

# Threats to Japanese Industrial Innovation Systems and the Need for New Direction

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# Some Characteristics of Innovation Systems in Japanese Firms

- Long-standing in-house development facilitated by low labor mobility
  - Existing firms change, evolve, and overcome technological discontinuity rather than new firm come in (e.g. Digital Still Camera).
- Close collaborations within firms and between related firms
  - In-house cross-functional integration
  - Close supplier relationships (keiretsu system)
- High skilled production and engineering workers

# A History of DSC Industry

- Electronics makers, such as NEC, Toshiba, Sony, and Matsushita, took initiatives to develop CCD in 70s right after invention at Bell lab.
- Some camera and film makers started to develop electric still cameras either in the late 70s or early 80s.
- Camera or film makers took initiatives in commercializing electric camera through the late 80s and early 90s.
- Casio hit the market in 1995, with QV-10

# How electric still camera engineers survived?

- Late 70s: Start R&D either for movie or electric still cameras
- Early 80s: MAVICA Shock ⇒ Shift to electric still cameras
- Failure of MAVICA system: People moved to R&D dpt. or integrated into video movie businesses.
- Failure of movie businesses ⇒ Still Camera
- QV-10 hit the market ⇒ rushing into DSC

Most people survived for more than 20 years.

Technologies were retained.

# Threats to the Long-Term R&D

- Low economic growth
- High pressure to financial returns
  - Withdrawing from the uncertain R&D
- Accelerated product cycle
  - Researchers and engineers devote their time to routine works.

# Threats to the Japanese collaborative systems

- Shift from the engineering to science-based industry (e.g. semiconductor)
  - Expanded ranges of integration requires much wider collaborations across firms than before (e.g. IMEC).
  - Increased Importance of scientific knowledge (even for manufacturing).
- Emergence of modular solutions for complex R&D activities

# A New Collaborative Scheme: Industrial Affiliation Program (IIAP) at IMEC

- R&D cooperation formula focused on specific and generic technology areas in the semiconductor industry.
- Various device, equipment, and material makers all over the world get together to develop advanced process and device technologies based on the bilateral contracts.
- Most IPs are co-owned b/w IMEC and partners, so that IMEC's knowledge base is evolved.

# Issues

- Adaptation to the environments: firm-level vs. industry level
  - Can firms still evolve?
  - Entrepreneurs, start-ups vs. spin-off firms
- Establish the wider space for collaborations beyond firm boundaries.
  - Labor mobility for knowledge synthesis
- Emphasis on scientific knowledge and its link to application, engineering, and manufacturing.