Conflict and Coordination in Multi-channel Distribution: Perspectives for Antitrust Policy from the Supply Chain Management community

American Antitrust Institute
Invitational Symposium
Washington DC
June 22, 2011

Santa Clara University
Professor Andy Tsay
Santa Clara University

- Oldest university in California
  - established by Jesuits in 1851 on a mission site
  - California joined US just one year earlier

- Top-20-ranked MBA/EMBA, for Silicon Valley working professionals
  - evening/weekend classes
  - emphasis on high-tech
Agenda

• What is a *supply chain*?
• What is a *(distribution) channel*?
• The *customer’s perspective*: what different channels mean to us
• The *supply chain manager’s perspective*: issues in channel choice
  • Intermediated vs. Direct?
  • How about using both?

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Supply chain. (a) (collectively) the routes or means by which supplies (esp. those for a military force) are received; (b) Business, the chain of processes involved in the production and distribution of a commodity.

1910 R. MORRIS *Railroad Admin.* i. 23 A railroad is better off than an army because...nobody is trying to cut its supply chain.

1956 *Operations Research* 7 10 It is possible to supply the steel at approximately this rate...provided no link in the supply chain breaks.

1962 W. E. MOORE *Conduct of Corporation* xiii. 183 The sales or marketing manager is concerned with the other end of the supply chain, the securing of orders and delivery of the product.

From *OXFORD ENGLISH DICTIONARY* (added 5/2003)

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Modern usage

• More than just the physical path of materials
• Three distinct flows
  – Materials
  – Information
  – Funds

• *Supply Chain Management* (SCM) = taking a *systemwide perspective*, beyond one factory’s walls
  – emphasis on managing relationships across interfaces (between firms, or between steps in value chain)

Booz-Allen & Hamilton claims to have coined the term SCM in 1982. (Oliver *et al*, *Strategy+Business*, Q2 2001)
What’s a channel, and what does it mean for you?—

How many ways can you buy a ....?
## A manufacturer's channels

<table>
<thead>
<tr>
<th>Bricks-and-mortar</th>
<th>Intermediated</th>
<th>Mfr-controlled</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Best Buy, Walmart, etc.</td>
<td>Apple store</td>
</tr>
<tr>
<td>Virtual</td>
<td>Bestbuy.com, Walmart.com, Amazon.com, etc.</td>
<td>Apple.com</td>
</tr>
</tbody>
</table>
Apple iPod touch 8 GB (4th Generation) NEWEST MODEL
by Apple

🌟🌟🌟🌟🌟 (1,748 customer reviews) | Like (1,281)

NEAREST VERSION

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Price: $199.99 & this item ships for FREE with Super Saver Shipping. Details

You Save: $29.01 (13%)

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Address:
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San Francisco, CA 94108
(415) 392-0202

Driving Directions & Map

Store hours:
Mon – Sat: 9:00 a.m. – 9:00 p.m.
Sun: 10:00 a.m. – 8:00 p.m.
The supply chain perspective: Manufacturers & Intermediaries – A Love-Hate Relationship
• Distribution requires building brand/product awareness, providing market coverage, gathering market info., breaking bulk, processing orders, customer support, etc.

  Total cost = (# of links)*(cost per link)

"It is an old axiom of marketing that it is possible to eliminate wholesalers (or any middlemen, for that matter) but impossible to eliminate their functions."

~Stern et al. 1996
Hate

• Reasons to “dis-intermediate”:
  – intermediaries carry only small *assortments* of a manufacturer's products
  – direct control of distribution and pricing can lead to higher *profit margins*
  – intermediaries can use their *power* to extract various concessions from the manufacturer
  – manufacturers can provide a *broader product selection in a better ambiance with higher service* in direct outlets
  – more *flexibility* in experimenting with product attributes
  – closer *contact with customers*
  – protection from *crises faced by intermediaries*
Recent developments: more reasons to “Be Direct” online

- **Expanding role of the Internet** → new access to customers, new capabilities for information flow
- **Information and materials handling technologies** → increased feasibility for a producer to also perform sales/distribution activities
- **Pervasive logistical networks (FedEx, UPS, etc.)** → coverage of the “Last Mile”
Hybrid strategies have grown in popularity, with a major inflection point during the Dot-com boom

- Different channels can appeal to different segments
- Total market coverage may increase
- But…
From a May 1999 letter from Home Depot to more than 1,000 of its suppliers:

“Dear Vendor, It is important for you to be aware of Home Depot's current position on its' [sic] vendors competing with the company via e-commerce direct to consumer distribution.

“We think it is short-sighted for vendors to ignore the added value that our retail stores contribute to the sales of their products....

“We recognize that a vendor has the right to sell through whatever distribution channels it desires.

“However, we too have the right to be selective in regard to the vendors we select and we trust that you can understand that a company may be hesitant to do business with its competitors.”

~Brooker, Fortune, 8/16/1999
Mimicking Dell, Compaq to Sell Its PCs Directly

“Compaq Computer Corporation...is expected to unveil today an aggressive new effort to sell personal computers directly to customers, bypassing the dealers who helped make it the world's largest seller of PC's.

Compaq's battle plan: use Internet and telephone-sales operations to reach the fast-growing small and medium-size business PC market.”
had already proven the viability of Internet-direct sales for PCs well before 1999
PC industry in the 1990s
Objectives of the remainder of this presentation

• Comparing the different types of multi-channel research

• Understanding the research methodology prevalent in the supply chain management academic community
How to think about the research on conflict in multi-channel systems

• This problem is studied in Economics, Marketing, and Supply Chain Management
  – Harder and harder to distinguish among these disciplines

• Better to just categorize the research as **Descriptive vs. Prescriptive**
  – **Descriptive**: characterize how the actors *actually do* behave
    • e.g., When adding a new channel, does free-riding actually occur? In what direction?
  – **Prescriptive**: how *should* the actors behave?
    • e.g., Assuming that a new channel affects demand in a given way, should the new channel be included? What contract should be used with the new channel partner?
Defining the scope

• At least one channel must contain an independent intermediary
  – no intermediary → no conflict

• Channel conflict requires both the following between the same two parties:
  – horizontal competition across channels (usually for either demand or supply)
  – vertical competition within intermediated channels

• The prescriptive research draws heavily from Classical Microeconomics and Game Theory
Representing horizontal and vertical competition
Basic model

- One manufacturer, one retailer
- Single period, single product
- Linear costs
- No capacity constraints
- Deterministic demand curves, usually linear
  - Either assume them directly or derive from specified consumer preferences
- Each channel sets price $p_i$
Horizontal competition

Method 1: Hotelling model

- Reconciling the Bertrand model with reality
- Premise:
  - Customers incur “travel” costs
  - So competing sellers that are “geographically” separated can each have some pricing power over part of the market → can charge higher than marginal cost (vs. Bertrand outcome)
Horizontal competition

**Method 1: Hotelling model**

- **Formulation:**
  - consumers are uniformly distributed along a linear city of length 1
  - two sellers of the same product are located at opposite ends of the segment
  - consumers have transportation costs of $t$ per unit of length (can represent more abstract forms of inconvenience)
  - all consumers value the product at $V$
  - Seller $i$ ($i=1,2$) sells for price $p_i$

- **Derive the demands** $D_1(p_1,p_2)$ and $D_2(p_1,p_2)$
Locate the “indifferent consumer”:

\[ V - p_1 - td = V - p_2 - t(1-d) \quad \Rightarrow \quad d = 1/2 + (p_2 - p_1)/(2t) \]

So \( D_1 = 1/2 + (p_2 - p_1)/(2t) \)

\( D_2 = 1 - D_1 = 1/2 + (p_1 - p_2)/(2t) \)

\( 1/t \) is a measure of competitive intensity
But there are other scenarios….

So the demand curves are actually piecewise linear in \( p_1 \) and \( p_2 \) → differentiability problems

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Horizontal competition

Method 2: Assume the demand curves

• Desired properties: \( dD_i/dp_i \leq 0 \) and \( dD_i/dp_j \geq 0 \)
• Usually linear for tractability
• Example:
  \[
  D_1 = A_1 - \alpha p_1 + \beta p_2 \\
  D_2 = A_2 - \alpha p_2 + \beta p_1
  \]

• vs. Hotelling
  – Resulting profit functions are smooth and differentiable
  – But no representation of individual consumers
  – Different notion of effect of adding/subtracting sellers
    • Above example: Adding seller 2 can only increase seller 1’s sales (at given prices)
    • Hotelling: Adding seller 2 can never increase seller 1’s sales (at given prices)
Vertical competition

• Manufacturer has unit production cost $c$ (given), and sells to retailers at unit wholesale cost $w$ (decision variable)

• Typically, manufacturer is assumed to be Stackelberg leader in choosing $w$
Horizontal + Vertical competition

Retailer: Choose $p_2$ to maximize $\Pi_R = (p_2 - w)D_2$

Manufacturer: Choose $w$ and $p_1$ to maximize $\Pi_M = (p_1 - c)D_1 + (w - c)D_2$

Solve by reverse induction for $w^*, p_1^*, p_2^*, D_1^*, D_2^*, \Pi_R^*, \Pi_M^*$
What’s missing?

• Competition is only in price
• The only differences between the channels are *decision control* and *markup structure*
• Ignores channel-specific differences in costs of doing business
  • e.g., Logistics costs
One extension: 
add a single non-price factor

• Let demands be $D_i(p_i, p_j, s_i, s_j)$
  - $s_i = \text{“service”/“sales effort” in channel } i \text{ can be provided at some cost}$

• Desired properties:
  - $dD_i/ds_i \geq 0$
  - $dD_i/ds_j$?
  - spillover vs. cannibalization

• Example:

$$D_i = A_i - \alpha p_i + \beta p_j + \gamma s_i - \delta s_j$$

cost of providing $s_i$ is $\eta_i s_i^2$
Typical research questions

- **Manufacturer:**
  - Managing the hybrid system: how to jointly manipulate wholesale price and direct channel price (and effort)
  - Channel choice: solve for decisions and profits under single-channel alternatives, and compare
  - Channel coordination: any way to overcome the horizontal and vertical inefficiencies?

- **Retailer:**
  - How does competition from manufacturer as seller affect choice of retail price (and service)?
  - Preferred system?

- **Customers**
  - Which types of customers will buy from each channel?
  - Analysis of consumer surplus

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Messages from this body of work

• A manufacturer channel might be a way for a manufacturer to implicitly influence retailers when explicit control would be illegal or difficult
  – e.g., achieve price control

• A hybrid system might be better for both firms
  – if true, channel conflict would be an irrational fear

• Findings may be dependent on assumption of manufacturer monopoly
  – the models do not consider multi-channel system vs. multi-channel system
Research opportunities
Assessment of current literature

- Simple models only
- Hasn’t adequately captured the flavor of how online and physical channels differ
- Hasn’t studied the full range of policies that can be used to mitigate channel conflict

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Areas requiring more work

- Representing channel characteristics
  - Pricing
    - Dynamic pricing
    - Auctions
  - Non-financial aspects of the purchase
    - Experiential aspects of shopping
    - Ease of return
    - Delivery delay
  - Non-price product attributes
    - Customization
  - Operational costs
    - Non-linearities
  - Demand uncertainty
  - Alternative types of multi-channel strategies
    - More complex topologies
    - Unbundling and reassigning channel functions
Areas requiring more work

• Evaluating distribution strategies
  – Company objectives besides (expected) profit
    • Non-financial
    • Risk sensitivity
  – Channel power structure
Re: Operational differences between the supply chains of online and bricks-and-mortar retail channels
<table>
<thead>
<tr>
<th></th>
<th><strong>Online retail</strong></th>
<th><strong>Retail stores</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Assortment?</strong></td>
<td>• Broader (but some items can be drop-shipped from other sources)</td>
<td>• Narrower</td>
</tr>
<tr>
<td><strong>Inventory levels?</strong></td>
<td>• Lower safety stock due to centralization of slow-movers (risk pooling)</td>
<td>• Higher because distributed</td>
</tr>
<tr>
<td></td>
<td>• Online sales facilitates dynamic pricing to &quot;sell what you have&quot;</td>
<td></td>
</tr>
<tr>
<td><strong>Warehouses?</strong></td>
<td>• Pick-and-pack at individual item level</td>
<td>• Efficient handling of large pallets</td>
</tr>
<tr>
<td><strong>Reverse supply chain? (customer returns)</strong></td>
<td>• Extensive additional infrastructure</td>
<td>• Handle through existing infrastructure</td>
</tr>
<tr>
<td><strong>Overall logistics effort for seller?</strong></td>
<td>• Higher due to &quot;last mile&quot; problem</td>
<td>• Lower since buyer does some of the work</td>
</tr>
</tbody>
</table>
"Firms either have to have their supply chain set up to have **high transportation costs if they are dealing with Internet delivery** or very **low transportation costs if they are dealing with a traditional retail store delivery**.

"The two don’t mix.

"**Ultimately, designing a supply chain to serve both traditional and Internet retail channels well is difficult.**"

~Metters & Walton (2007)
"It is our thesis that moving to a multi-channel Internet purchasing option with an existing physical store network can create significant operational diseconomies of scope."

... 

"The move to a multi-channel Internet retail strategy requires a move to a multi-channel supply chain strategy, and this may not be in the best interest of the firm."

~Metters & Walton (2007)
Thank you!

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