# Summary & Discussion of Profiting From Technological Innovation: Implications for Integration, Collaboration, Licensing and Public Policy By David J. Teece (1987)

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# Who gets what share of the profits from an innovation?

# Possible outcomes from Innovation Process

| | **Innovator** | **Follower-imitator** |
|---|---|---|
| **Win** | G.D. Searle (Nutrasweet)<br>Dupont (Teflon)<br>Pilkington (Float Glass) | IBM (personal computer)<br>Matsushita (VHS)<br>*Apple (iPod)*<br>*Kodak (digital photography)* |
| **Lose** | RC Cola (diet, can)<br>Xerox (office computer, mouse, icons)<br>DeHaviland (commercial jet) | Kodak (instant photography)<br>Northrup (F20 fighter)<br>DEC (personal computer) |

# Keys to how profits from an innovation are divided: #1 - Regimes of appropriability

- Tight or Weak?
- Elements:

-legal regime (patents, copyrights, trade secrets, enforcement)

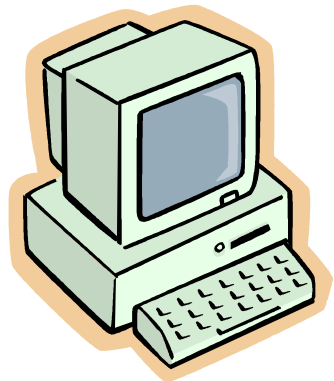
- nature of technology:

product/process

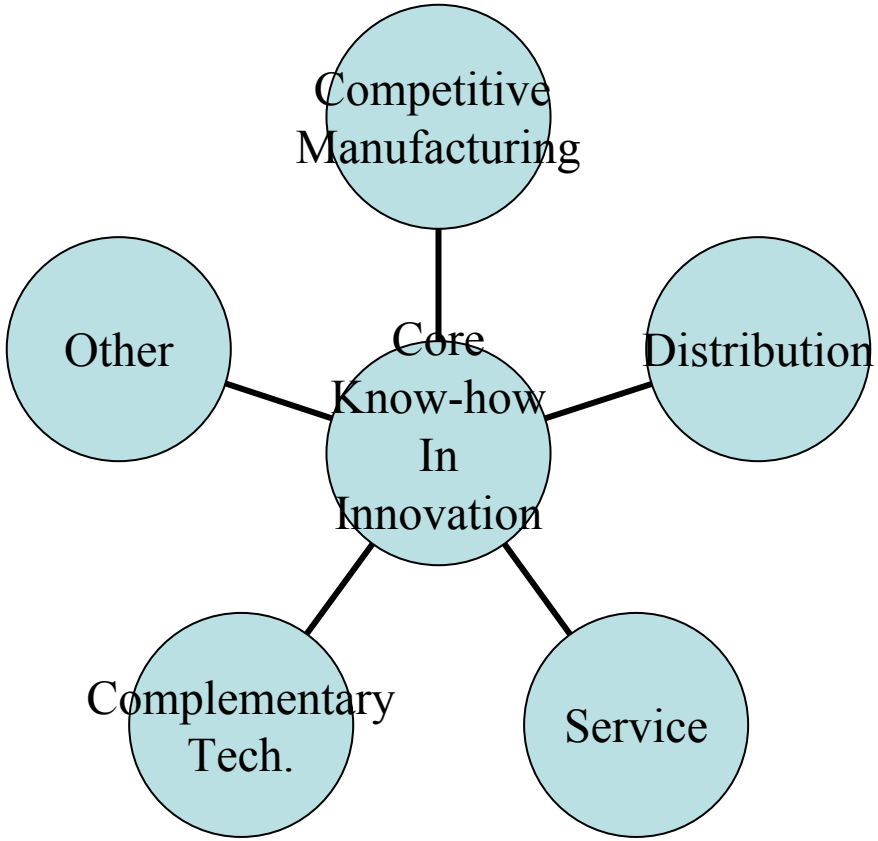
tacit/codified

# Dominant Design Paradigm

- ✓ Acceptance of agreed on standards by which NORMAL scientific research can proceed.
- ✓ These standards remain in force unless or until paradigm is overturned
- ✓ Pre-paradigmatic stage: Competition based on designs that are different.
- ✓ Once DDP emerges, competition shifts to price and AWAY from design.
- ✓ Future innovation focuses on process innovation and/or details of DPP.
- ✓ **If imitation is easy, followers can enter market, modify innovator's design yet rely on fundamental designs of innovator to establish themselves as dominant design**!



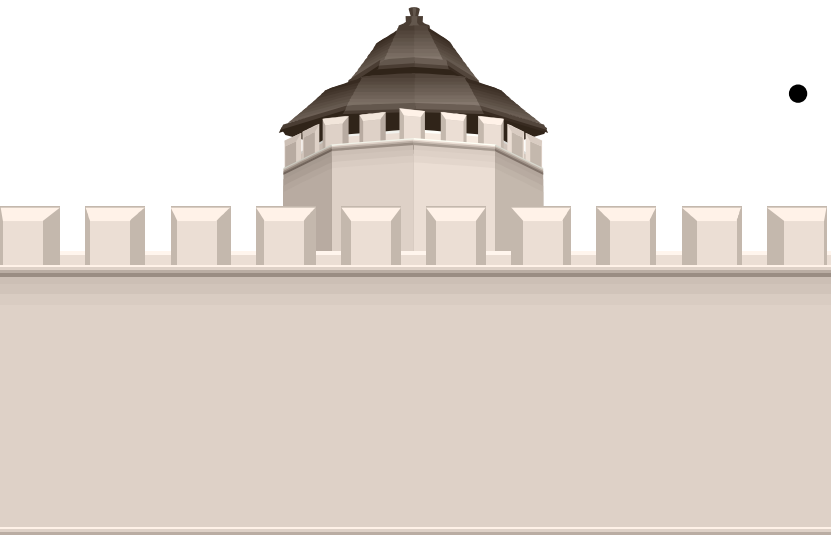
# Complementary Assets Needed to Commercialize an Innovation



# Complementary Assets (CA's)
## (successful commercialization requires that know-how be used in conjunction with other capabilities or assets)

- Generic: general purpose assets not tailored to the innovation. e.g. plant & equipment for athletic shoes.
- Specialized: assets with one-way dependence between innovation and the asset e.g. specialized repair facilities for rotary engine.
- Co-specialized: assets with two-way dependence between innovation and the asset. e.g. filling stations for hydrogen fuel cell vehicles.
- Note: Extent of dependence need not be equal in both directions.

# Implications for Profitability I: Tight Appropriability Regimes



- Strong legal protections &/or trade secrets hard to access:
- Innovator can and will translate innovation into superior returns!

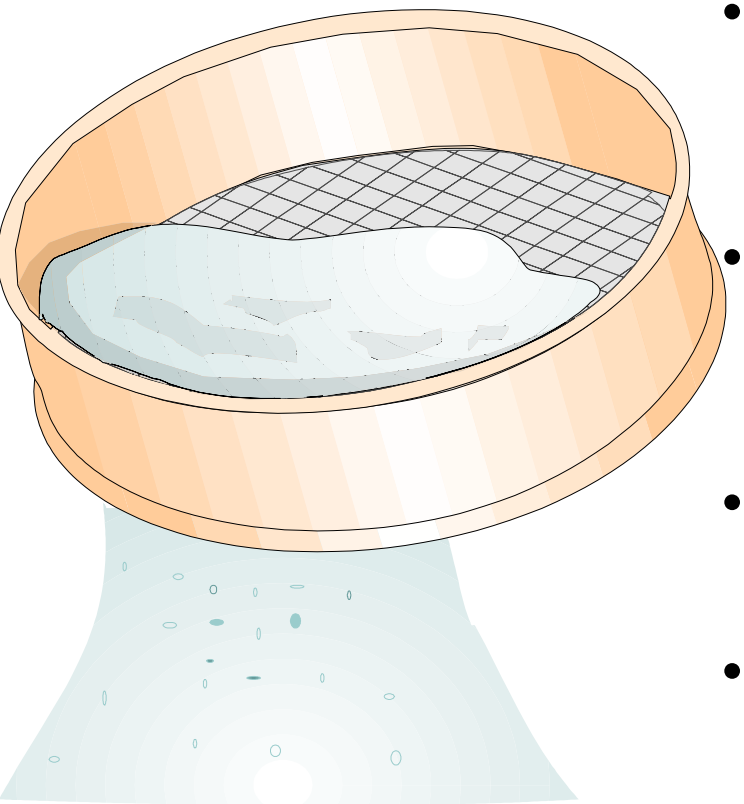
  Innovator has time to access needed complementary assets

  Innovator may license innovation to gain generic assets
- OR, innovator can commit $ to acquiring specialized or cospecialized CA's AND
- Innovator has time to refine product concept before DDP.

# Implications for Profitability II: Weak Appropriability Regimes

- 1st question: Paradigmatic or prepardigmatic phase?
- If pre: innovator must let basic design "float" until it is clear which design will become industry standard.
- Innovators must be linked to market asap so that user needs can influence design.
- Answer: Multiple parallel & sequential prototyping ie. the < cost of prototyping, > linkage to market needs.

# Implications for Profitability III: Weak Appropriability Regimes



- Paradigmatic stage: As leading design emerges, volumes increase>> economics of scale opportunities.
- Firms “ramp up” for mass production by acquiring specialized tooling & distribution: “irreversibilities”.
- Prices become Less important -access to complementary assets CRITICAL.
- Since core technology easy to imitate, COMMERCIAL SUCCESS DEPENDS ON TERMS OF ACCESS TO CA’s.
- Monopoly holders of CA’s could capture ALL profits from innovation.

# Channel Strategies for Acquiring CA's I: Contractual Modes

- Innovator signs contract (e.g. license) with independent suppliers, manufacturers, distributors.
- Pros: Less investment > less risk.
  Less investment > less need for cash
  Gain credibility/reputation of partner
  Learn from partner
- Cons: Convince potential partners to invest in "irreversibilities" : Innovator may have to offer to carry some/most of risk.
  Risk that partner doesn't perform as planned
  Risk that partner copies & runs with design
  ie. innovator CREATED competitor
- When optimal:
  i) relatively tight appropriability regime
  ii) competitive supply of CA's (ie. capacity and choice) – CA is relatively generic

# Channel Strategies for Acquiring CA's II: Integration Modes

- Owning I/O leasing CA's
- Innovator could buy capacity in CA's BEFORE announcing innovation OR
- Innovator could buy capacity in CA's AFTER announcing innovation.
- However, if appropriability regime is WEAK, getting control of CA's fast is CRITICAL – bottlenecks/tight supply e.g. manufacturing capacity, distribution
- In this case, innovator must PRIORITIZE CA's: If a CA is critical > try to own.
- BUT: $ constraint (minority share)
  Watch competitors (they might build or buy more quickly/cheaply)

# Cash Constraints for Acquiring CA's

| | **Optimal Investment for** | **Business in Question** |
|---|---|---|
| **How imp-Ortant** | Minor | Major |
| Critical | Internalize (majority ownership) | Internalize (take minority share if cash constrained) |
| Not critical | Discretionary | Contract out. |

# Decision matrix for acquiring CA's

| | Time Required to position i.e. acquire CA's | relative to competition |
|---|---|---|
| $ Needed | Long | Short |
| Minor | OK if timing not critical | Full steam ahead |
| Major | Forget it | OK if cost position tolerable |

# Acquiring CA's via Contract or Integration Modes

| **Start here** | **Yes** | **NO** |
|---|---|---|
| Innovation requires access to CA's for commercial success | CA's specialized ? | Contract for Access |
| **NO** | Appropriability Regime weak? | Contract for Access |
| Commercialize Immediately | Specialized asset critical? | Contract for Access |
| | Cash position OK? | Contract for Access |
| | Imitators better positioned re: CA's | Integrate |
| | Contract for access | |

| | **Strong approp. Regimes (legal, technical)** | **Weak approp Regime but Inn. well positioned re acquiring CA** | **Weak approp Regime: Inn. Poorly positioned re acquiring CA** |
|---|---|---|---|
| ***Inn. & Imm. Good pos. Re: CA holders*** | 1. Contract<br>Innov. Wins | 2. Contract<br>Innov. Should win | 3. Contract<br>Innov. Or Imm. Win |
| ***Inn. & Imm. Poor pos. Re: CA holders*** | 4. Contract if Compet OR Integrate<br>Inn should win but may have to share $ | 5. Integrate<br>Inn should win | 6. Contract<br>Imm or CA holders win |

# Lessons from Teece

Innovator can improve total return to R&D by adjusting R&D investment portfolio to maximize # of discoveries that are either a) easy to protect within existing IP law OR

b) require for commercialization co-specialized assets ALREADY within firm's repetoire of capabilities.

- ✓ In weak appropriability regimes esp. where required manufacturing assets are specialized to the innovation, participation in manufacturing is NECESSARY if innovator wants to appropriate rents from innovation.
- ✓ If an innovator's manufacturing costs are HIGHER than those of its imitators, innovator may lose most of the profits to the imitators.
- ✓ AS the technology gap closes (dominant design emerges), basis of competition shifts to cospecialized assets.