The Economics of E-commerce and Technology

Competitive Advantage

Industry vs. Firm Analysis

- Industry analysis looks at what determined average profitability
- What makes individual firms within an industry different?
- To create an advantage, a firm must do something unique and valuable
- Goal: Understand why some firms earn superior profits, and use this knowledge to evaluate strategic options.
- Porter: "Competitive Strategy is about being different"

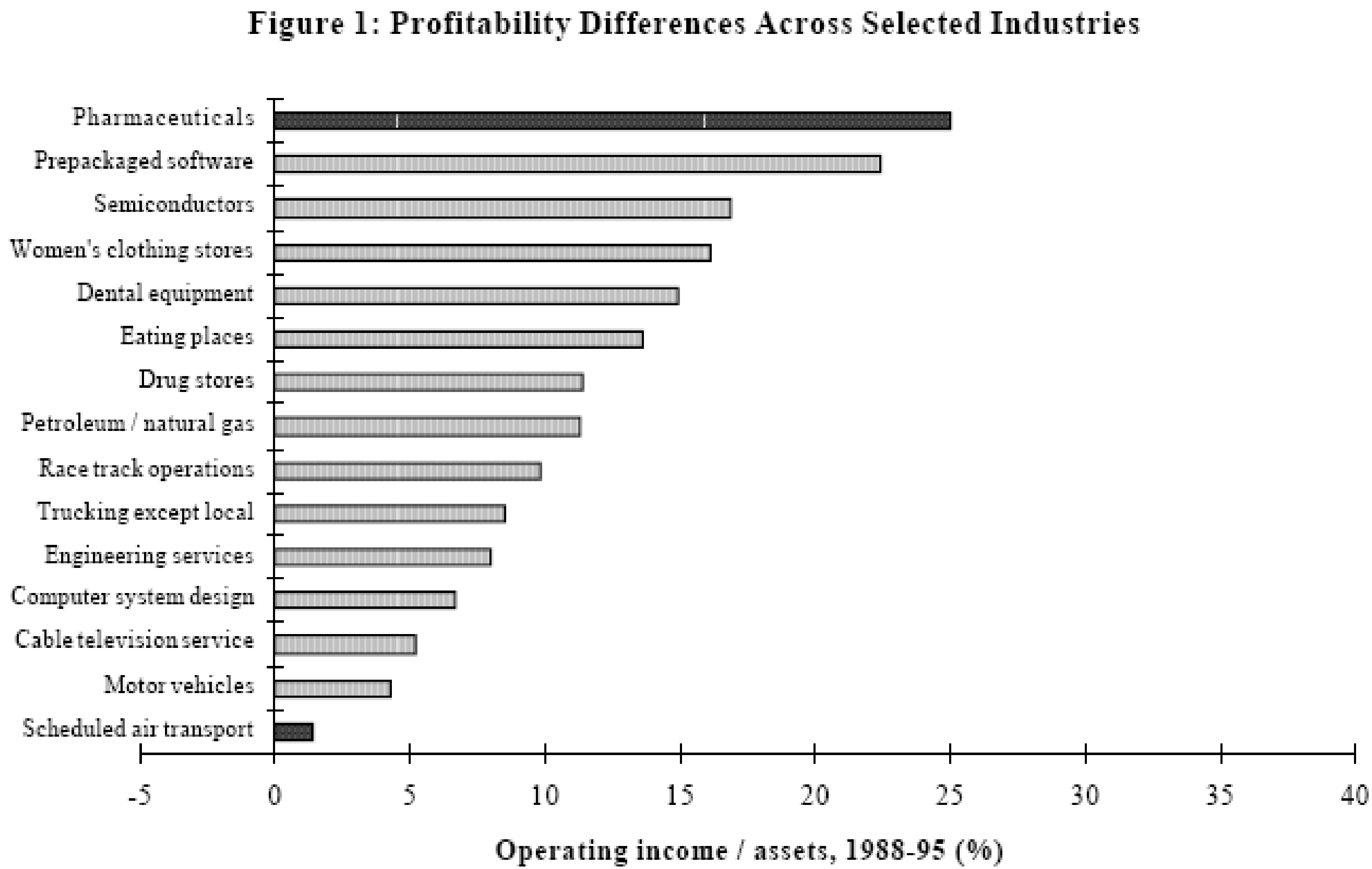


Figure 1: Profitability Differences Across Selected Industries
Pharmaceuticals
Prepackaged software
Semiconductors
Women's clothing stores
Dental equipment
Eating places
Drug stores
Petroleum / natural gas
Race track operations
Trucking except local
Engineering services
Computer system design
Cable television service
Motor vehicles
Scheduled air transport
-5
0
5
10
15
20
25
30
35
40
Operating income / assets, 1988-95 (%)

Figure 2a: Profitability Differences Within the Pharmaceutical Industry

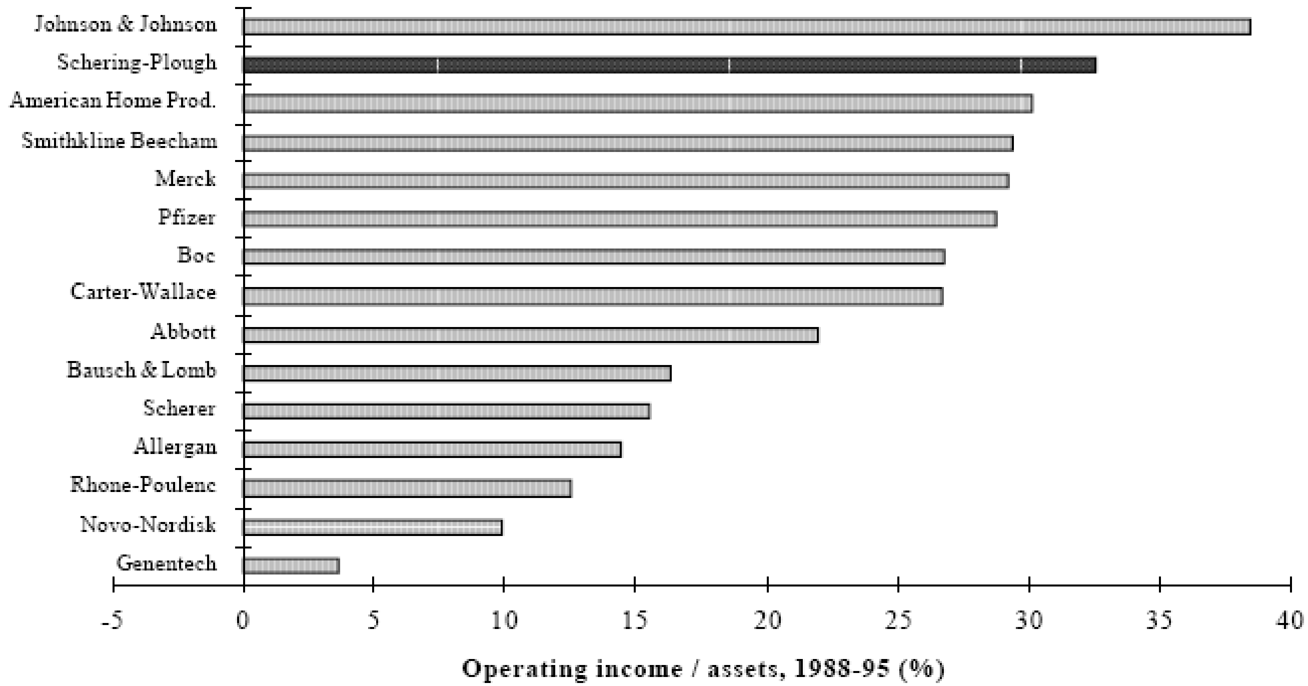
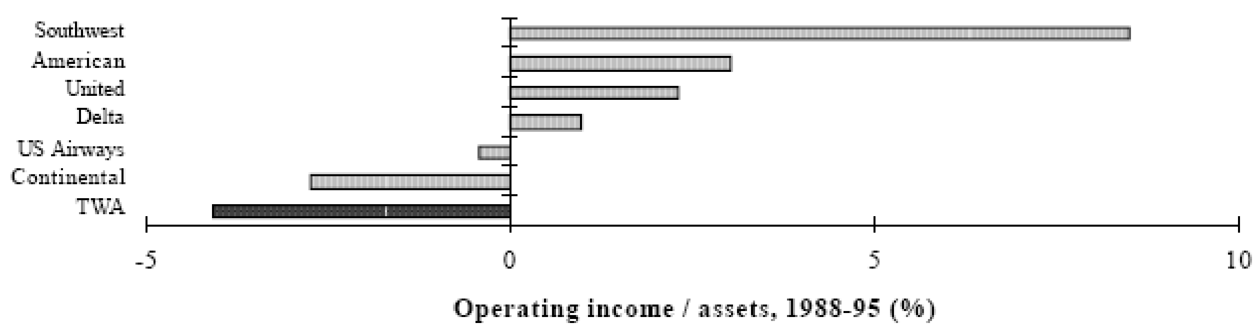


Figure 2b: Profitability Differences Within the Airline Industry



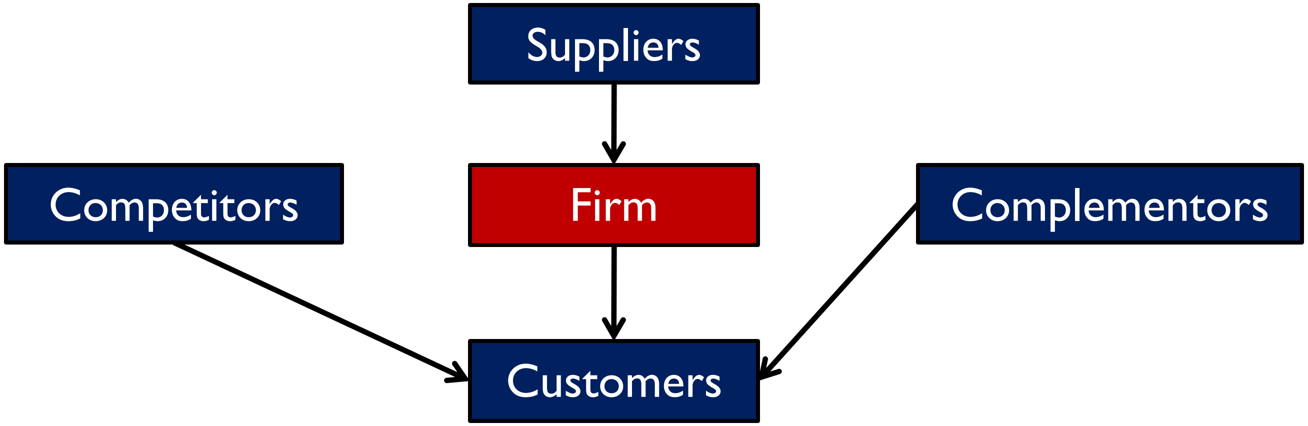
Two Questions

- How does a firm create a competitive advantage?
  - How can a firm position itself differently from its competitors?
  - What activities can a firm adopt that will differentiate itself?
  - About short-run profitability.

- What makes a competitive advantage sustainable?
  - What assets, resources or capabilities prevent imitation?
  - How can firm leverage existing assets, resources and capabilities?
  - About long-run profitability.

Added Value

The Value Pie



- Total value of industry
  - Utility of consumer minus opportunity costs of inputs
- Added value of firm
  - Reduction in total value of industry if your firm is annihilated.

Value Creation: Example

- In 2009, Ruud Lighting signed deal with city of Los Angeles for 140,000 LED streetlights.
- Total value
  - LA saves $100m by switching to LED
  - Price is $57m
  - Ruud's costs are $30m.
  - Total value = $70m, LA gets $43m, Ruud gets $27m.
- Ruud's added value
  - What if Ruud is only LED company?
  - What if ACME can produce $90m savings for cost $25m?

Added Value

- Claim: A firm's profits cannot exceed added value.
  - Idea: If firm's profits exceed added value, the other parties can jointly become better off by working around this firm.

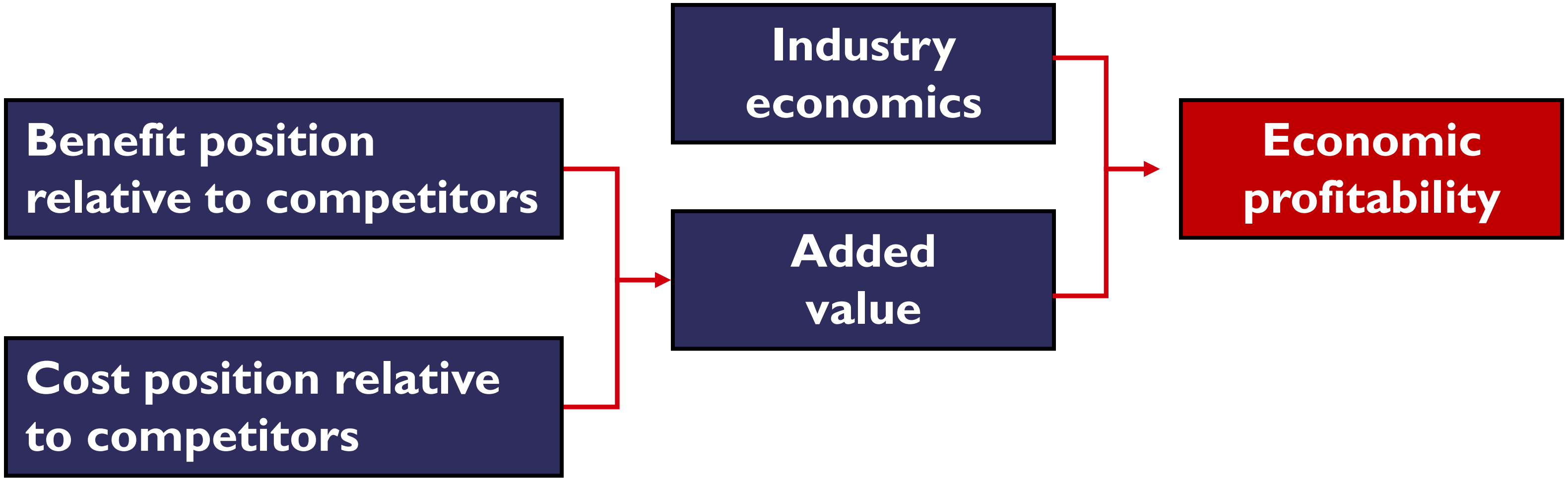
- Right questions are not
  - Is this an attractive industry in general?
  - Is demand for product growing?

- Right questions are:
  - Can I make product at lower cost than competitor?
  - Can I create more value than my competitor?

Example

- Verizon, T-Mobile and Apple.
- Assumptions
  - 100m smart phone customers.
  - T-Mobile capacity 40m; Verizon capacity 80m. Marginal cost $0.
  - People value T-Mobile at $40; Verizon at $50.
- Question: How much will Verizon get?
  - Value added is $3200m, so this is upper bound.
  - Value added of Apple is $4800m, so Verizon's lower bound is 0.
- What if we add Google?
  - With Android, value T-Mobile at $30; Verizon at $40.
  - Value added Apple $1000m, Google $0, T-Mobile $800m.
  - Verizon gets at least $4800 - $1000 - $800 = $3000.

Added value and industry economics



From added value to strategy

- To increase profits firm must increase added value
  - Drive a bigger wedge between benefits and costs
- How do we identify what strategic moves will do this?
  - Break down and analyze the specific activities that make a firm different from its competitors
  - How do these affect benefits/costs?
  - How can we change the activity mix to create more benefits or reduce costs?
  - Given a specific customer niche, what activities should we engage in so as best to serve them?

Differentiation

Product differentiation

- In the LED example, only one firm (the one with the greatest added value) can earn positive profits
- Often, consumers are heterogeneous (not just firms)
  - Some people prefer Android features, others iPhone features
  - Some people place low value on data plan and have old Nokia
- Many firms can have positive added value and earn profits
  - Understanding consumer heterogeneity is key to successful strategy

Product Differentiation: Classification

- Consider two products: A and B
- Vertical differentiation
  - If $p_A=p_B$ then everyone prefers A to B
  - If people value quality differently, some firms offer high-quality high-price goods; others offer low-quality low-price goods.
- Horizontal differentiation
  - If $p_A=p_B$ then some prefer A and some prefer B.
  - Firms can carve out niches, targeting specific customers
- Measuring degree of heterogeneity
  - When we increase p_A how many people switch to B?

Strategy: Horizontal Differentiation I

- Hotelling's Model
  - Customers located uniformly distributed on line [0,1].
  - Customers have transport costs cd, where d is distance.
  - Firms have zero costs.
- Minimal differentiation: Both firms located at ½
  - Bertrand competition: $p_A=p_B=0$ and both get zero profit.
- Maximal differentiation: Firms located at 0 and 1
  - Given prices (p_A,p_B) demand is given by

$$q_A = \frac{1}{2} + \frac{p_B - p_A}{2c} \text{ and } q_B = \frac{1}{2} + \frac{p_A - p_B}{2c}$$

  - Tradeoff: If lower price steal marginal customer, but make less money on inframarginal customers.
  - Profit maximizing prices: $p_A=p_B=c$ and profits $\pi_A= \pi_B=c/2$.

Strategy: Horizontal Differentiation II

- Minimal or maximal differentiation?
- As A moves away from 0
  - Direct effect: It steals some of B's customers
  - Indirect effect: Price competition becomes more intense.
  - Suggests firm might move in a little, but not all the way.
- Other reasons to cluster
  - Be where demand is (e.g. Amazon market place).
  - Attract customers (e.g. malls).
  - If no price competition (e.g. radio stations, where use adverts).

Finding a niche market

- Usual laptop firms: HP, Dell, Acer, Toshiba, Lenovo
- Military laptops: Getac, General Dynamics, Trimble
    - Need to withstand shock, weather, humidity, explosions…

Strategy: Vertical Differentiation I

- Model
  - Customers have valuations v~U[0,1].
  - Two firms with qualities x_A and x_B, where $x_A \geq x_B$.
  - Agents receives utility vx-p, where p=price.
- Minimal differentiation: Both firms located at 'x'.
  - Bertrand pricing $p_A = p_B = 0$ and both get zero profit.
- Differentiation: Firms located at $x_A > x_B$.
  - Given prices $p_A > p_B$ demand is

$$q_A = 1 - \frac{p_A - p_B}{x_A - x_B} \quad \text{and} \quad q_B = \frac{p_A - p_B}{x_A - x_B} - \frac{p_B}{x_B}$$

  - Tradeoff: marginal vs. inframarginal agents.
  - Firm with higher quality has higher profits.

Strategy: Vertical Differentiation II

- How much differentiation?
  - Producing higher quality is costly
  - Higher quality raises WTP of agents and thus prices.
- What if there is only one firm?
  - Insight: care about WTP of the *marginal* agent.
  - Example: Three agents have values $v_1=10$, $v_2=7$ and $v_3=2$.
    - Suppose innovation costs \$1 and increases v_1, v_2 by \$1.
    - Suppose innovation costs \$1/2 and increases v_1 by \$1.
- Returning to two firms.
  - Competition becomes softer when high firm raises quality and low firm lowers quality.
  - Obtain some differentiation in equilibrium.

Generic Strategies

Generic strategies

- The analysis of differentiation leads to a taxonomy of generic competitive strategies along two dimensions
- Cost vs. Benefit strategies
  - Cost = Low cost, standardized products.
  - Benefit = Differentiate and target customer segments.
  - Concerns fit of product to customers.
- Broad vs. Focus strategies
  - broad = try to serve a wide range of customer segments and/or offer a full line of related products
  - focus = target a narrow customer segment and/or offer a narrow set of product varieties
  - Range of products to offer

Cost vs. Benefit leadership

- Cost position (e.g. Dell)
  - Standardized products, limited customization
  - Cost conscious culture
  - High volumes
- Benefit position (e.g. Alienware)
  - Differentiated products
  - Highly targeted
- Which is better?
  - Are economies of scale exploited?
  - Are quality improvements valued? (e.g. phone size vs. features)
  - Are quality improvements easily imitated?

Broad vs. Focus

- Broad strategy (e.g. Apple)
  - Serve full range of customers
  - Can have single low-cost product (e.g. Apple)
  - Can have range of differentiated products (e.g. HTC)
  - Attractive if there are economies of *scope* across products
    - Can use common components in different products (e.g. batteries).
    - Can share branding/reputation advantages
    - Complementarities in consumption (e.g. Mac and iPhone)
- Focus strategy (e.g. Designer phones)
  - Attractive if consumer heterogeneity is important,
  - Economies of scale in narrow product segments
  - Expertise in product not transferable.

Sustainability

Sustainability

- Competitive advantages depend on a firm’s
  - Resources (things you have): a firm's physical, human, and other intangible assets (knowledge, reputation)
  - Capabilities (things you can do): organizational routines that transform a firm's resources into goods and services
- To be sustainable, a resource must by
  - Hard to imitate
  - Immobile
- We’ll discuss three special cases:
  - Early mover advantages
  - Networks of activities
  - Core competencies

Example: Google

- Google has high value added today.
- Will it have high value added in 5 years? 20 years?
- List of competitive advantages
  - Expertise in search
  - Network of advertisers
  - Quality of people
  - Culture of innovation
  - Range of complementary products (with network effects and switching costs)
  - Server farms (increasing returns to scale)
  - Data (about everything and everyone)
- Are these sustainable?

Barriers to Imitation

- A resource is a source of sustainable advantage if it is difficult / costly for competitors to duplicate.

1. Competitors cannot access resources
   - Literal scarcity (diamond mines),
   - Legal restrictions (patents; trademarks; licenses)
   - Privileged access to buyers or suppliers (long-term contracts)

2. Competitors cannot imitate
   - Causal ambiguity (firm does many things; which are critical?)
   - Competitor cannot observe parts of strategy (e.g. Google algorithm)
   - Path dependence (firm succeeded because of historical circumstances that no longer exist)
   - But hire away key employees?

Barriers to Imitation

3. Not profitable for competitors to imitate
   - Large returns to scale mean imitator cannot cover fixed costs
   - High switching costs create entry cost for imitator
   - Imitator needs to build up network
   - Imitator expects harsh price competition

4. By time competitor imitates, firm in better position
   - Learning by doing
   - Continual technological advancement

Immobility

- If perfectly mobile, resources extract all the rents
  - Lionel Messi should collect value of Champions League win.
- Example: FIFA has exclusive agreement with EA for soccer video games.
  - Is this a source of sustainable competitive advantage for EA?
- Immobility depends on
  - Contractibility (can you sell a reputation?)
  - Definability (knowledge may be dispersed throughout firm)
  - Complementarily with other assets (can't just move one asset)

Three Examples of Sustainable Advantage

(1) First Mover Advantage

- Many of the barriers to imitation we have discussed suggest an advantage for first movers
  - Getting a prime location
  - Securing an exclusive contract
  - Being the first to pay sunk costs in a natural monopoly
  - Moving down a learning curve
  - Capturing consumers in a market with switching costs
  - Building an installed base for your standard

But… Late Mover Advantage

- First-movers are guinea pigs (e.g. GM EV1 car)
- First mover pays costs that benefit the late comers
  - Consumer awareness of a new technology (e.g. LCD TVs)
  - Supply chains and distribution channels (e.g. MP3 and flash)
  - Complementors (e.g. iPhone and apps)
  - Investments by consumers (e.g. Blu-Ray and player)

Apple's iPod

- First into industry
  - SaeHan's flash player in 1988
  - Compaq's 2.5" player in 1999
  - Design became standardized
- Apple launched in Fall 2003
  - Minimalist design with wheel interface
  - iTunes software
  - DRM enabled deal with record companies
  - Locked in supply of drives/flash
  - Gained 70% market share by Dec 2007
- Competition
  - Sandisk and Zune running WMP had 10% market share each

(2) Coherent Strategies

- Porter (1996).
  - Sustainable strategies rest on doing many interlocking activities
  - Create fit among activities, doing all well
  - Make trade-offs. Choose what not to do.
  - Complementarities increase value added.
- Systems of activities hard to imitate
  - Causal ambiguity
  - Have to imitate the entire system
  - Danger: when growing firm forgets what makes them unique.

Apple's Laptops

- Differentiated from competitors
  - Apple is highly differentiated.
- Sells complementary lines
  - Apple has ecosystem - iPod, iPhone, iPad, iTunes.
- Offers few varieties
  - Apple sells five versions of MacBook Pro.
- Makes in anticipation of orders
  - Apple makes computers in China.
- Sells via self-branded retailers
  - Uses Apple stores rather than online or Best Buy.
- Highly branded
  - Lots of advertising, recognizable products.

(3) Core competencies

- A small number of key assets or capabilities define a firm's competitive advantage
  - Google: culture, experience of search
  - Canon: precision mechanics, fine optics, micro-electronics
- Seems very different from the Porter formulation
  - Focus on a few key things instead of a network of activities
- However, it carries a similar message
  - Focus on deepening advantages
  - Look for niches in which current assets give you an advantage

Wrap-Up

- Competitive advantage means adding value
  - Differentiate your product
  - Appeal to a particular market
  - Be more efficient
- Is your competitive advantage sustainable?
  - Be hard to imitate
  - Have immobile resources
  - Have a coherent strategy