

Technology Innovation 1

Management of Technology

10



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- Management of Technology
- Spring 2014
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- D. of Information & Electronic Commerce
- WONKWANG University

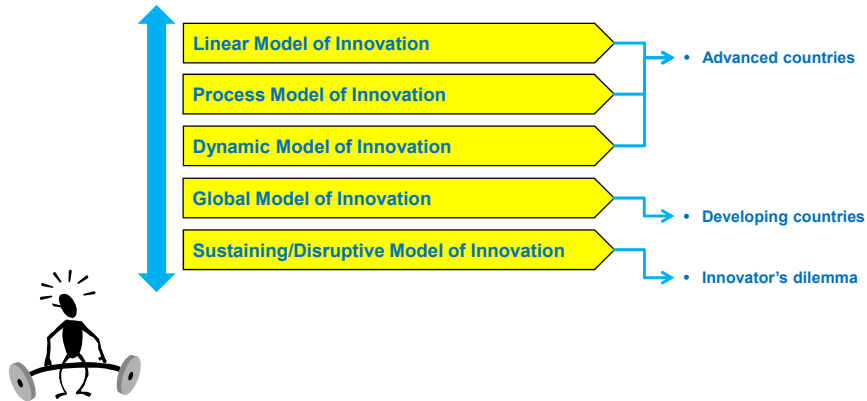
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- 01. Technology Innovation
- 02. Technology Innovation Model

02. Technology Innovation Model

- Technology Innovation Model

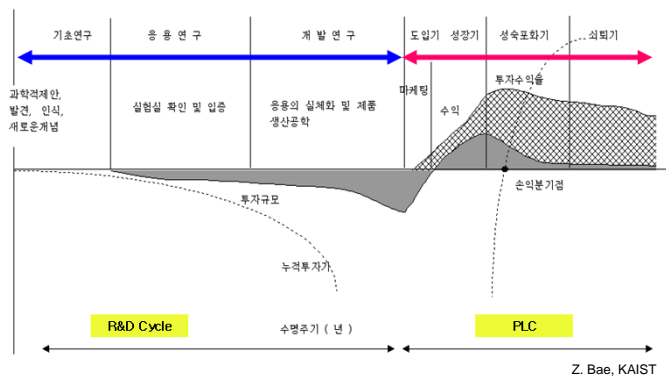
Types of Technology Innovation Model



02. Technology Innovation Model

- Technology Innovation Model
 - Linear Model of Innovation

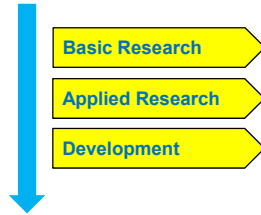
Innovation Cycle = R&D(Research & Development) Cycle → PLC(Product Life Cycle)



02. Technology Innovation Model

- Technology Innovation Model
 - Linear Model of Innovation

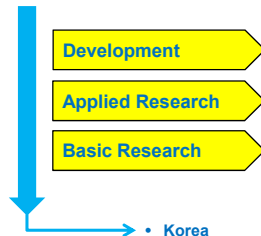
Linear Model: General



02. Technology Innovation Model

- Technology Innovation Model
 - Linear Model of Innovation

Linear Model: General



02. Technology Innovation Model

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 - Linear Model of Innovation

Linear Model: Traditional



02. Technology Innovation Model

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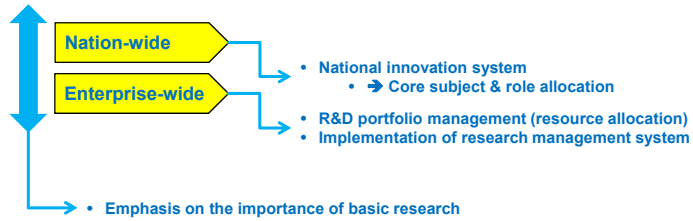
Linear Model: Silicon



02. Technology Innovation Model

- Technology Innovation Model
 - Linear Model of Innovation

Applications of Linear Model



02. Technology Innovation Model

- Technology Innovation Model
 - Linear Model of Innovation

Research and Development



02. Technology Innovation Model

- Technology Innovation Model
 - Linear Model of Innovation

Research and Development

구분	연구 (R) - 기초연구/응용연구	개발 (D)
1) 특성	비정형적 활동 (문제 설정/해결)	주로 비정형적 활동 (정형적 문제해결활동도 다수 포함)
2) 목적	새로운 지식(가치)의 창조	지식가치를 사업가치로 변환
3) 대상	특정 제품을 전제로 하지 않음	특정 제품/공정/프로그램 개발
4) 협력방식	비공식적 (Informal)	공식적 (Formal)
5) 프로세스	불확실성을 점차 제거해 가는 시행 착오 프로세스	[목표달성을 위한 기획] → [실험/개발] → [평가/실용화] 프로세스
6) 평가기준	정성적, 주관적	정량적/정성적, 객관적/주관적
7) Risk 관점	과학적/기술적 리스크 감소	투자회수에 역점 (기술적/사업적 Risk 관리)
8) 개인자유도	개인의 호기심과 자율에 의한 창조	목표/진도/예산 관리, 착수 및 종료 타이밍, 팀워크 중요
9) 활동 주체	과학자 (Scientist)	기술자 (Engineer)
10) 성과	보이지 않는 성과, 암묵적 지식, 옵션가치 창출	보이는 성과 (사업화), 명시적 지식, 수익 창출

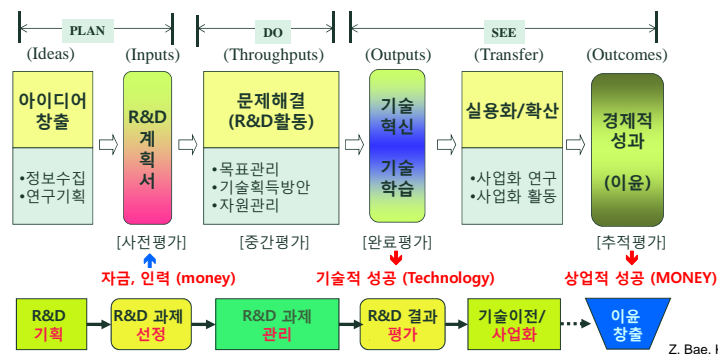
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02. Technology Innovation Model

- Technology Innovation Model
 - Process Model of Innovation

Plan-Do-See Process

= Idea Generation → Problem Solving → Implementation & Diffusion

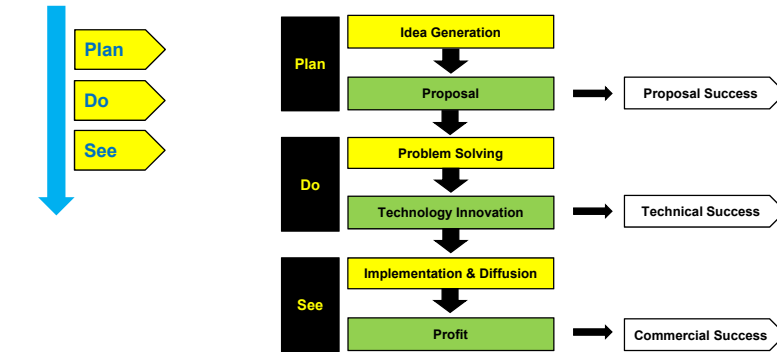


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02. Technology Innovation Model

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Process Model

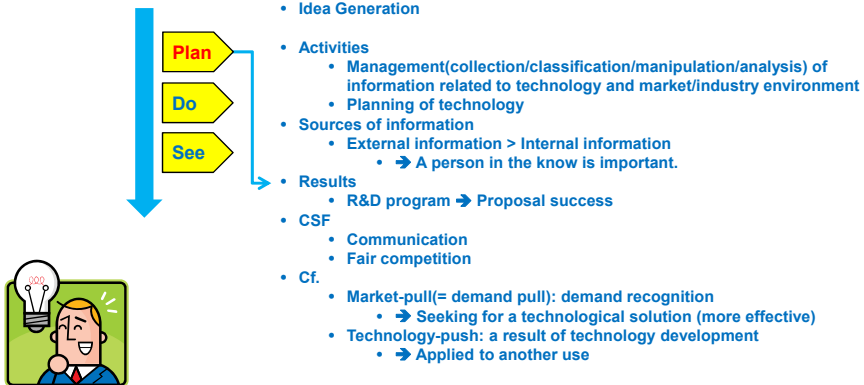


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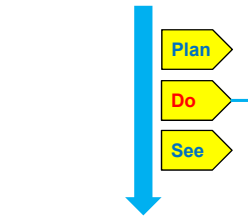
Process Model



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Process Model

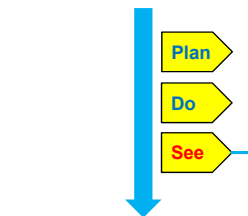


- Problem Solving
- Activities
 - Setting-up definite objectives for each phase/task
 - Seeking for alternative solutions
- Sources of information
- External information < Internal information
 - → An information center or information management is important.
 - Information search should be progressed in the order of easy of access.
 - Easily accessible data (memory, documents) → The 2nd data (publications) → The 1st data (direct research)
- Results
 - Technology Innovation/learning technical success
- CSF
 - Technical factors (complexity of innovation)
 - Passion of innovators
 - Government supports
- Cf.
 - PM(project management)
 - MBO(management by objectives) → Result
 - TM(time management) → Progress
 - CM(cost management) → Budgets, government supports

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 - Process Model of Innovation

Process Model

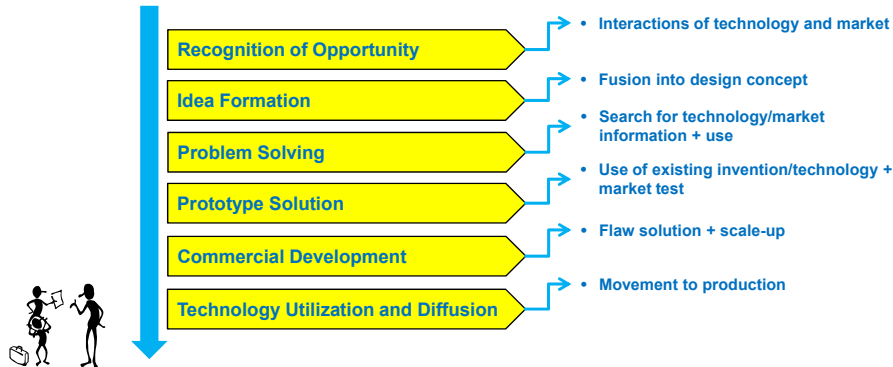


- Implementation and Diffusion
- Activities
 - Commercialization research and Commercialization activity
 - The connection with related department is important.
 - Engineering and market shipment are included.
- Sources of information
 - Both of internal information and external information are important.
- Results
 - Profit → Commercial success
- CSF
 - Relative advantage of performance/price

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 - Process Model of Innovation

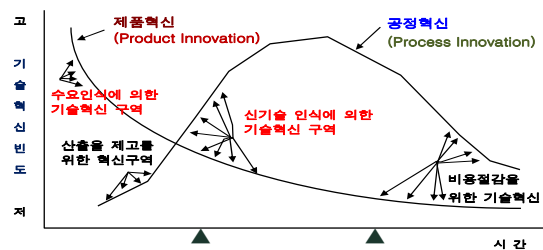
Process Model (Roberts)



02. Technology Innovation Model

- Technology Innovation Model
 - Dynamic Model of Innovation

FTS Process = Fluid → Transition → Specific



□ 단계 :	유동기 (Fluid)	→	과도기 (Transition)	→	경화기 (Specific)
■ 제품혁신 :	성능극대화		판매극대화		비용극소화
■ 공정혁신 :	비조정기		단편적 자동화기		체계적 자동화기
■ 단계특성 :	제품혁신중심		공정혁신중심		혁신정체단계

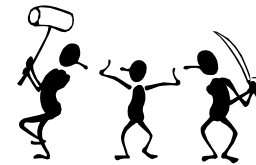
J. M. Utterback and W. J. Abernathy, "A Dynamic Model of Process and Product Innovation," Omega, Vol.3, 1975.

02. Technology Innovation Model

- Technology Innovation Model
 - Dynamic Model of Innovation

Dynamic Model

	Stage 1	Stage 2	Stage 3
Stage	Fluid	Transition	Specific
Innovation	Product Innovation	Process Innovation	Innovation Stagnancy
Product Innovation	Performance maximization	Sales maximization	Cost minimization
Process Innovation	No-automation	Partial-automation	Full-automation



02. Technology Innovation Model

- Technology Innovation Model
 - Dynamic Model of Innovation

Dynamic Model

Stages	1(Fluid)	2(Transition)	3(Specific)
Product Technology Innovation	<ul style="list-style-type: none"> · 제품성능의 극대화 강조 · 사용자/시장수요에 의해 기술혁신 발생 · 창의적이고 급진적임 · 기술혁신 빈도가 아주 높음 · 기술혁신은 주로 제품 혁신임. 	경제조건 (F) (S) (T) 과도적 상황	<ul style="list-style-type: none"> · 비용의 절감을 강조 · 혁신은 제품/공정 모두 점진적임. · 창의적/급진적 혁신은 거의 발생하지 않고, 외부에서 발생 · 기술혁신에 대한 자극은 파괴적인 외부의 힘에 의해서 생김
Production Process Status	<ul style="list-style-type: none"> · 생산공정/조직은 융통성이 있으나 비효율 · 규모나 크기는 작음 · 범용설비나 기기가 사용됨 · 제품은 자주 변경되며 고객의 요구에 따라 설계됨 	변환의 정상적 방향 →→→	<ul style="list-style-type: none"> · 생산공정은 효율적/체계적/자본집약적 · 공정변화에 따른 비용이 아주 높음 · 시장점유율, 설비규모가 아주 큼 · 전용설비와 기기가 사용됨 · 제품의 다양화가 거의 없게 됨

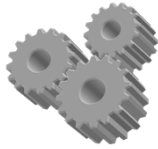


02. Technology Innovation Model

- Technology Innovation Model
 - Dynamic Model of Innovation

Dynamic Model

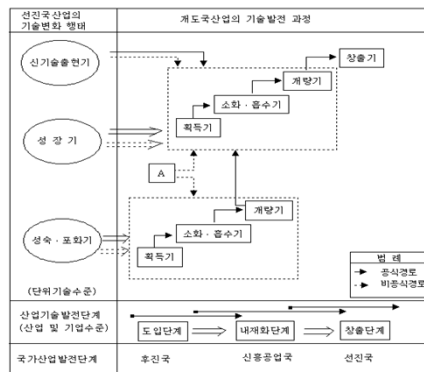
- There is a relation between dynamic model and marketing strategy.
- Continuous process innovation and technology accumulation are important.
 - Continuous process innovation is needed after production shipment.
 - → Technology learning is important.
 - Ex.
 - Car cost by process innovation: \$5,000 → \$900
- Post-dynamic model
 - Dematurity
 - Industrial renaissance: stage III → Stage I



02. Technology Innovation Model

- Technology Innovation Model
 - Global Model of Innovation

Global-Perspective Model = Initiation → Internalization → Generation

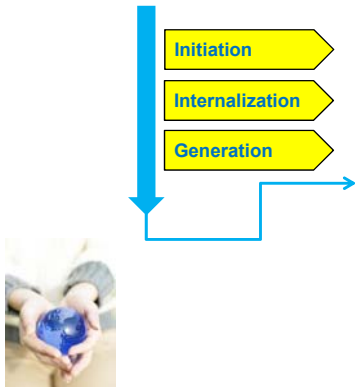


- 1) 관련기술숙련기(A)는 고위/중위 권위기술. 다른 국이 뒤에서 축적된 경험의 열매이 이루어짐.
- 2) 기술발전단계(도입단계 → 내재화단계 → 창조 단계)의 포석단위는 산업 및 기업이며, 혁신기 → 소화-흡수기 → 기업기술발전 단계 포석단위는 기업 단위기술임.
- 3) 실현은 급속경로, 평선은 경로를 의미하며, 선의 두께는 각 경로의 발육원도로 나타냄. B. Lee & Choi, 1988

02. Technology Innovation Model

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 - Global Model of Innovation

Global Model



- The model can analyze the pattern of technological development multi-dimensionally.
- Informal imitation(technology transfer) is important in Technology Innovation.
- It is needed to connect advanced countries with developing countries from the global perspective.
 - The pattern of technological development in developing countries is dynamic.
 - The pattern of technological development in developing countries has the opposite direction of that in advanced countries.

02. Technology Innovation Model

- Technology Innovation Model
 - Global Model of Innovation

Pattern of Technological Development in Developing Countries

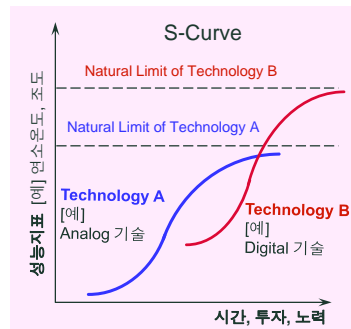
-
- The diagram shows the title 'Pattern of Technological Development in Developing Countries' with a blue arrow pointing to the right, leading to a list of four bullet points.
- Imitative learning type
 - Technological self-reliance type
 - Technology dependency type
 - Laissez-faire type



02. Technology Innovation Model

- Technology Innovation Model
 - Sustaining/Disruptive Model of Innovation

S Curve (Harvard Model)



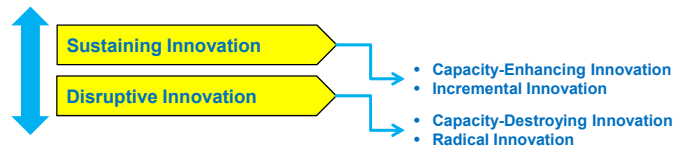
- **존속적 혁신 (Sustaining Innovation)**
 - Capacity-Enhancing Innovation
 - Incremental Innovation
- **파괴적 혁신 (Disruptive Innovation)**
 - Capacity-Destroying Innovation
 - Radical Innovation

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02. Technology Innovation Model

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 - Sustaining/Disruptive Model of Innovation

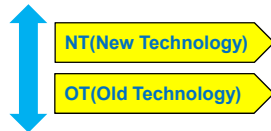
Sustaining/Disruptive Innovation



02. Technology Innovation Model

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 - Sustaining/Disruptive Model of Innovation

New vs. Old Technology



- NT could substitute OT.
 - When NT overcomes limits of OT
 - When limits of NT is the same as that of OT but performance advancement of NT is faster than that of OT
- Reasons of OT's weak action against NT
 - Performance of NT is weaker than that of OT in early days.
 - Innovator's dilemma
 - Mentality and confidence of disinvestment in OT



02. Technology Innovation Model

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 - Sustaining/Disruptive Model of Innovation

Notion of Sustaining/Disruptive Model

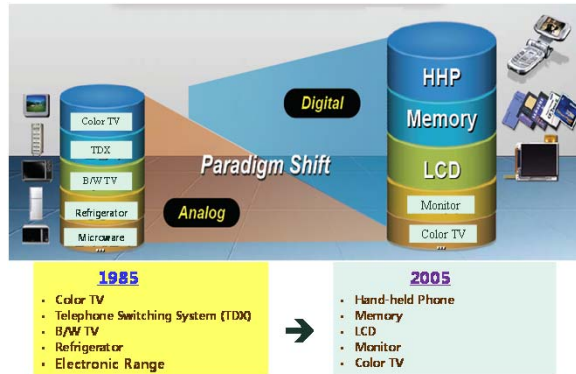
- The development process of technology conforms to s-curve.
 - → NT could substitute OT
- As ROI(returns on investment) of OT decreases, entrepreneurs search for NT.
- Switching cost from OT to NT is high.
 - → Innovator's dilemma



02. Technology Innovation Model

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 - Sustaining/Disruptive Model of Innovation

Ex. SAMSUNG vs. SONY



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02. Technology Innovation Model

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Cf. Disruptive (or Collapsing) Model

