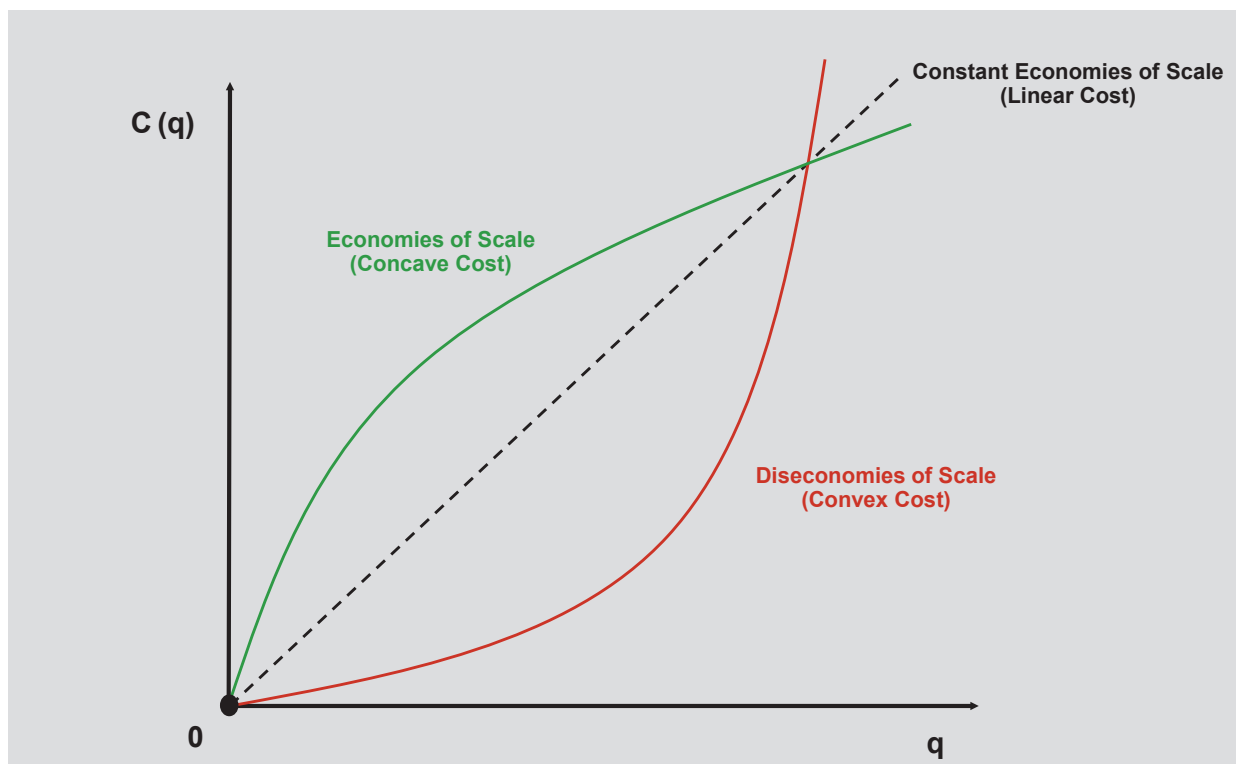
$$AC(q) = \frac{C(q)}{q} \quad \text{goes down, as } q \text{ goes up.}$$

If average costs increase in  $q$ , then  $C(\cdot)$  exhibits **diseconomies of scale**; if average costs stay constant, then  $C(\cdot)$  exhibits **constant economies of scale**.

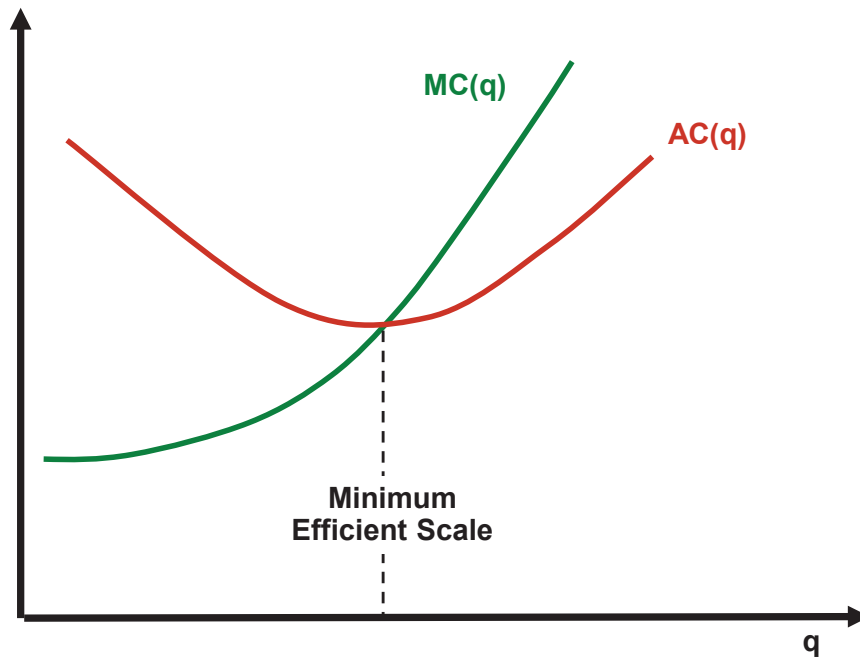
[Remark. **Marginal cost** is the cost “at the margin,” corresponding to the slope of  $C(q)$  at  $q$ , i.e.,  $MC(q) = C'(q)$ .]

Similarly, a **production function**  $F(z)$  with a scalar input  $z$  exhibits **economies of scale** (**diseconomies of scale/constant economies of scale**) if the conversion rate  $F(z)/z$  increases (decreases/stays constant) in  $z > 0$ .

## ECONOMIES/DISECONOMIES OF SCALE



## AVERAGE COST AND MARGINAL COST



$MC(q) = AC(q)$  at the minimizer of the average cost (= "minimum efficient scale")

## AGENDA

Production and Cost Functions: Some Basic Economics

Critical Components of Distribution Design

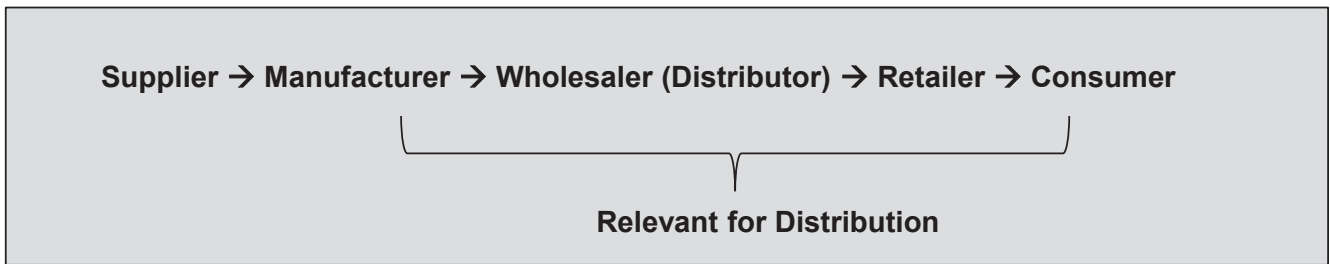
Standard Design Options

Practical Issues

Key Concepts to Remember

# DISTRIBUTION IN A SUPPLY CHAIN

**Definition:** The *distribution* in a supply chain comprises the subprocesses to move the product from the manufacturer to the consumer (incl. intermediate storage).



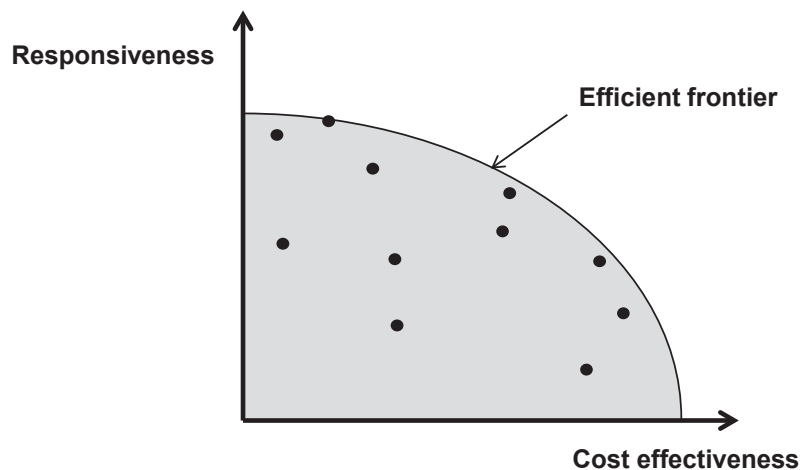
Distribution affects both the cost effectiveness and responsiveness of a firm.

- The **design of the distribution network** is therefore important to implement the firm's strategic position in the (cost effectiveness, responsiveness)-space and thus to attain the strategic fit necessary to gain competitive advantage from its unique set of resources.

Examples: Amazon, Apple, Dell, Procter & Gamble, Walmart

## DISTRIBUTION: COST EFFECTIVENESS VS. RESPONSIVENESS Strategic Positioning

Recall the basic tradeoff



# DISTRIBUTION: STRATEGIC POSITIONING (Cont'd)

## Critical Components

### Cost Effectiveness

- Inventory cost
- Transportation cost
- Facility cost
- Information cost (systems, transmission) [neglected for now]

### Responsiveness

- Response time
- Product variety
- Product availability
- Service experience
  - Order visibility
  - Returnability

Different designs of distribution systems (or “**distribution networks**”) need to be evaluated with respect to the critical components of the dimensions in the strategy space, which for our purposes means the (cost effectiveness, responsiveness)-space introduced earlier.

## STUDENT PROJECT (2012): DIGITEC

The screenshot shows the Digitec website interface. At the top, there is a navigation bar with links for Kontakt, Hilfe, Über uns, Standorte, Social Media, and Stellenangebote. The main content area is divided into several sections:

- Left Sidebar:** A vertical menu with categories like Audio & HiFi, Fernseher & Video, Foto- & Videokameras, Gadgets, Gaming, Navigation & Uhren, Netzwerk, Notebooks & Tablets, PC Komponenten, PCs & Server, Peripherie, Software, Speicher, Telekommunikation, and Zubehör. Below this is a 'Top 10 Kategorien' list and a 'Direkt zu' section with links for Ausverkauf, Gutscheine, and Promotionen.
- Main Content Area:**
  - Angebote der Woche:** A featured product, the Microsoft Surface Pro 3, is displayed with an image of the device and text: 'Microsoft Surface Pro 3 – Laptop UND Tablet in Einem'.
  - Netflix-Filmdatenbank:** A promotional banner for Netflix, stating 'Finden Sie die richtigen Produkte, um die Netflix-Filmdatenbank zu nutzen.'
  - Logitech Promotion:** A banner for Logitech products, stating 'Profittieren Sie bis einschliesslich 5. Oktober von 20% Rabatt auf Logitech-Produkte.'
  - FIFA 15:** A banner for the FIFA 15 game, stating 'FIFA 15 - Feel the Game' and 'Jetzt erhältlich'.
- Right Sidebar:**
  - Tablet Offer:** A yellow banner for a Samsung 1800 Galaxy Tab S 10.5 (16GB, Bronze, WLAN) priced at 399.-.
  - Angebote des Tages:** A section for daily offers with links to 'Zu den aktuellsten Angeboten' and 'Zu den Angeboten von Samsung'.
  - Der neue Onlineshop:** A section titled 'häufig gestellte Fragen' (frequently asked questions) with a 'Zu den Shop-FAQ' link.
  - News:** A section with a date '30.09.2014' and news about Dolby Atmos and Onkyo products.

## SHOULD DIGITEC HAVE SHOWROOMS?

- **Wide range of products but small stock of each**
- **Providing a place where costumers can identify with the company**
  - **Costumers feel safer**
- **Offer customer services**
  - **Propose a pick-up service as opposed to shipping by post (used by 40% of customers)**
  - **Help clients to decide which products to buy**



Source: Benjelloun, A., Fallahi, Z., Wilkins, N. (2012) "Digitec.ch," MGT-528 Course Project, EPFL, Lausanne, Switzerland.

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## BIG PICTURE: OMNICHANNEL RETAILING



Source: vabulous.com

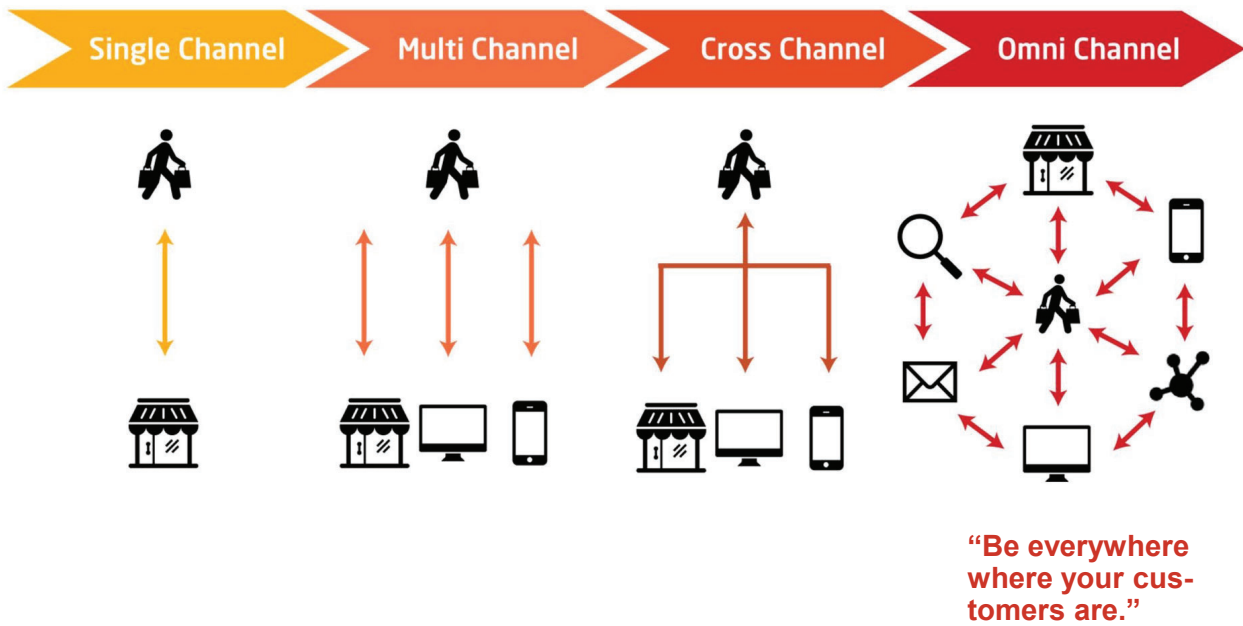
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# OMNICHANNEL RETAILING (Cont'd)

## “Seamless Shopping Experience”

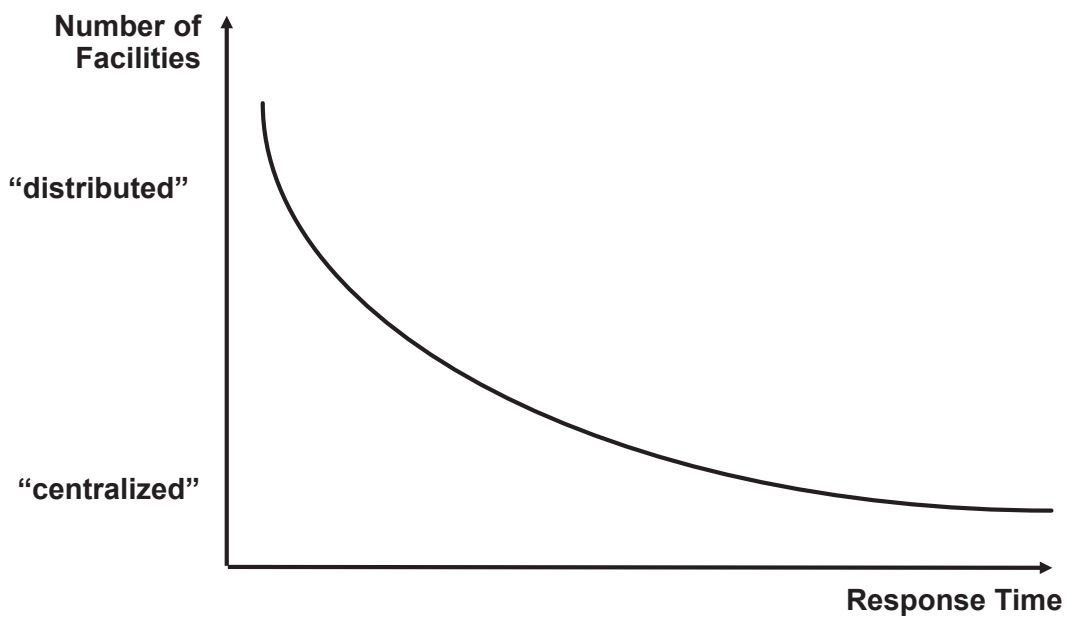


Source: medium.com

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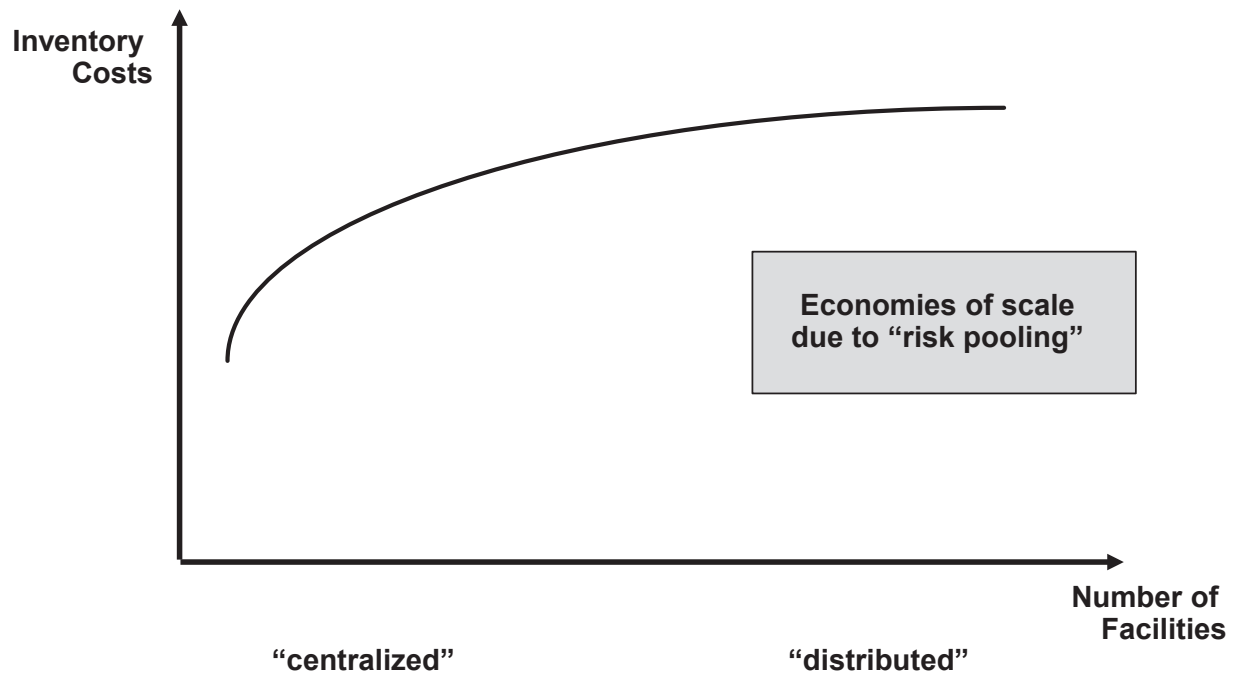
## RESPONSE TIME vs. NUMBER OF FACILITIES



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# INVENTORY COST vs. NUMBER OF FACILITIES



## RISK POOLING "Principle of Diversification"

Let  $X$  and  $Y$  be two normally distributed random variables (RVs), e.g., the demand for a product in two different geographical regions:

$$X \sim N(m_X, v_X),$$

$$Y \sim N(m_Y, v_Y),$$

and consider the sum of the two,  $Z = X + Y$ . Then  $Z$  is also normally distributed,

$$Z \sim N(m_Z, v_Z),$$

with

$$m_Z = m_X + m_Y, \quad v_Z = v_X + v_Y + 2 E[(X-m_X)(Y-m_Y)].$$

**Remark.** If  $m_X = E[X]$ ,  $m_Y = E[Y]$ , and  $m_Z = E[X+Y]$ , the last relation always holds (no matter what the distribution of  $X$  and  $Y$ , provided the expectations exist)

## RISK POOLING (Cont'd)

The risk of a normally distributed random variable  $X$  is captured by its variance,

$$v_X = E[(X-m_X)(X-m_X)].$$

Thus, for the sum of two normal RVs,  $Z = X + Y$ , as introduced earlier:

$$v_Z = v_X + v_Y + 2 \rho_{XY} \text{sqrt}(v_X v_Y),$$

where  $\rho_{XY} = E[(X-m_X)(Y-m_Y)]/\text{sqrt}(v_X v_Y)$  is the **correlation coefficient** (in  $[-1,1]$ ).

$\rho_{XY} = -1$  :        **perfect negative correlation**

$\rho_{XY} = 0$  :        **no correlation**

$\rho_{XY} = +1$ :        **perfect positive correlation**

**Remark.** As before, all of this is perfectly general, and holds for any RVs  $X$  and  $Y$ , subject to some minor technical assumptions.

## RISK POOLING (Cont'd)

The effect of risk pooling is best illustrated using  $N$  identically distributed variables  $X_1, \dots, X_N$ , where each  $X_i$  is normally distributed with mean  $m$  and variance  $v$

Then  $Z = X_1 + \dots + X_N$  is normally distributed with mean  $m_Z = m.N$  and variance

$v_Z = N^2.v$  if the  $X_i$ 's are perfectly positively correlated

$v_Z = N.v$  if the  $X_i$ 's are uncorrelated (e.g., i.i.d.: independent, identically distributed)

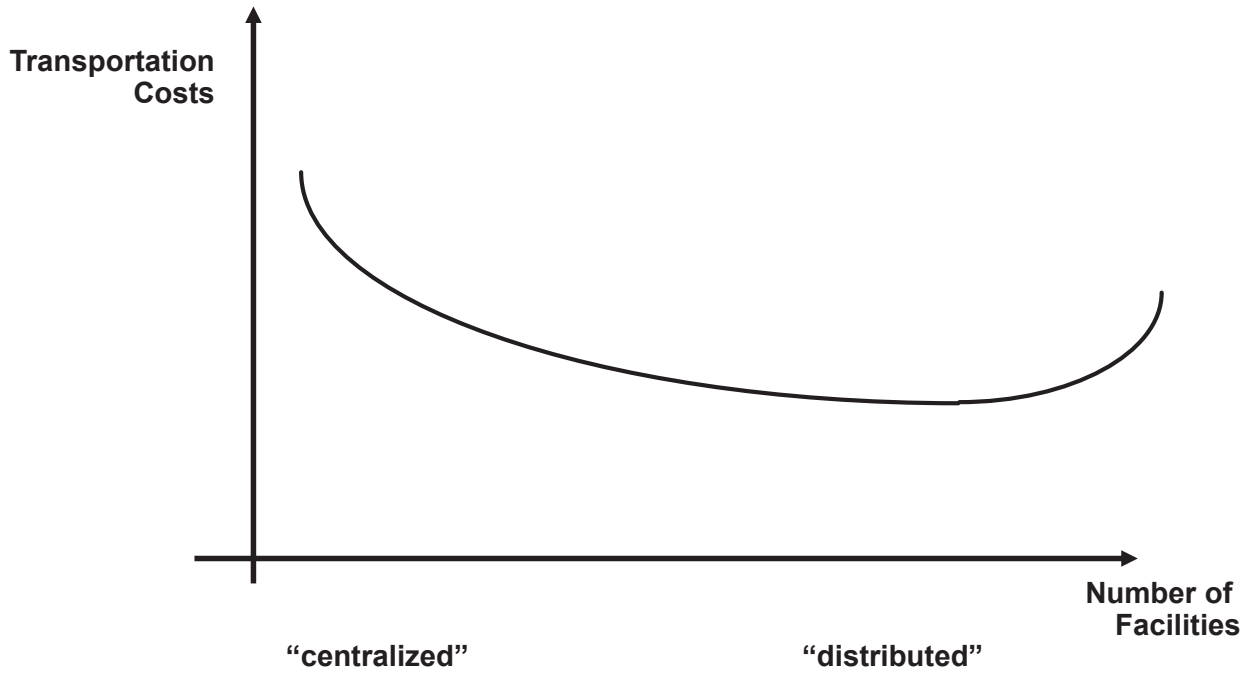
In other words, *the standard deviation (= square root of variance) of a sum of less than perfectly positively correlated identically distributed RVs increases less than linearly in the number of variables.*

That is, if  $\rho_{ij} < 1$  for a pair  $X_i, X_j$ , then  $s_Z < N.s$ , where  $s_Z = \text{sqrt}(v_Z)$  and  $s = \text{sqrt}(v)$ .

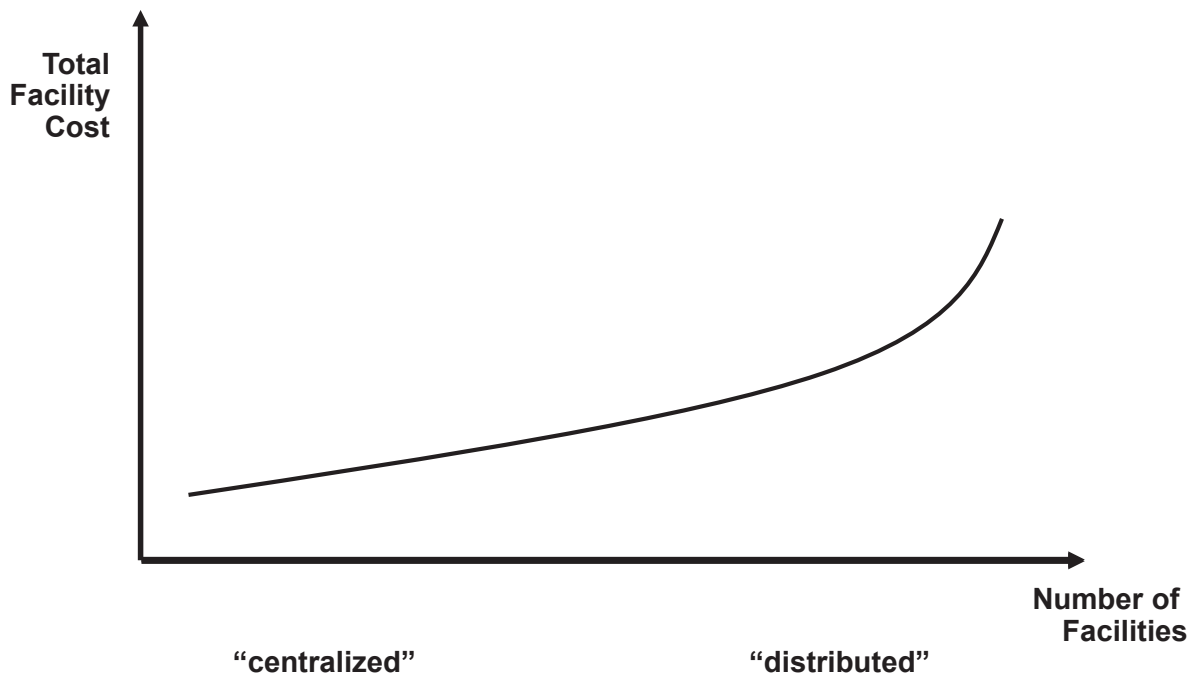
This is called the **risk-pooling effect** (or **principle of diversification**).

[For example, when the  $X_i$ 's are uncorrelated:  $s_Z = \text{sqrt}(N).s$ ]

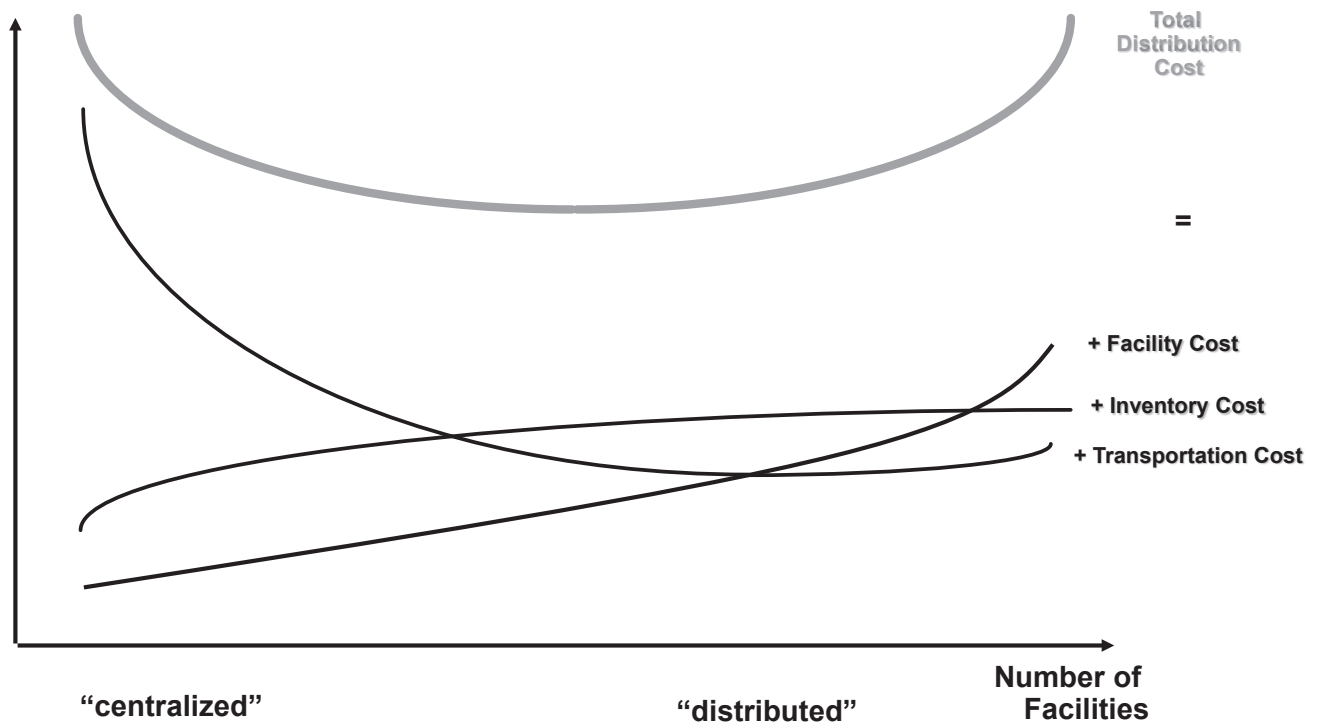
## TRANSPORTATION COST vs. NUMBER OF FACILITIES



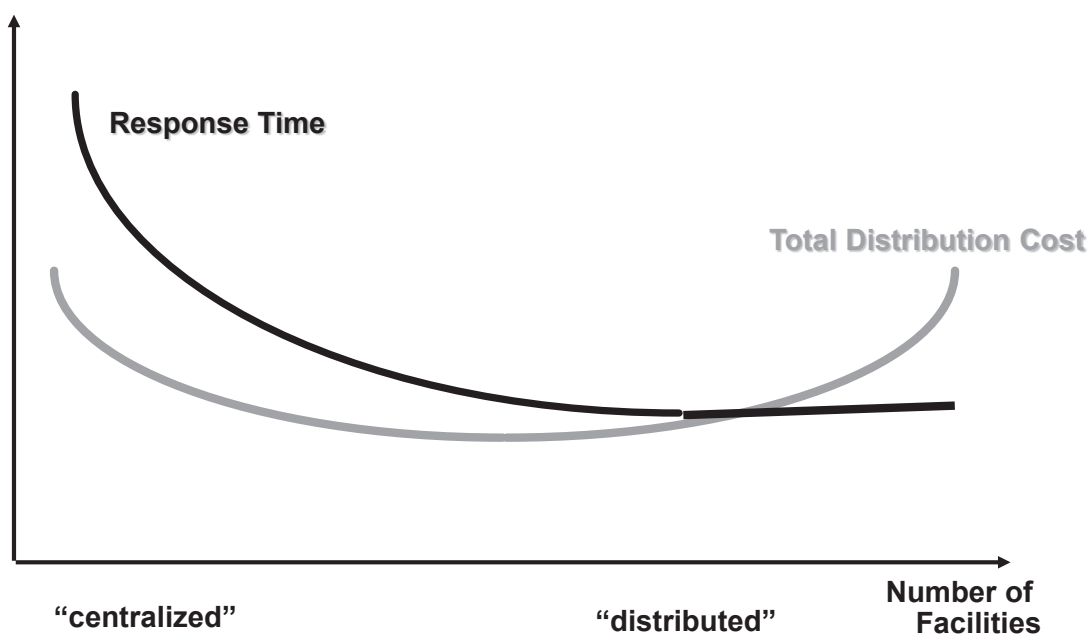
## TOTAL FACILITY COST vs. NUMBER OF FACILITIES



## TOTAL DISTRIBUTION COST vs. NUMBER OF FACILITIES



## DISTRIBUTION COST & RESPONSE TIME vs. NUMBER OF FACILITIES



The two curves define a frontier in the (cost effectiveness, responsiveness)-space, (provided that one restricts attention to response time as a proxy for responsiveness)

# AGENDA

**Production and Cost Functions: Some Basic Economics**

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**Key Concepts to Remember**

## **STANDARD DESIGN OPTIONS FOR DISTRIBUTION NETWORK** **Key Determinants: Inventory Location & Shipping Mode**

### **I. Manufacturer Storage**

- Direct Shipping → “Drop Shipping”
- Direct Shipping & In-Transit Merge

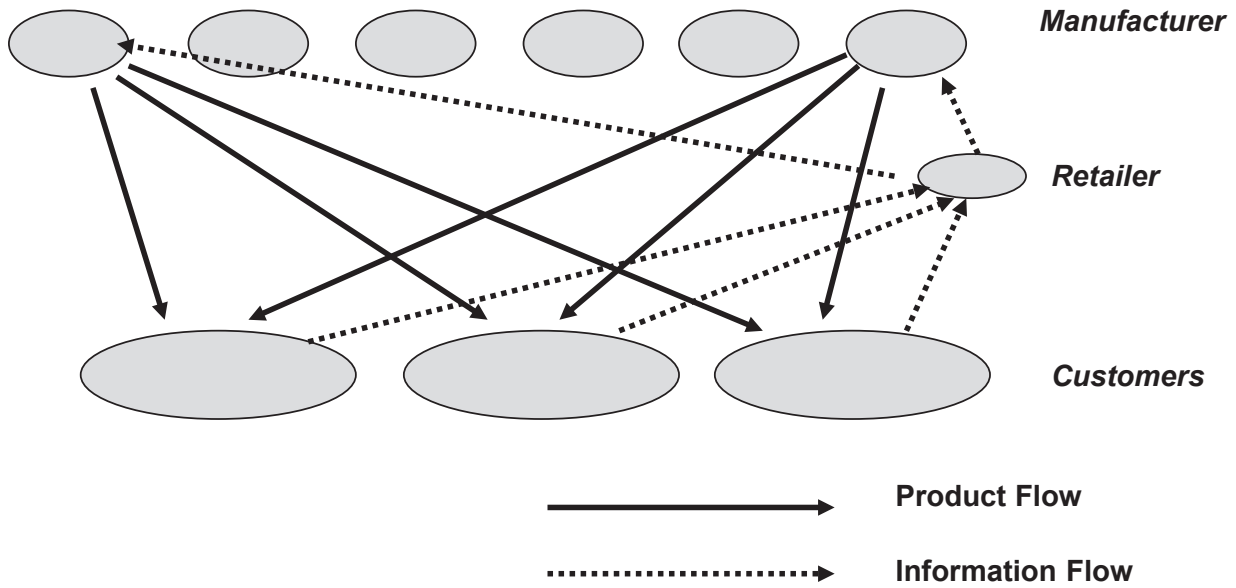
### **II. Distributor Storage**

- Carrier Delivery
- Last-Mile Delivery

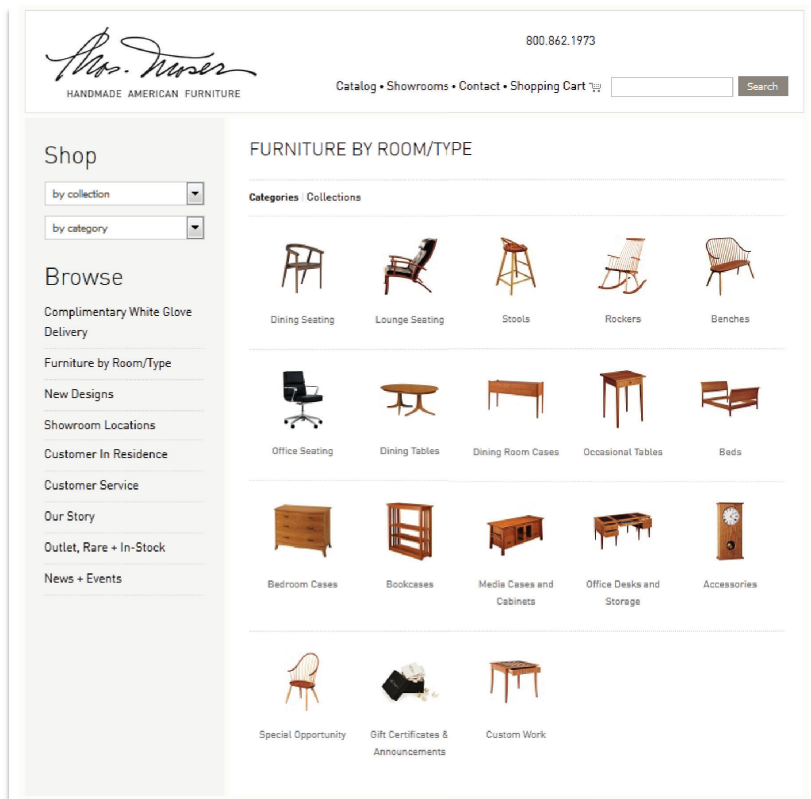
### **III. Customer Pickup**

- Mixed Manufacturer/Distributor Storage
- Retail Storage

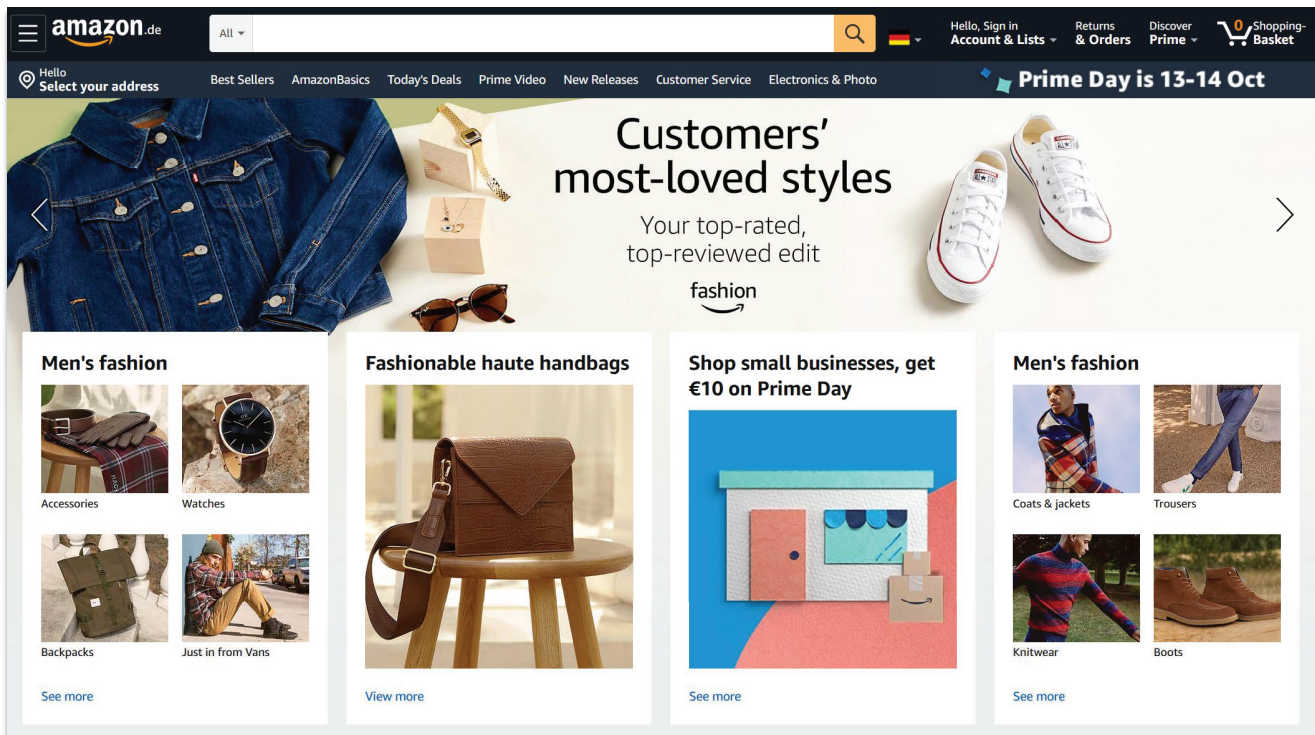
# I. MANUFACTURER STORAGE WITH DIRECT SHIPPING “Drop Shipping”



## EXAMPLE: THOS. MOSER FURNITURE



## EXAMPLE: AMAZON



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## I. MANUFACTURER STORAGE WITH DIRECT SHIPPING Performance Evaluation

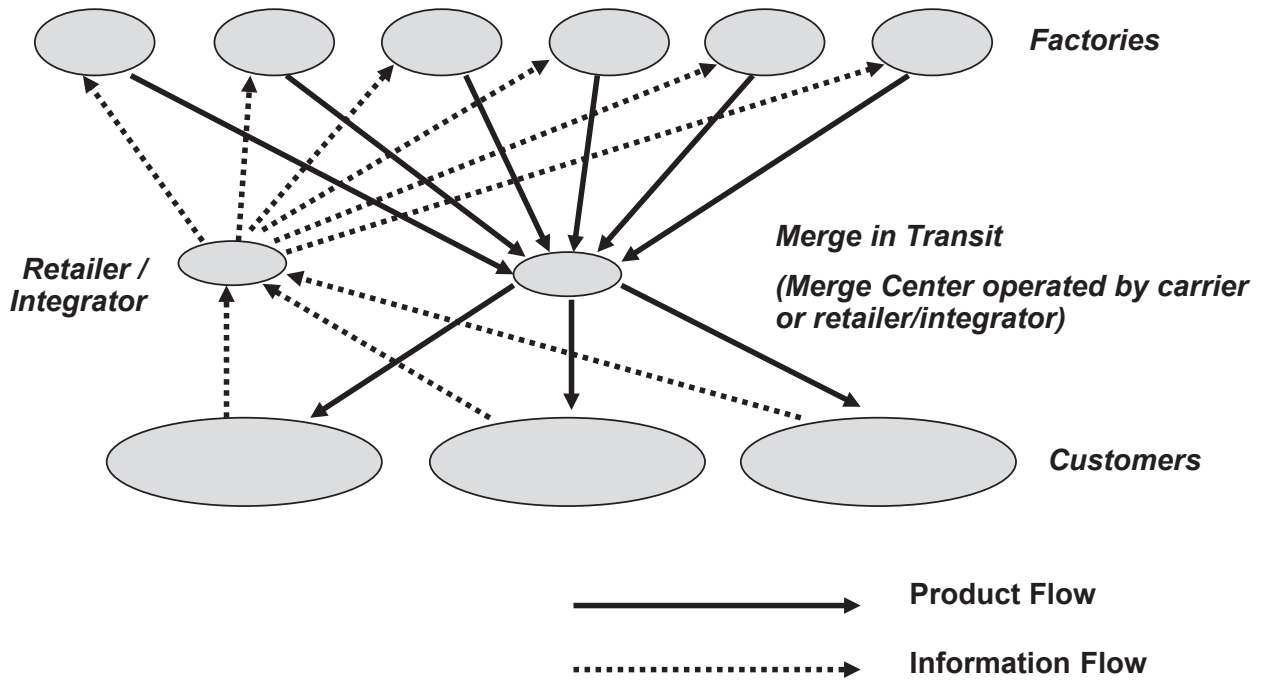
<i>Cost Factor</i>	<i>Performance</i>
Inventory	Lower costs because of aggregation. Benefits of aggregation are highest for low-demand, high-value items. Benefits are very large if product customization can be postponed at the manufacturer.
Transportation	Higher transportation costs because of increased distance and disaggregate shipping.
Facilities and handling	Lower facility costs because of aggregation. Some saving on handling costs if manufacturer can manage small shipments or ship from production line.
Information	Significant investment in information infrastructure to integrate manufacturer and retailer.
<i>Service Factor</i>	<i>Performance</i>
Response time	Long response time of one to two weeks because of increased distance and two stages for order processing. Response time may vary by product, thus complicating receiving.
Product variety	Easy to provide a very high level of variety.
Product availability	Easy to provide a high level of product availability because of aggregation at manufacturer.
Customer experience	Good in terms of home delivery but can suffer if order from several manufacturers is sent as partial shipments.
Time to market	Fast, with the product available as soon as the first unit is produced.
Order visibility	More difficult but also more important from a customer service perspective.
Returnability	Expensive and difficult to implement.

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# I. MANUFACTURER STORAGE WITH IN-TRANSIT MERGE



## EXAMPLE: McDONALD'S



# EXAMPLE: IKEA

Business Network Kitchen Offer | We'll give you a one-time gift of CHF 100.- when you spend CHF 1000.- or more\* | IKEA Gift Registry

Menu | **IKEA** | What are you looking for? | Heji Log in now | Enter postcode | Select store

Products | Rooms | New

## Welcome to IKEA Switzerland

**The new BLÄVINGAD collection**

Spark play and curiosity with our new marine animal textiles, games, and lighting. Dive in and discover the new BLÄVINGAD collection!

[Discover the BLÄVINGAD collection](#)

**New**  
**KURA**  
Bed tent  
CHF 39.95

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# EXAMPLE: DELL

**DELL Technologies** | Rechercher sur le site Dell | Nous contacter | Panier | Se connecter | CH/FR

APEX | Produits | Solutions | Services | Support | Offres | La société

Ordinateurs portables | Ordinateurs de bureau | Stations de travail | Écrans | Serveurs & Stockage | Accessoires

**NOUVEAU XPS 13 2-EN-1**  
**Vive la polyvalence**  
Notre modèle XPS le plus polyvalent est disponible. Nouveau XPS 13 2-en-1.

[Acheter XPS](#) | [En savoir plus](#)

**Découvrez Dell Technologies**

Mois De Sensibilisation À La Cybersécurité | Cyber-résilience multicloud | Découvrez les innovations logicielles

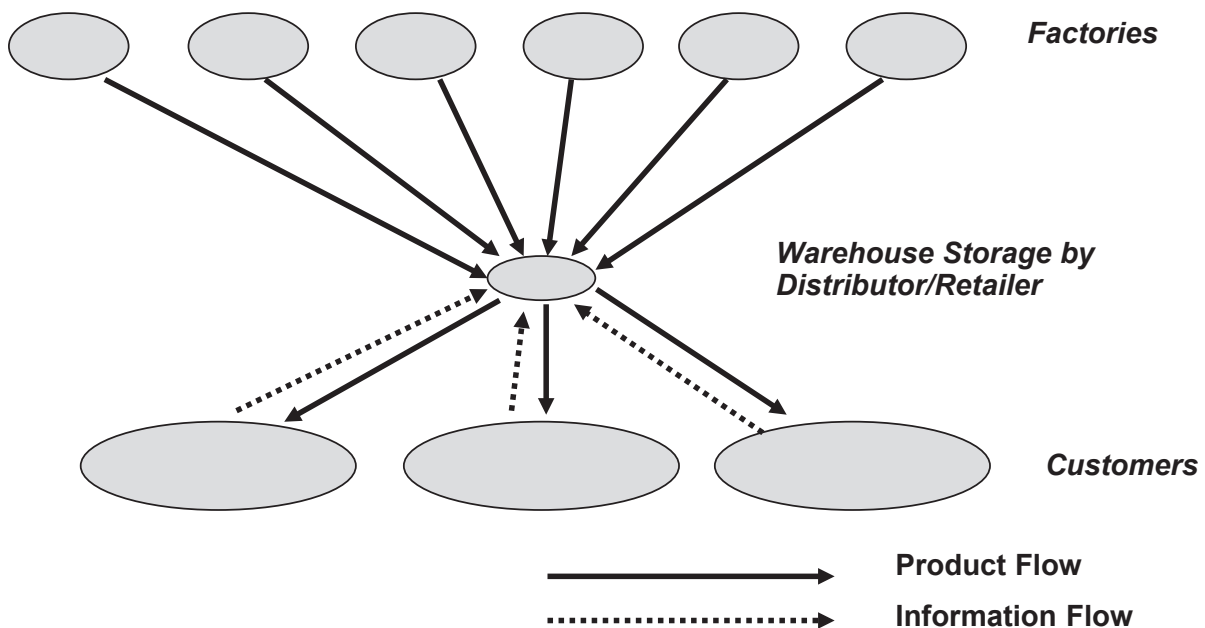
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# I. MANUFACTURER STORAGE WITH IN-TRANSIT MERGE Performance Evaluation

<i>Cost Factor</i>	<i>Performance</i>
Inventory	Similar to drop-shipping.
Transportation	Somewhat lower transportation costs than drop-shipping.
Facilities and handling	Handling costs higher than drop-shipping at carrier; receiving costs lower at customer.
Information	Investment is somewhat higher than for drop-shipping.
<i>Service Factor</i>	<i>Performance</i>
Response time	Similar to drop-shipping; may be marginally higher.
Product variety	Similar to drop-shipping.
Product availability	Similar to drop-shipping.
Customer experience	Better than drop-shipping because a single delivery has to be received.
Time to market	Similar to drop-shipping
Order visibility	Similar to drop-shipping.
Returnability	Similar to drop-shipping.

# II. DISTRIBUTOR STORAGE WITH CARRIER DELIVERY



# EXAMPLE: HOUSE OF SOUND

**House of Sound** Hotline +41(0)61 281 10 20 / Mein Benutzerkonto / Anmelden

Garantie & Reparatur / FAQ / AGB / Über uns / Kontakt / Jobs  
 Sie haben keine Artikel im Warenkorb.

News Deals Occasionen Bestsellers Sellout

**Kategorien**

- STUDIO / RECORDING
- KEYBOARDS & KLANGERZEUGER
- DJ EQUIPMENT
- GITARREN
- BASS GITARREN
- MIKROFONE
- KOPFHOERER
- MISCHPULTE
- BESCHALLUNG/ LIVE
- E-DRUMS
- PERCUSSION & MORE
- KABEL, ADAPTER & STECKER
- STÄNDER & STUDIOMÖBEL

**Vorteile**

- 3 Jahre Garantie
- Ladengeschäft
- Tiefpreisgarantie
- 24h Lieferservice
- Seit 1998 für Sie da

**Zahlungsmöglichkeiten**

**PLAYED BY THOUSANDS  
HEARD BY MILLIONS**  
**TYROS 5**  
 THE ULTIMATE PERFORMANCE KEYBOARD  
**FREE HI-FI OFFER**

30 Artikel Zeige 30 pro Seite  
 Darstellung als: Gitter Liste Sort By Lieferstatus

**SE Electronics Pop Screen**  
 CHF 46,00 Stück  
 KAUFEN an Lager

**Korg PA 500 International**  
 CHF 649,00 Stück  
 KAUFEN an Lager

**Brauner Phantom Classic**  
 CHF 1.005,00 Stück  
 KAUFEN an Lager

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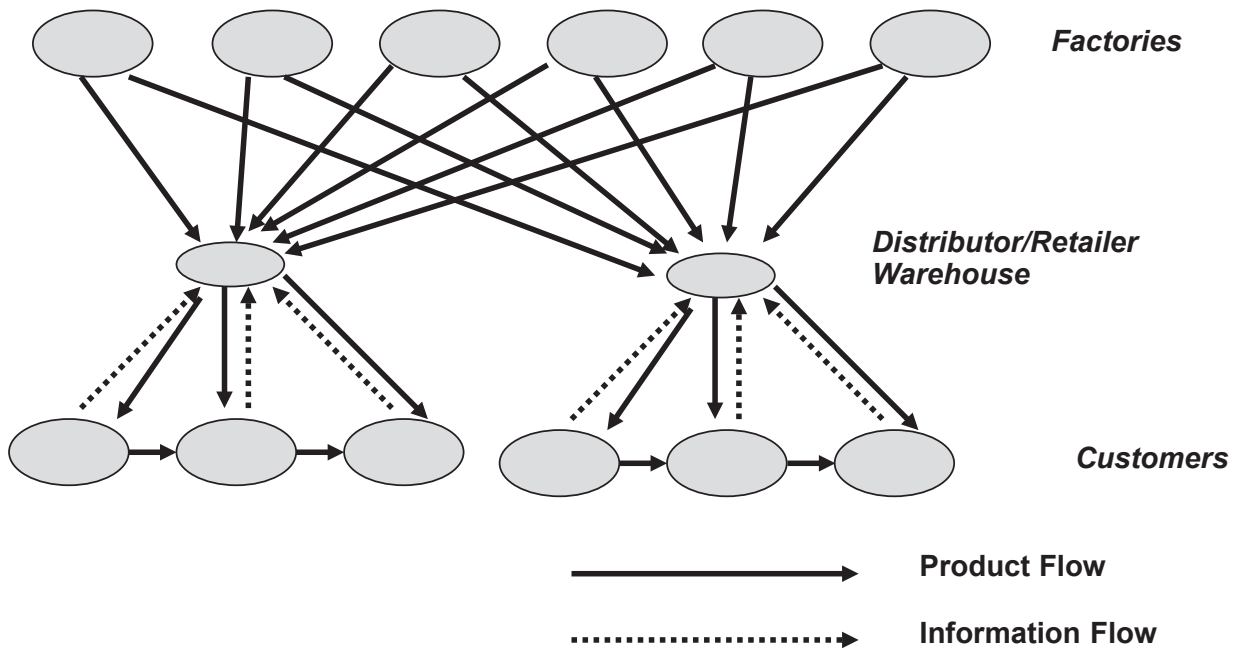
## II. DISTRIBUTOR STORAGE WITH CARRIER DELIVERY Performance Evaluation

<i>Cost Factor</i>	<i>Performance</i>
Inventory	Higher than manufacturer storage. Difference is not large for faster-moving items.
Transportation	Lower than manufacturer storage. Reduction is highest for faster-moving items.
Facilities and handling	Somewhat higher than manufacturer storage. The difference can be large for very slow-moving items.
Information	Simpler infrastructure compared to manufacturer storage.
<i>Service Factor</i>	<i>Performance</i>
Response time	Faster than manufacturer storage.
Product variety	Lower than manufacturer storage.
Product availability	Higher cost to provide the same level of availability as manufacturer storage.
Customer experience	Better than manufacturer storage with drop-shipping.
Time to market	Higher than manufacturer storage.
Order visibility	Easier than manufacturer storage.
Returnability	Easier than manufacturer storage.

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## II. DISTRIBUTOR STORAGE WITH LAST-MILE DELIVERY



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## EXAMPLE: CONFORAMA

The screenshot shows the Conforama website interface. At the top, there is a search bar and navigation icons. The main content area features several promotional banners:
 

- CONFO DAILY**: A banner for a daily discount of up to 15% on Conforama products, valid until October 5th.
- Rends-toi la vie Confo avec nos offres anniversaire**: A banner celebrating an anniversary with various offers.
- OFFRE DE LA SEMAINE**: A banner offering 100 CHF of immediate discount on purchases over 500 CHF, valid from September 28th to October 10th.

 Below the banners, there are sections for:
 

- TOP CATÉGORIES**: A list of product categories including Canapé, Literie, TV, Linge-linge, Tapis, Lampes, Meuble de jardin, and Table à manger.
- OFFRES DU MOMENT**: A section highlighting current offers, such as 100 CHF of immediate discount on purchases over 500 CHF, and an anniversary offer with the best prices on selected products.
- NOS SERVICES**: A list of services including home delivery, assembly and installation, van rental, and click & collect.

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## EXAMPLE: STEG

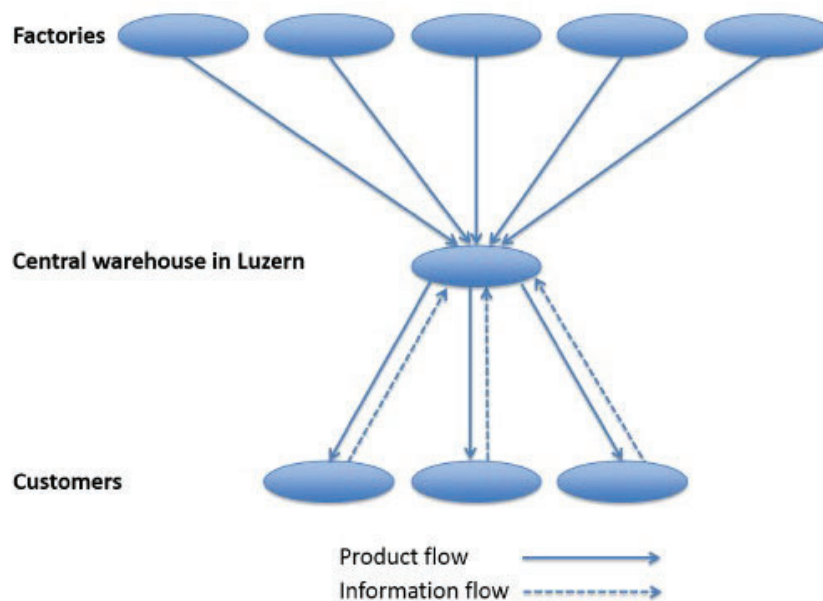
The screenshot shows the STEG website interface. At the top, there is a navigation bar with the STEG logo, a search bar, and links for 'Rechercher', 'Comparer', 'Selection', and 'Panier'. Below the navigation bar, there are three main promotional banners: 'STEG PREMIUM PASSEZ À UN MEILLEUR NIVEAU DE SERVICE', 'NOS SÉRIES DE PC: HOME, OFFICE, GAMING & CO', and 'TOUT SUR LE THÈME DU GAMING!'. Below these banners, there is a section titled 'Nos recommandations et meilleurs ventes pour vous' which displays four product cards with their respective prices and discounts.

Product	Price	Discount
Lenovo IdeaPad 3 14ITL6 (14" FHD, i3, 8GB, 256GB SSD, Intel UHD, W11H)	569.90	-
Centrales électriques EcoFlow River Pro Portable Power Station 720 (EU Version)	797.00	-
Moniteurs AGC Q32V4 (32", QHD)	209.00	-16%
PC ASUS ExpertCenter E5402 E5402WHAK-BA008X (CH, 23.8" FHD, i7B, 16GB, 512GB SSD, Intel UHD, W11P)	899.00	-31%

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## STUDENT PROJECT (2014): STEG

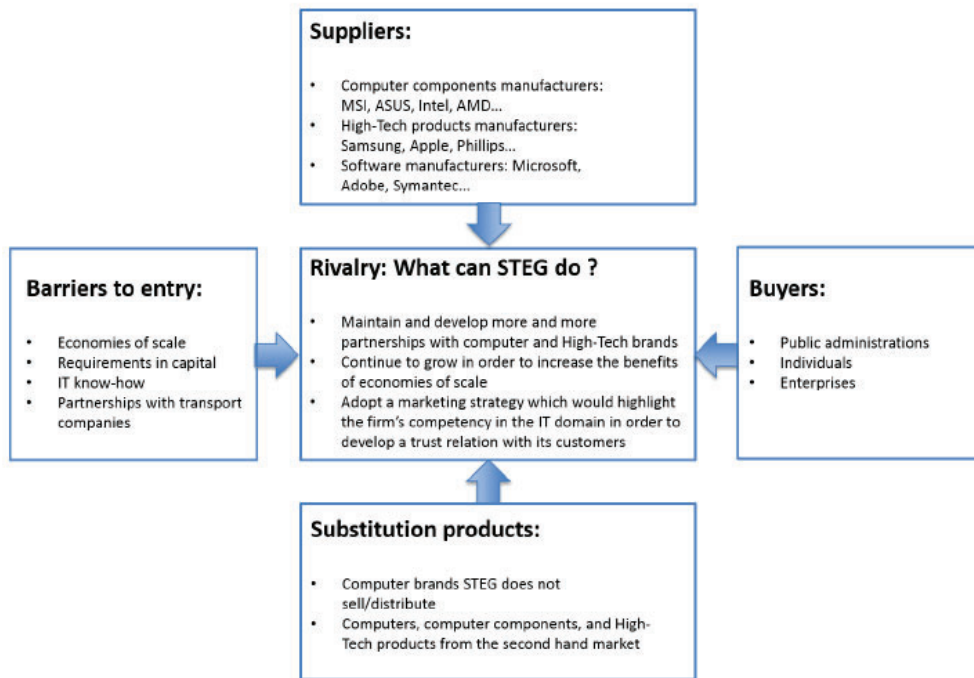


Source: Tissot, J.-M., Litzler, L. (2014) "Steg AG: Generating Value by Optimizing Cost-Effectiveness while Maintaining Responsiveness," MGT-528 Course Project, EPFL, Lausanne, Switzerland.

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## STUDENT PROJECT (2014): STEG (Cont'd)

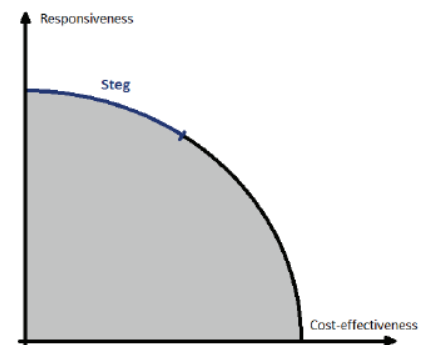
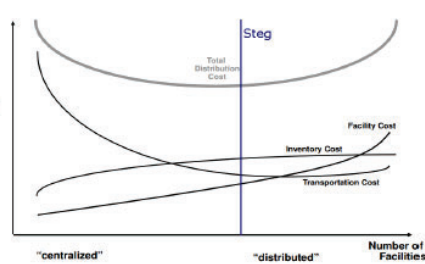
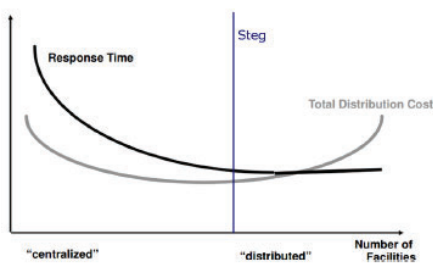
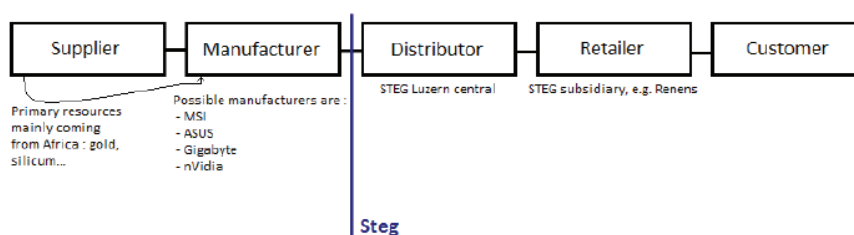


Source: Tissot, J.-M., Litzler, L. (2014) "Steg AG: Generating Value by Optimizing Cost-Effectiveness while Maintaining Responsiveness," MGT-528 Course Project, EPFL, Lausanne, Switzerland.

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## STUDENT PROJECT (2014): STEG (Cont'd)

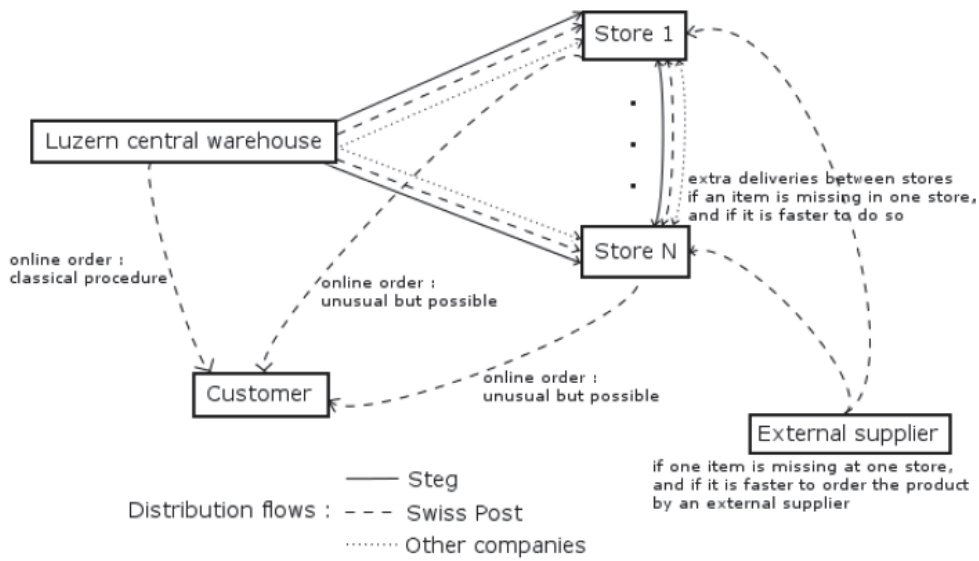


Source: Tissot, J.-M., Litzler, L. (2014) "Steg AG: Generating Value by Optimizing Cost-Effectiveness while Maintaining Responsiveness," MGT-528 Course Project, EPFL, Lausanne, Switzerland.

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## STUDENT PROJECT (2014): STEG (Cont'd)

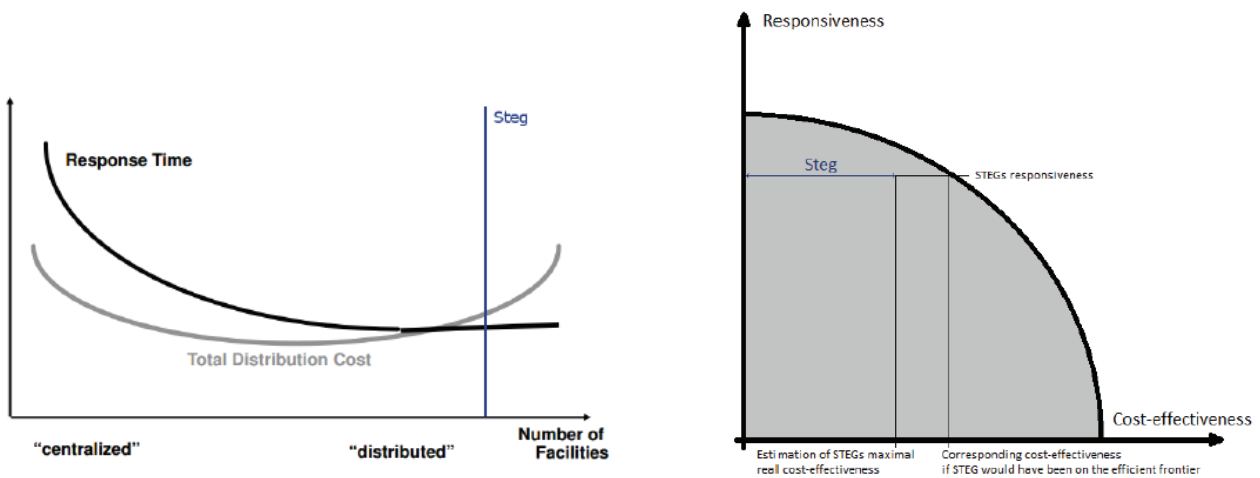


Source: Tissot, J.-M., Litzler, L. (2014) "Steg AG: Generating Value by Optimizing Cost-Effectiveness while Maintaining Responsiveness," MGT-528 Course Project, EPFL, Lausanne, Switzerland.

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## STUDENT PROJECT (2014): STEG (Cont'd)



(More detailed analysis shows that Steg is not on the efficient frontier)

Source: Tissot, J.-M., Litzler, L. (2014) "Steg AG: Generating Value by Optimizing Cost-Effectiveness while Maintaining Responsiveness," MGT-528 Course Project, EPFL, Lausanne, Switzerland.

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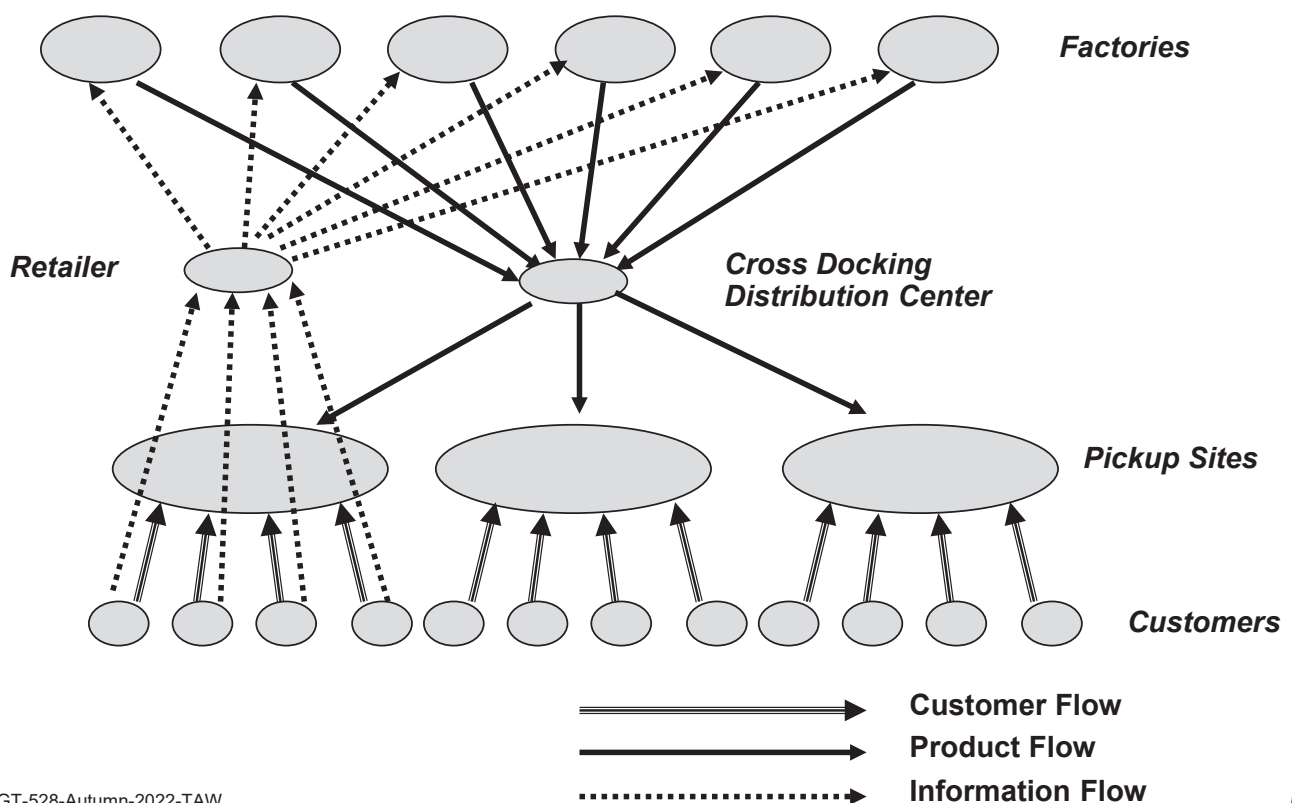
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## II. DISTRIBUTOR STORAGE WITH LAST-MILE DELIVERY Performance Evaluation

<i>Cost Factor</i>	<i>Performance</i>
Inventory	Higher than distributor storage with package carrier delivery.
Transportation	Very high cost given minimal scale economies. Higher than any other distribution option.
Facilities and handling	Facility costs higher than manufacturer storage or distributor storage with package carrier delivery, but lower than a chain of retail stores.
Information	Similar to distributor storage with package carrier delivery.
<i>Service Factor</i>	<i>Performance</i>
Response time	Very quick. Same day to next-day delivery.
Product variety	Somewhat less than distributor storage with package carrier delivery but larger than retail stores.
Product availability	More expensive to provide availability than any other option except retail stores.
Customer experience	Very good, particularly for bulky items.
Time to market	Slightly higher than distributor storage with package carrier delivery.
Order traceability	Less of an issue and easier to implement than manufacturer storage or distributor storage with package carrier delivery.
Returnability	Easier to implement than other options. Harder and more expensive than a retail network.

## III. CUSTOMER PICKUP & RETAIL STORAGE



# EXAMPLE: PAYOT

**PAYOT**  
LIBRAIRIE  
Français | English

SÉLECTIONS | NEWSLETTER | DOSSIERS D'ACTUALITÉ | BONS CADEAUX | KIOSQUE

Accueil | Livres en français | Livres en anglais | Livres en allemand | Livres en italien | eBooks | Vidéos

Livres en français

**NOS RAYONS**

- Littérature & Fiction
- Policier & Science-Fiction
- Jeunesse
- Bandes dessinées, comics & mangas, humour
- Développement durable & Écologie
- Nature, animaux
- Loisirs, jeux
- Santé, diététique, sport
- Bien-être, dans sa tête et dans son corps
- Cuisine, vins & boissons
- Tourisme, voyages, géographie
- Arts & spectacles
- Histoire, actualité
- Religions, spiritualité, ésotérisme
- Sciences humaines et sociales
- Psychologie, psychanalyse, pédagogie
- Sciences, techniques

**GRAND DEBAT ALAIN TOURAINE**

Le sociologue français Alain Touraine, spécialiste des nouveaux mouvements sociaux, sera l'hôte exceptionnel d'un Grand Débat au Théâtre du Grütli à Genève le **lundi 12 octobre, dès 19h**. Il proposera, à partir de son dernier essai, une réflexion sur le thème « *Nous, sujets humains* » : face aux pressions des totalitarismes économiques et politiques, les nouvelles capacités des sociétés civiles sont mises au défi d'agir. [Entrée libre, réservation obligatoire]

**Hommages**

**Henning Mankell**  
L'écrivain suédois Henning Mankell, créateur entre autres du personnage du commissaire Wallander, est décédé le 5 octobre 2015 à l'âge de 87 ans. Le commissaire Wallander n'a pas eu de chance avec sa famille, épouse en fuite, fille à problème, et aujourd'hui un père qui déserte prématurément... Imaginé en 1991 dans Meurtres sans visage, Kurt Wallander est certainement le plus célèbre personnage né de la plume d'Henning Mankell. Dès ce premier roman, qui en annonçait une dizaine d'autres et ...  
06 octobre 2015, Joëlle Brack

**Actualité du livre**

« **Le livre des Baltimore** »  
Avec culot et humour, Joël Dicker, dans son deuxième roman, metait en scène un jeune écrivain, Marcus Goldman, inconsidérément adulé pour son premier ouvrage – et « séchant » lamentablement sur la rédaction du second, celui qu'on attend trop, dont on attend trop. Bilan : La vérité sur l'affaire Harry Quebert s'est vendue en français à un million et demi d'exemplaires, et autant en traduction ! Beau joueur, Joël Dicker partage le succès avec Marcus, que l'on retrouve écrivain définitivement ...  
02 octobre 2015, Joëlle Brack

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# EXAMPLE: WALMART

Walmart

All

Gift Cards | Registry | Lists | Weekly Ads | Store Finder | Track Order | Credit Card | Help

Hello, Sign In My Account

All Departments | Daily Savings Center | My Local Store | Tips & Ideas | Savings Catcher

FREE store pickup as soon as today

**Healthier together**

10 ways to get you started on a journey to healthier living.

Shop Now

Advertisement  
AdChoices

glade  
FEEL RELAXED. FEEL GLADE.  
Up to 60 days of fragrance\*  
Buy Now  
\*Each refill lasts up to 30 days on low setting.

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### **III. CUSTOMER PICKUP & RETAIL STORAGE Performance Evaluation**

<i>Cost Factor</i>	<i>Performance</i>
Inventory	Can match any other option, depending on the location of inventory.
Transportation	Lower than the use of package carriers, especially if using an existing delivery network.
Facilities and handling	Facility costs can be very high if new facilities have to be built. Costs are lower if existing facilities are used. The increase in handling cost at the pickup site can be significant.
Information	Significant investment in infrastructure required
<i>Service Factor</i>	<i>Performance</i>
Response time	Similar to package carrier delivery with manufacturer or distributor storage. Same-day delivery possible for items stored locally at pickup site.
Product variety	Similar to other manufacturer or distributor storage options.
Product availability	Similar to other manufacturer or distributor storage options.
Customer experience	Lower than other options because of the lack of home delivery. In areas with high density of population, loss of convenience may be small.
Time to market	Similar to manufacturer storage options.
Order visibility	Difficult but essential.
Returnability	Somewhat easier given that pickup location can handle returns.

## **AGENDA**

**Production and Cost Functions: Some Basic Economics**

**Critical Components of Distribution Design**

**Standard Design Options**

**Practical Issues**

**Key Concepts to Remember**

# PERFORMANCE COMPARISON OF DISTRIBUTION DESIGNS

## Scoring Matrix [Specific Values Depend on Available Resources]

	Retail Storage with Customer Pickup	Manufacturer Storage with Direct Shipping	Manufacturer Storage with In-Transit Merge	Distributor Storage with Package Carrier Delivery	Distributor storage with last mile delivery	Manufacturer storage with pickup
Response Time	1	4	4	3	2	4
Product Variety	4	1	1	2	3	1
Product Availability	4	1	1	2	3	1
Customer Experience	5	4	3	2	1	5
Order Visibility	1	5	4	3	2	6
Returnability	1	5	5	4	3	2
Inventory	4	1	1	2	3	1
Transportation	1	4	3	2	5	1
Facility & Handling	6	1	2	3	4	5
Information	1	4	4	3	2	5

Performance scale: 1-6, with 1: lowest performance, and 6: highest performance

## LINKING PRODUCT CHARACTERISTICS TO DISTRIBUTION DESIGN

	Retail Storage with Customer Pickup	Manufacturer Storage with Direct Shipping	Manufacturer Storage with In-Transit Merge	Distributor Storage with Package Carrier Delivery	Distributor storage with last mile delivery	Manufacturer storage with pickup
High demand product	+2	-2	-1	0	+1	-1
Medium demand product	+1	-1	0	+1	0	0
Low demand product	-1	+1	0	+1	-1	+1
Very low demand product	-2	+2	+1	0	-2	+1
Many product sources	+1	-1	-1	+2	+1	0
High product value	-1	+2	+1	+1	0	-2
Quick desired response	+2	-2	-2	-1	+1	-2
High product variety	-1	+2	0	+1	0	+2
Low customer effort	-2	+1	+2	+2	+2	-1

Key: +2: very suitable; +1: somewhat suitable; 0: neutral; -1: somewhat unsuitable; -2: very unsuitable

# IMPACT OF ONLINE PRESENCE ON EXTANT OFFLINE DISTRIBUTION NETWORKS

**Question A:** What is the impact of an online distribution channel on firms' ...

1. ... cost effectiveness?
2. ... responsiveness?

(Trick!?-)**Question B:** What is the impact of an online distribution channel on firms'

3. ... profitabilities?

**Remark:** **Bertrand/Cournot Traps (and Supertraps)**

## SOME PRACTICAL ISSUES IN DISTRIBUTION DESIGN

- **Incentives** are key: the ownership structure of the distribution network and the terms of contractual arrangements are similar in importance to the design of the physical distribution network
- Because of the high **adjustment costs** and (partial) **irreversibilities**, the adoption of a particular distribution design commits the firms resources for a significant time
- **Competition** in the distribution channels can be desirable or not
- The product's price, commoditization, and demand elasticity have an impact on the type of **distribution system preferred by customers**

# EXAMPLE: OFFLINE VS. ONLINE



VS.

**iTunes Preview** Overview Music Video Charts

**The Dark Side of the Moon (Remastered)** [View More by This Artist](#)

**Pink Floyd**

To preview a song, mouse over the title and click Play. Open iTunes to buy and download music.

Name	Artist	Time	Price	
The Dark Side of the Moon (Re...		—		
1 Speak to Me	Pink Floyd	1:05	\$1.29	<a href="#">View in iTunes+</a>
2 Breathe (In the Air)	Pink Floyd	2:49	\$1.29	<a href="#">View in iTunes+</a>
3 On the Run	Pink Floyd	3:45	\$1.29	<a href="#">View in iTunes+</a>
4 Time	Pink Floyd	6:53	\$1.29	<a href="#">View in iTunes+</a>
5 The Great Gig in the Sky	Pink Floyd	4:43	\$1.29	<a href="#">View in iTunes+</a>
6 Money	Pink Floyd	6:22	\$1.29	<a href="#">View in iTunes+</a>
7 Us and Them	Pink Floyd	7:49	\$1.29	<a href="#">View in iTunes+</a>
8 Any Colour You Like	Pink Floyd	3:26	\$1.29	<a href="#">View in iTunes+</a>
9 Brain Damage	Pink Floyd	3:46	\$1.29	<a href="#">View in iTunes+</a>
10 Eclipse	Pink Floyd	2:10	\$1.29	<a href="#">View in iTunes+</a>
11 Items				

**\$9.99**

Genre: **Rock, Music, Psychedelic, Prog-Rock, Art Rock, Hard Rock, Arena Rock**

Released: Mar 01, 1973

© 2011 Digital Remaster (P) 2011 The copyright in this sound recording is owned by Pink Floyd Music Ltd under exclusive licence to Parlophone Records Ltd

**Customer Reviews**

Average: ★★★★★  
By mp2316

Easily one of the greatest albums ever made!

**Customer Ratings**

★★★★★ 355 Ratings

**Classic** ★★★★★  
By Pkoc7291

One of the greatest albums of all time.

# EXAMPLE: MULTIOPTIONALITY

Shipping outside of the U.S. or Canada? [Learn About International Shipping](#) Switzerland

**NORDSTROM** [Holiday Gifts](#) [Women](#) [Men](#) [Kids](#) [Young Adult](#) [Activewear](#) [Home](#) [Beauty](#) [Designer](#) [Sale](#) [Brands](#) [Search](#) [Sign In](#) [Cart](#)

Home / Customer Service / Pickup & Delivery

**Customer Service**

- Check Order Status
- Returns & Exchanges
- Pricing & Adjustments
- Frequently Asked Questions

**Pickup & Delivery**

- Pay Bill Online
- Buy Gift Cards
- Check Gift Card Balance
- Find a Store

Nordstrom Policies

- Customer Reviews
- Product Recalls & Issues

**Featured**

- Nordstrom Services
- International Shopping
- Single & Split Shoe Program

**Pickup & Delivery**

**Pick Up Your Way**

Pick up today curbside (at Nordstrom stores) or in store (at Nordstrom and Nordstrom Rack). Shop a wider selection of items when you pick up tomorrow (available in most areas). Plus, free gift wrapping is available at Nordstrom stores!

**Get It Delivered**

We have easy ways to deliver your items right to you.

- Free Shipping
- Ship to Store
- Expedited Shipping
- International Shipping

**Free Returns—by Mail or in Store**

Don't love it? Return it for free. It's that easy.

[Returns & Exchanges](#)

**Nordstrom Local**

Easy online order pickup and returns in your neighborhood.

[Find Out More](#)

**Shop with Us**

[Nordstrom](#) [Nordstrom Rack](#) [Nordstrom Trunk Club](#)

# AGENDA

**Production and Cost Functions: Some Basic Economics**

**Critical Components of Distribution Design**

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**Practical Issues**

**Key Concepts to Remember**

## KEY CONCEPTS TO REMEMBER

- **Cost structure (fixed/variable cost, average/marginal cost)**
- **Dis-/economies of scale**
- **Minimum efficient scale**
- **Standard design options for distribution networks**
- **Risk pooling**
- **Critical components for positioning in (cost effectiveness, responsiveness)-space**
- **Tradeoffs between critical components and number of facilities (as an indexing parameter for different design options)**
- **Performance comparison of distribution designs**
- **Use of product characteristics for distribution design**
- **Evaluation of design options and real-world considerations**