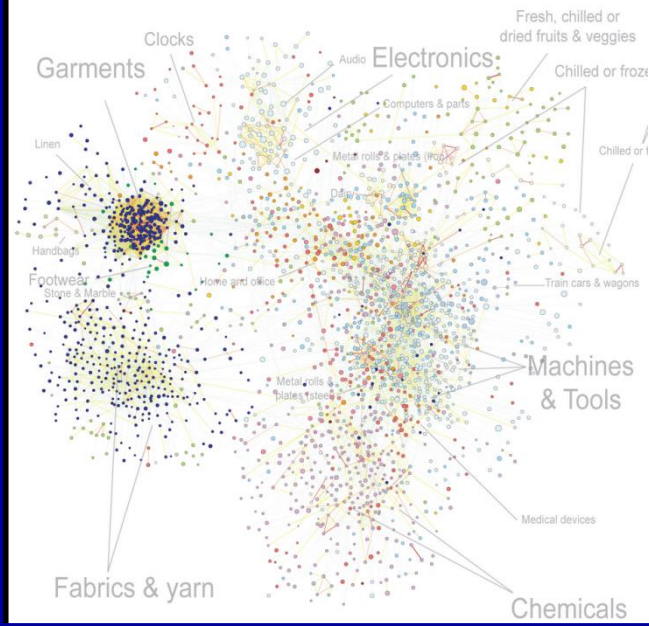


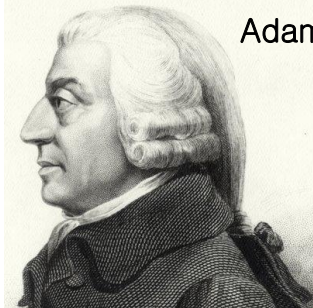
Classics of Innovation Studies

2023. 9. 9.

Euseok Kim



Long time ago.....

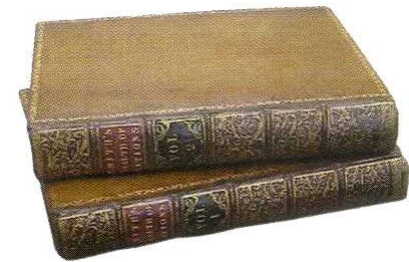


Adam Smith, 1723. 6. 5. ~ 1790. 7. 17.



An Inquiry into the nature and Causes of the Wealth of Nations

1776.3.9



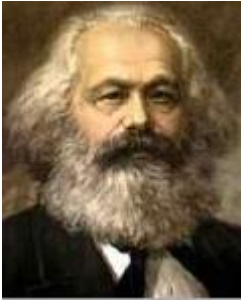
1776.7.4.



The Declaration of Independence

Long time ago.....

Predestination ?



Karl Heinrich Marx

독일

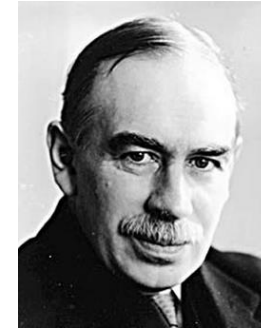
1818.5.5~**1883**.3.14



Joseph Alois Schumpeter

오스트리아

1883.2.8~1950.1.8



John Maynard Keynes

영국

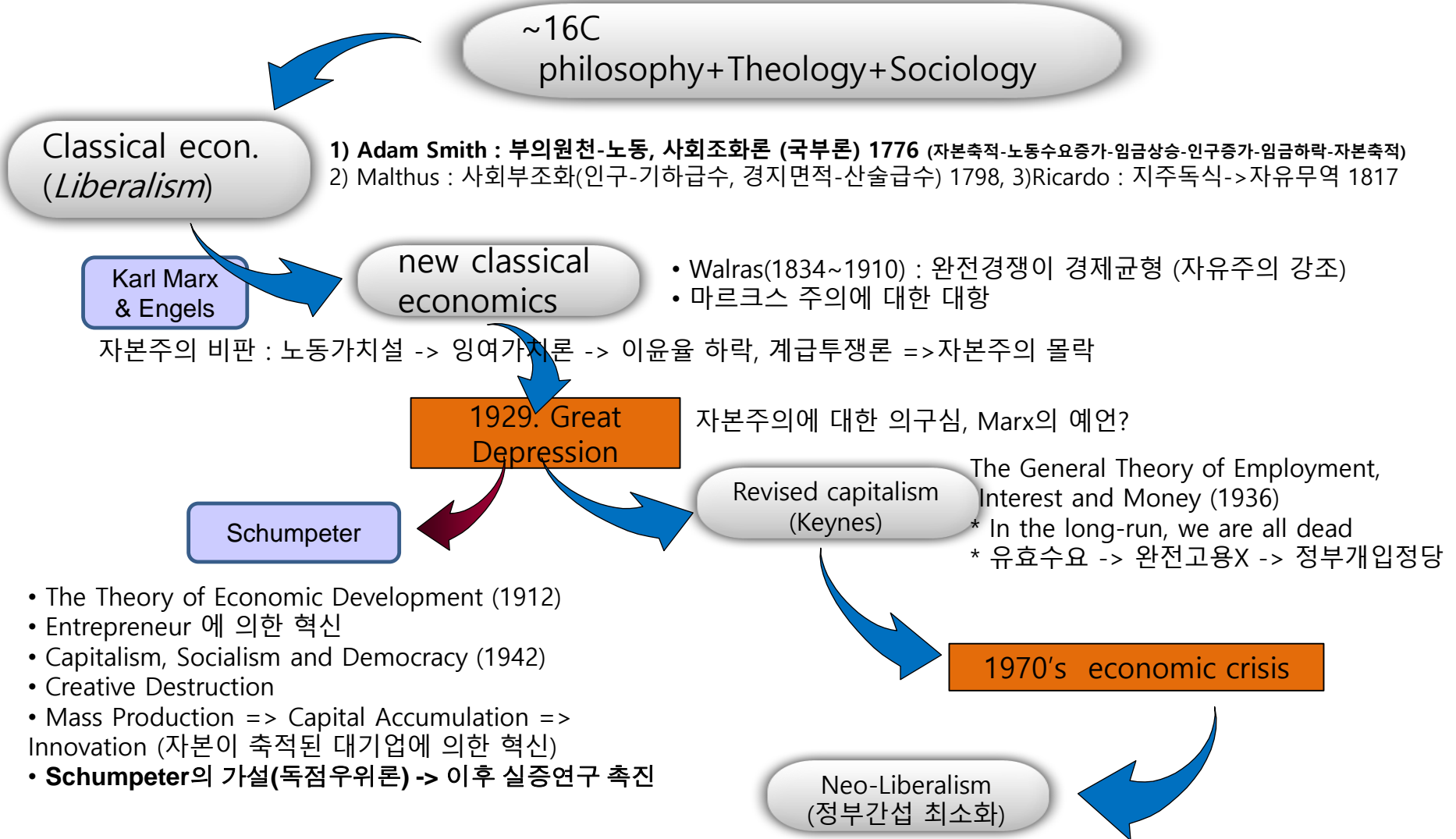
1883.6.5~1946.4.21

Creative destruction

Schumpeter, Mark 1. Theorie der wirtschaftlichen Entwicklung (1912)
<The Theory of Economic Development> Entrepreneur

Schumpeter, Mark 2. Capitalism, Socialism and Democracy (1942)
<Creative Destruction>

History of the Economics



History of Innovation studies

Schumpeter

~1970
생산성 & 슉페터 가설 실증

- Abramovitz, Salter : 기술&생산성
- Solow : 생산함수내의 잔여분석
- Nelson, Arrow : 기업 이윤관련 혁신연구
- Pavitt : 기술이전 비용
- Marshall, Meckling : 거시적 관점, 혁신 인프라

경제이슈

~1980
혁신과 과학&기술

- Rosenberg : 과학,기술 관계, 동태적 관점
- Utterback, Abernathy : 기술 궤적, 패턴
- Mowery, Rosenberg : 선형모델 -> 혼합모델
- Myers, Marquis, Freeman, Soete, Clark : Market pull, Tech push 및 이에 대한 실증분석

정책이슈

시스템 관점

~1990
제도, 혁신 & 다양성

- Nelson, Winter : 진화경제학 관점의 혁신
- Winter, Vincenti, Senker : 기술의 성격
- Hippel, Rothwell : 사용자 & 혁신
- Lundvall : NIS
- Pavitt : 기술특수성

기업관점

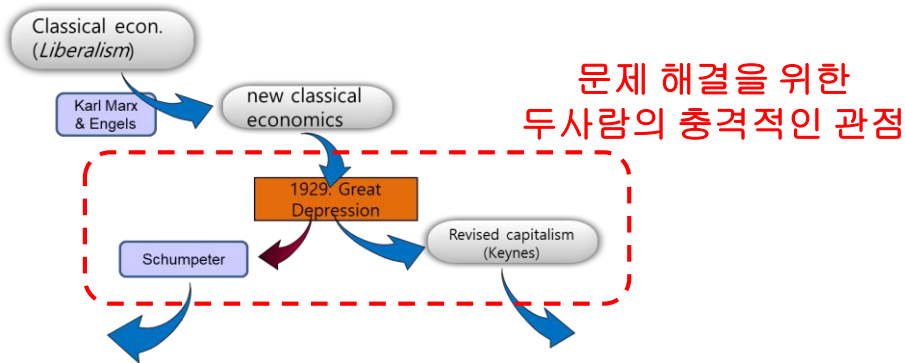
~2000
기업과 혁신

- Clark, Fujimoto, Womack : 국가간비교
- Porter : 기업전략
- Prehalad, Hamel : 기업핵심역량
- Nelson, Winter, Penrose, Alberathy : 기술 경로의존, 기술 누적성, 제도

현상분석

~현재
Open, 융합, Disruptive, 녹색

The origin of the Innovation



대공황의 원인

수요가 작으면 생산수준은 낮아짐
=> 불황은 '수요부족'이 원인

Dynamic을 잘 보아야하는데 그 중심은
언제나 “생산자”, 생산자인 기업의 혁신
이 자본주의 경제 발전의 핵심

✓ 조지프 슘페터

- 움직임이나 변화가 없는 “정태적 자본주의 경제”란 존재하지 않음
- **완전 경쟁은 기본적으로 불가능한 명제**
- 자본주의 본질은 기업가에 의한 혁신을 바탕으로 한 **Dynamism**
- 기업의 ‘혁신’ 이 핵심 : 신결합과 창조적 파괴

✓ 존 메이너드 케인스

- “정부의 간섭이 없는 “자유시장(완전경쟁시장)” 같은 것은 없었다”
- “자본주의 사상은 그 자체로 돈과 부채에 대한 규제처럼 정부의 적극적인 경제 관리가 필요“
- 고전경제학의 문제점 1) 희소성 강조, 2)시장의 자정작용, 3) 비자발적인 실업은 불가능하다는 생각
- 경제 침체가 정말 심각할 때는 정부가 자체적인 공공사업 프로젝트를 주도해 국내 투자를 촉진해야 함
- 돈은 지역 상인들이 편의성을 높이기 위해 개발한 관습이 아니라 문자, 도량형 등 국가가 만든 다른 발명품과 함께 등장한 정교한 통치도구(정치적인 수단) 임

The origin of the Innovation

✓ New Combination

생산은 여러 가지 사물과 힘을 “결합” 하는 것이며 새로운 결합(New Combination) 에서 성장이 이루어짐
새로운 결합은 비연속적으로만 나타날 수 있음,
“마차를 아무리 연결해도 철도가 되지 않는다”

- 신결합의 5가지 경우
 - 1) 새로운 상품의 창출
 - 2) 새로운 생산방법의 개발
 - 3) 새로운 시장의 개척
 - 4) 새로운 원자재 공급원의 발굴
 - 5) 새로운 조직의 실현
- 신결합의 직접적인 주체는 기업 또는 기업가
- 기업가는 신결합을 수행하는 사람
- 기업가가 신결합을 수행하는 동기 (경제적 이득이 아님)
 - 1) 사적제국, 자신의 왕조를 건설하고자 하는 몽상과 의지
 - 2) 승리하고자 하는 의지, 성공하고자 하는 의욕
 - 3) 창조적 기쁨

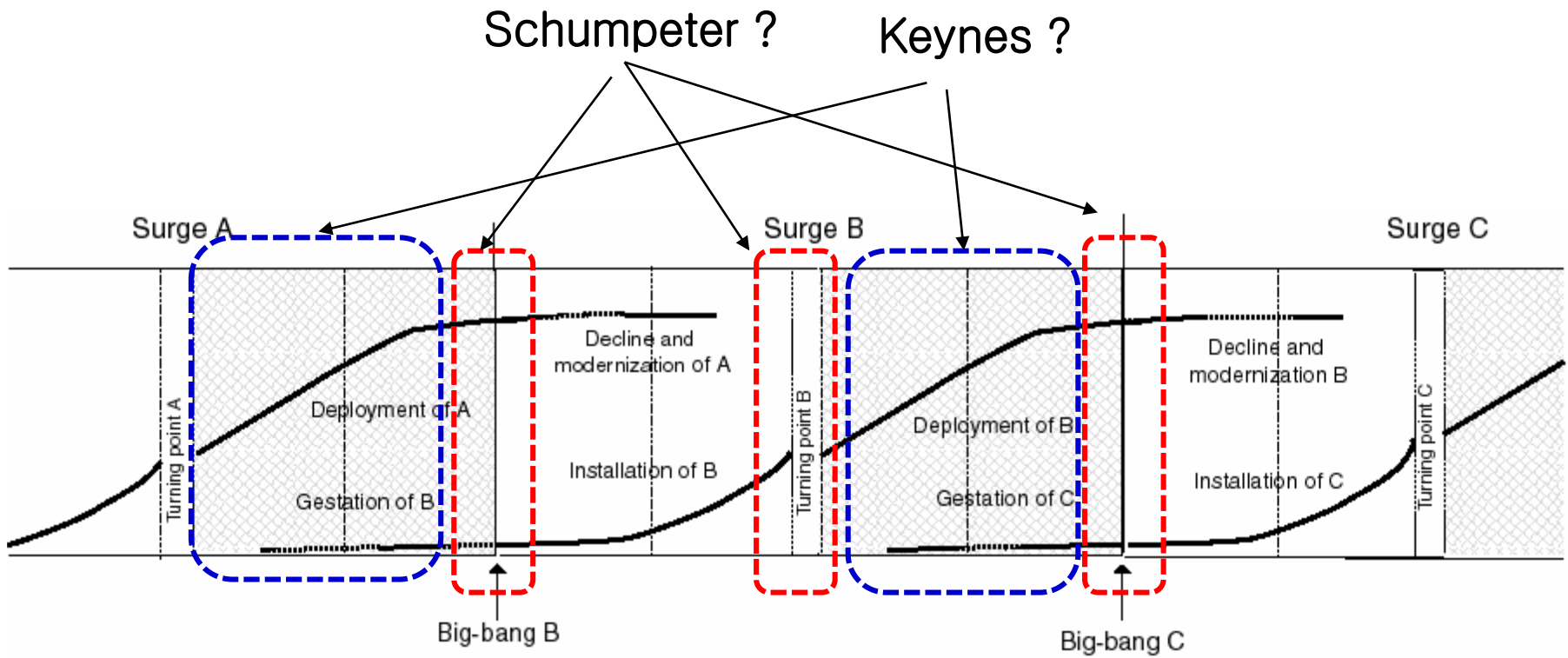
Schumpeter, J. A. (1911). The Theory of Economic Development: An Inquiry Into Profits, Capital, Credit, Interest, and the Business Cycle

✓ Creative Destruction

부단히 낡은 것을 파괴하고 새로운 것을 창조하여 끊임없이 내부에서 경제구조를 혁명화하는 것
the same process of industrial mutation that incessantly revolutionizes the economic structure from within, incessantly destroying the old one, incessantly creating a new one.

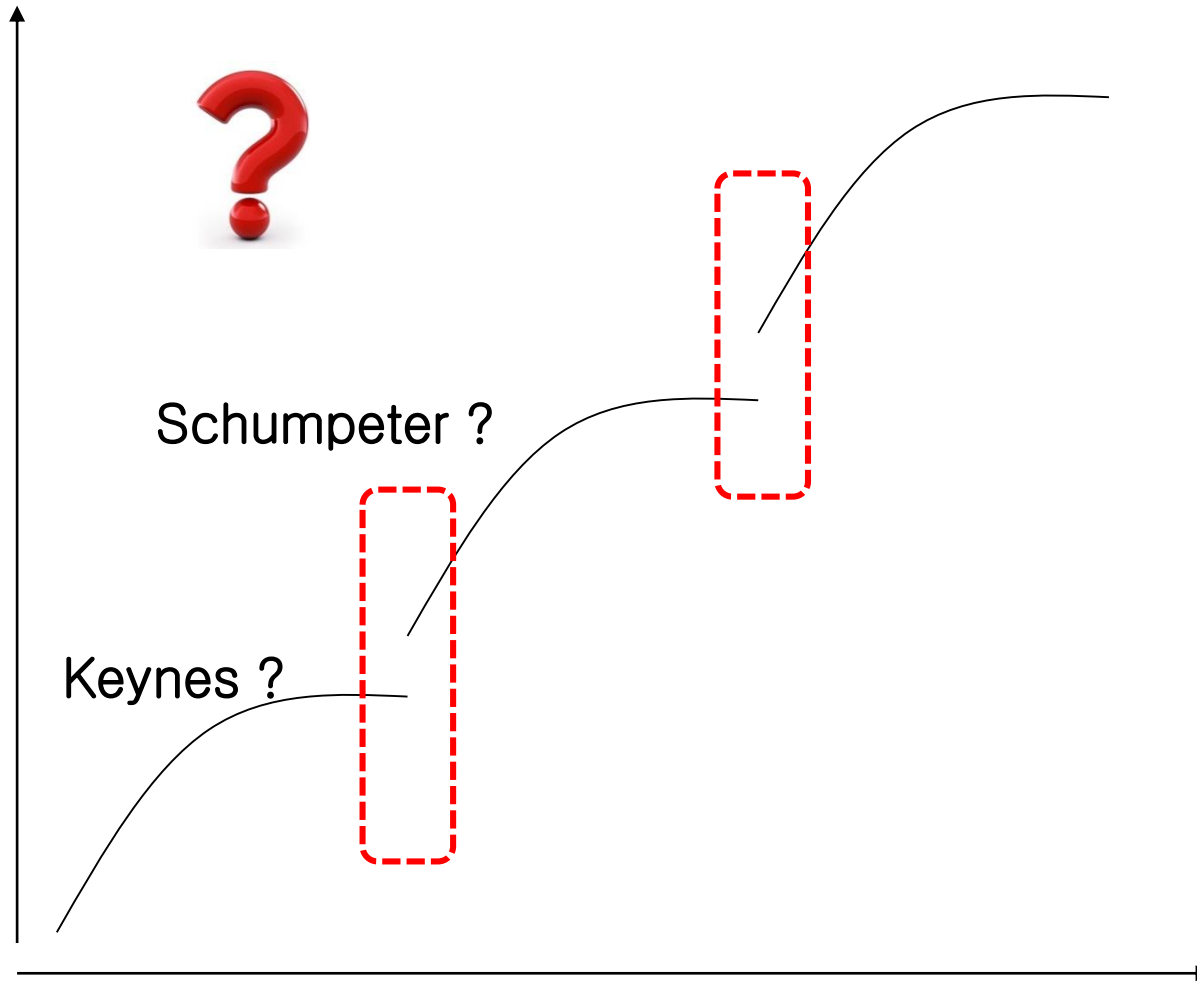
Schumpeter, J. A. (1942). Capitalism, Socialism, and Democracy. University of Illinois at Urbana-Champaign's Academy for Entrepreneurial Leadership Historical Research Reference in Entrepreneurship.-

특히, 전환기에 유용한 접근



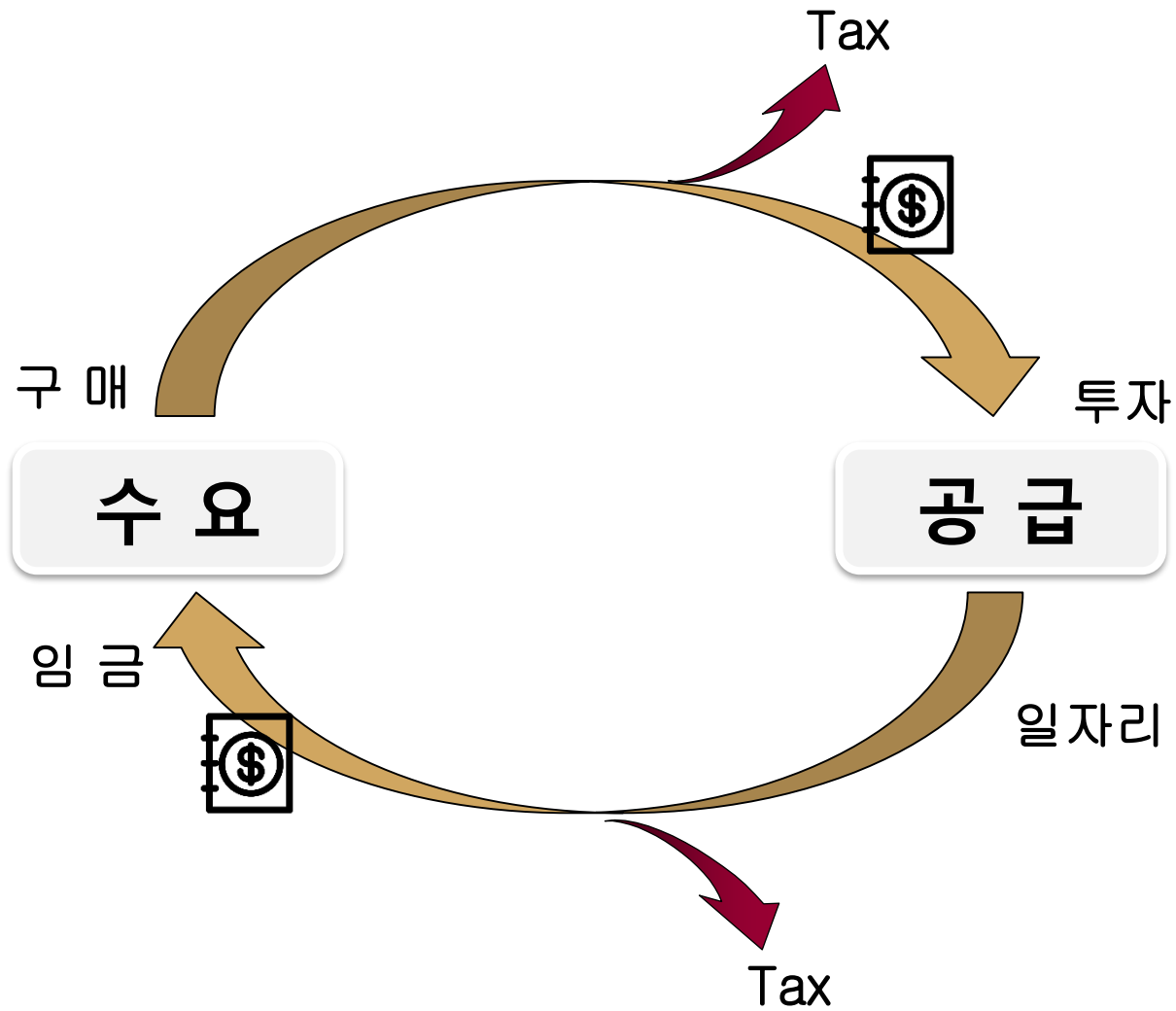
Perez, C. (2011). Finance and technical change: a long-term view. *African Journal of Science, Technology, Innovation and Development*, 3(1), 10–35.

특히, 전환기에 유용한 접근



케인즈

숨페터



✓ Part II Can Capitalism Survive? Chapter 8 Monopolistic Practices

- 완전 경쟁은 기본적으로 불가능한 명제 (또한 완전경쟁 생태계에 있다고 하더라도 비효율적 경쟁유발)
- 새로운 경제진입자는 새로운 기술 혹은 경쟁적 압박을 통해 질적, 양적 총 생산량을 증가시킴. 그러나 창조적 파괴과정의 특징인 급격한 변화로 인한 대규모 손실 => 보완적 보호막 필요 => 전유성 필요성 (appropriability)
- 장기적 가격경직성의 사례는 없다. 가격은 기술진보에 스스로 적응해, 그에 호응하여 현저하게 하락한다
- 순수한 장기독점은 매우 희박한 경우 -> 단기적으로 독점이 일반적
- 독점상태는 기업가에게 강력한 자극제가 되며 장기계획을 세우도록 하는 동기가 됨
- 대기업은 경제 발전의 강력한 엔진이며, 장기적으로 총 생산량 확대에 기여 (독점 기업의 가격 결정-시장지배-은 끊임없는 차별화 성공의 결과일 수 있음, 혁신가에 대한 보상차원)
- 정부는 완전경쟁을 전제로 규제하고 대기업을 통제하려 해서는 안됨

Schumpeter, J. A. (1942). Capitalism, Socialism, and Democracy. University of Illinois at Urbana-Champaign's Academy for Entrepreneurial Leadership Historical Research Reference in Entrepreneurship.-

Schumpeterian hypothesis

- ✓ Schumpeter 이전 : 독점은 완전경쟁시장 관점에서는 " 악 "
- ✓ Schumpeter 논리 : 어느 순간도 완전경쟁시장 상태는 없음
→ 불완전 경쟁상태에서 혁신하기 위해서는 독점 상태와 장점을 인정해야 함

Schumpeter, J. A. (1942). Capitalism, Socialism, and Democracy. University of Illinois at Urbana-Champaign's Academy for Entrepreneurial Leadership Historical Research Reference in Entrepreneurship.-

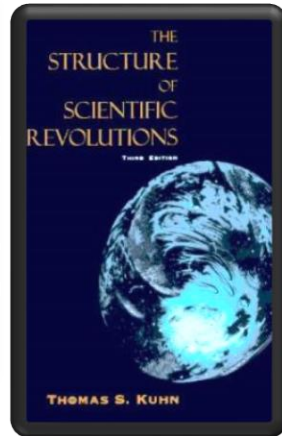
Schumpeterian hypothesis

- **Shumpeter Hypothesis (1942) : market power and large firms stimulate innovations**
 - ① **positive relationship between Monopoly firm and innovation,**
 - ② **Technological innovation need large firm's money and market power**

Schumpeterian hypothesis

연구자	내용	결과
Scherer(1965)	연구개발 집약도(종속변수)- 기업규모(독립변수)	역 U 관계
Kamien & Schwartz(1982)	연구개발 집약도(종속변수)- 기업규모(독립변수)	연관성이 약함
Soete(1979), Freeman(1982), Rothwell & Zegveld(1982)	연구개발 집약도(종속변수)- 기업규모(독립변수)	연관성이 약함
Pavitt(1984)	기업규모, 전유능력, 사업다각화가 기술혁신에 미치는 영향	기업규모 - insignificant 기술 및 수요의 특성 - significant
Cohen(1987)	기업규모, 전유능력, 기술적기회가 기술혁신에 미치는 영향	기업규모 - insignificant 전유능력, 기술적 기회 - significant
Cohen & Klepper(1996)	기업규모, 경영의 단위가 기술혁신에 미치는 영향	기업규모 - insignificant 경영의 단위 - significant
Acs & Audretsch (1987)	혁신의건수-혁신활동 지표	* 대기업: 자본집약도, 시장집중도, 광고비 집약도가 높은산업에서 혁신가능성 high * 중소기업: 인적자본이 중요한 역할 * 시장집중도와 (-) 관계
Geroski (1990)	잠재적인 경쟁압력의 상승과 기업의 시장지배력 약화가 혁신을 촉진	
Geroski & Pomoroy(1990)	혁신-시장의 경쟁	혁신이 기업의 시장지배력을 완화시킴
Bhattacharya & Bloch(2004)	기술적 특성에 따라 산업을 구분하여 혁신활동의 결정요인분석	* High tech : 기업규모, 시장집중도, 수출, 연구개발 집약도 - 기술혁신 비례 * Low tech: 기업규모, 수익성 -기술혁신비례
Lunn(1986)	제품,공정 혁신분류 혁신건수 조사	*공정혁신-시장집중도 significant *제품혁신-시장집중도 insignificant
Koeller(1995)	시장구조-혁신 연립방정식 해석	*대기업 : 혁신활동-시장집중도 비례 ->대기업의 높은 시장지배력은 중소기업 혁신활동 저해
Sutton(1996)	연구개발 집약도와 시장집중도의 주요 결정요인으로 산업특성을 지닌 두 개의 외생변수 제시(1. 기술특성인 R&D 비용함수의 탄력성, 2. 수요특성인 수평적 제품다각화)	기술적기회가 높은 산업에서는 제품개선을 위한 연구개발비 지출과 신제품을 개발하기 위한 연구개발비 지출사이에 trade-off 관계가 존재, 제품개선을 위한 연구개발 활동은 상대적으로 높은 시장집중도를 유인하지만 신제품개발을 위한 연구개발 활동은 상대적으로 낮은 시장집중도를 유인

Paradigm



Thomas S. Kuhn

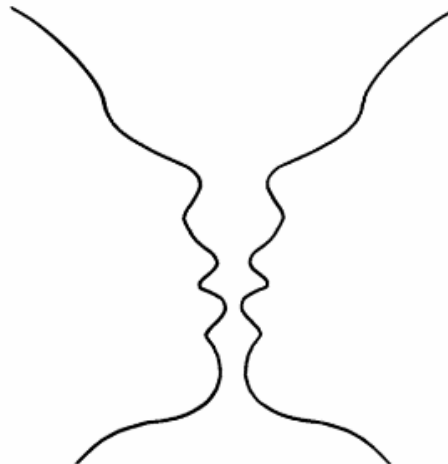
July 18, 1922 ~ June 17, 1996

패러다임의 변화 (Thomas kuhn)

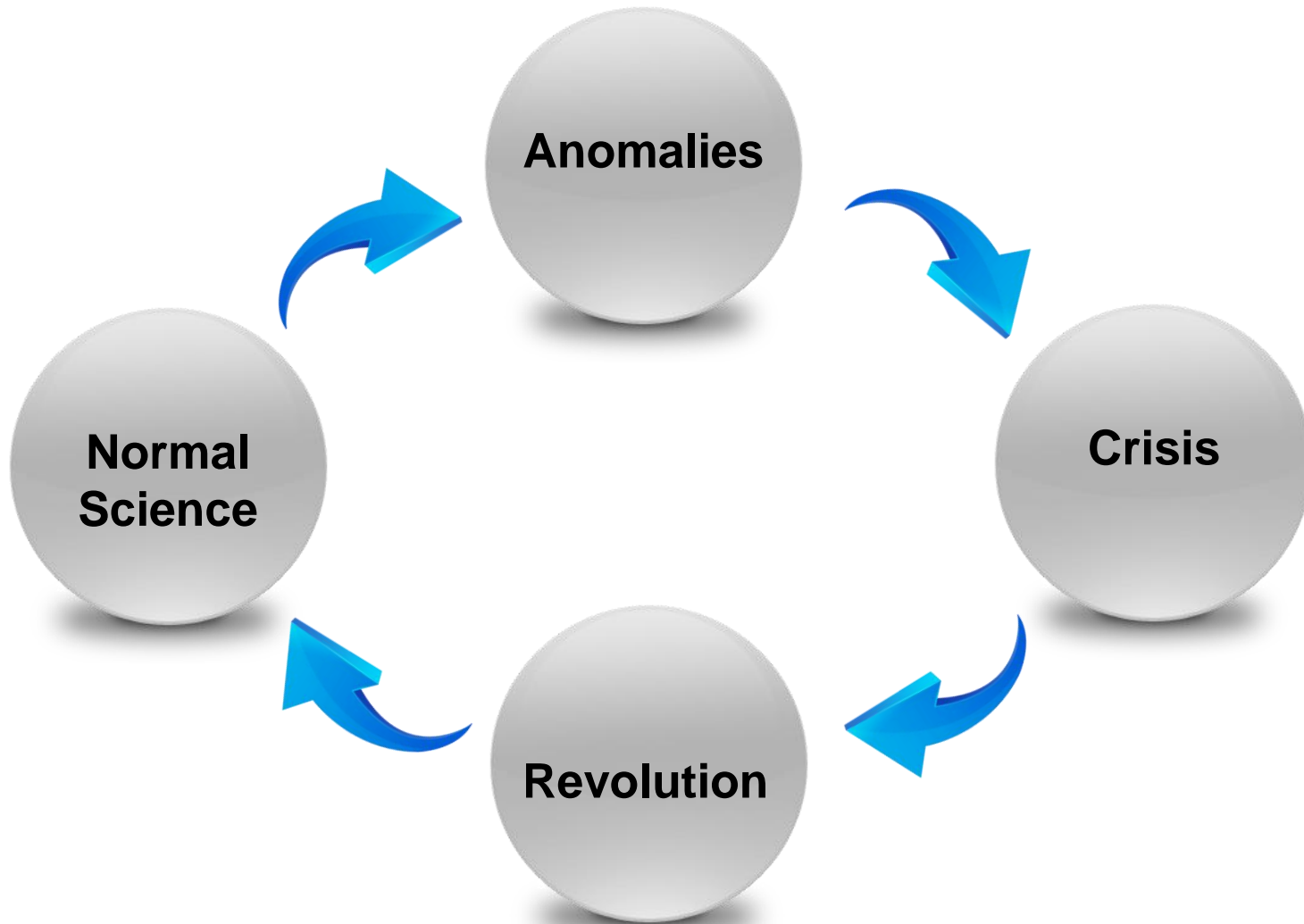
믿음, 세계관을 포함하는 넓은 의미의 형이상학적 변화
정상과학(교과서)의 변경

"Though the world does not change with a change of paradigm, the scientist afterwards works in a different world."

The Structure of Scientific Revolutions, p. 121.



Paradigm shift



Paradigm shift

The Ptolemaic Universe

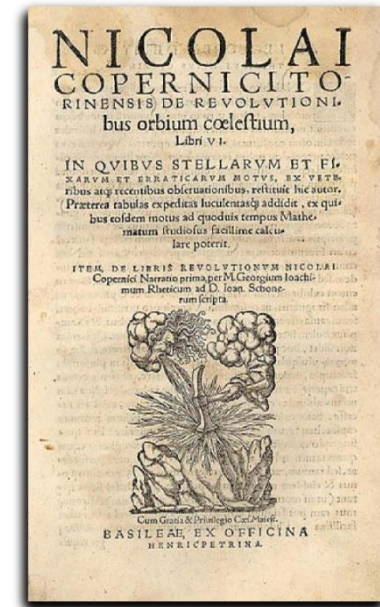


Klaudios Ptolemaios



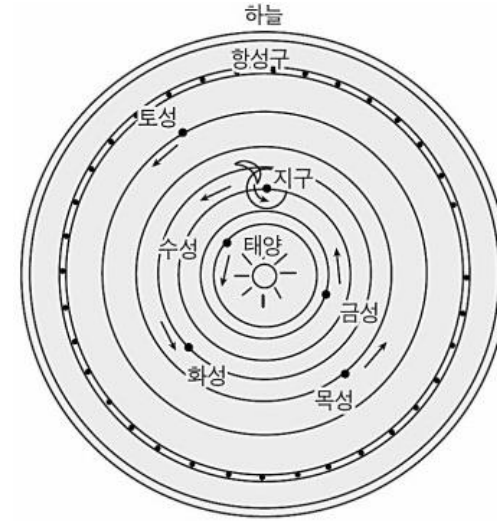
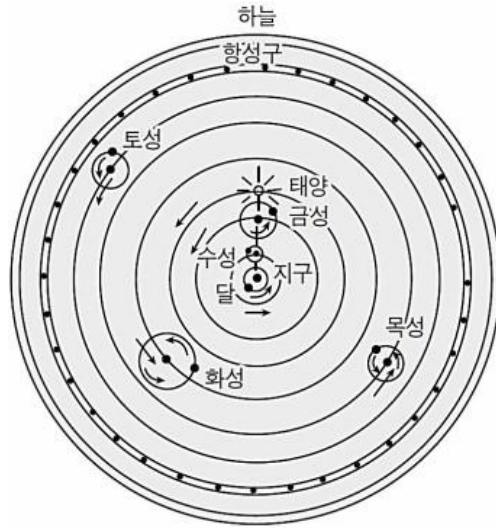
Nicholas Copernicus

**Paradigm
Shift**



On the Revolutions of
the Celestial Spheres (1543)

Paradigm shift



$$F=ma$$



$$F=a/m$$

General Purpose Technology

범용기술 (General Purpose Technology)

새로운 세대로의 기술적, 산업적 변화를 불러오는 혁신기술들의 최상단에 위치하는 기술로, 한 세대 산업혁명 안에서 많은 기술들의 뿌리로 인식될 수 있는 기술

산업혁명은 일반적으로
범용기술의 출현과 함께 시작되어 당시 산업구조의 혁신적 변화를 일으킴

1. 산업간 확산성 (Pervasiveness)
2. 개선 가능성 (Improvement)
3. 혁신 촉진성 (Innovation Spawning)



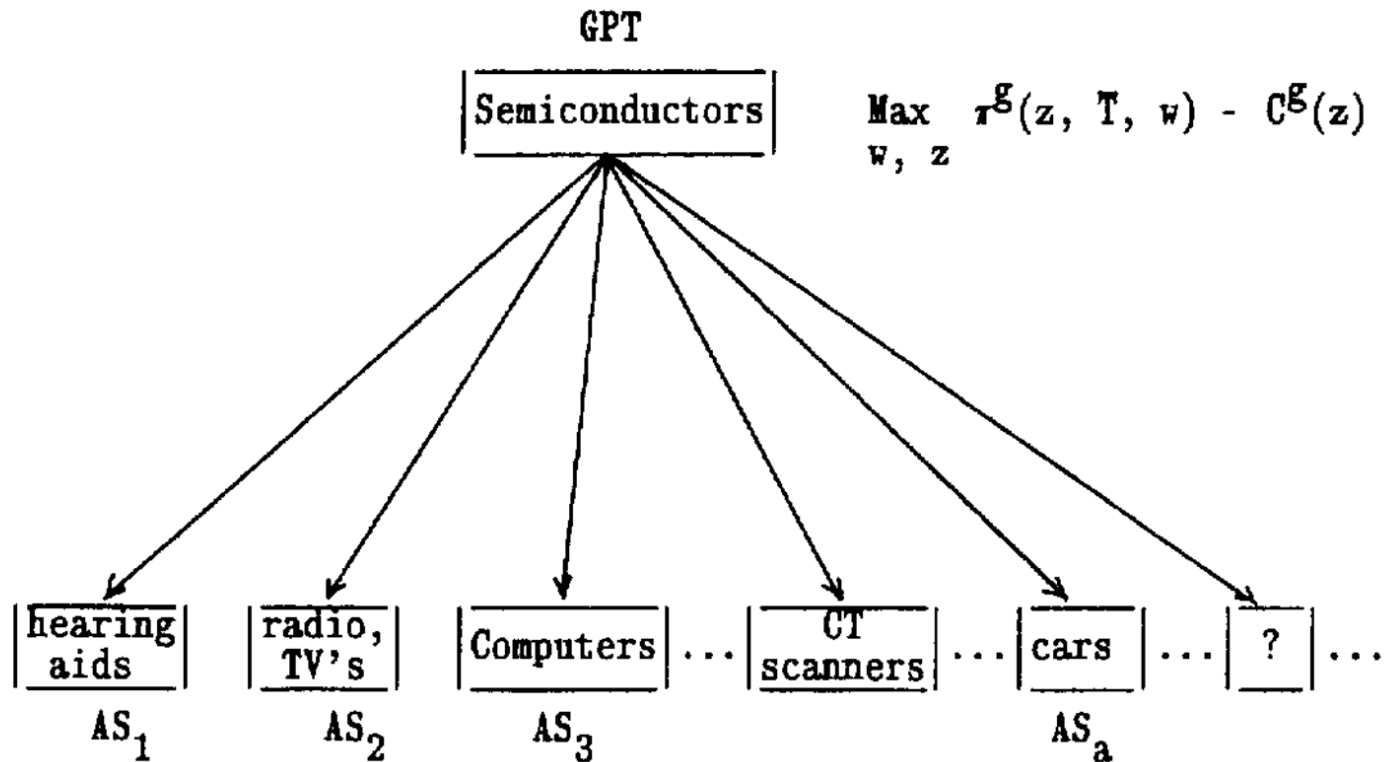
**Enabling
Technology**

General Purpose Technology

구 분	범용기술	새로운 인프라
1차. '산업혁명' 영국(1771~)	기계류, 면 산업 기계화	운하, 수로, 유료도로, 수력
2차. 증기와 철도 영국, 미국(1829~)	증기엔진, 철광 채광, 철도	철도, 우편서비스, 전신, 항구
3차. 철강, 전기, 중공업 미국(1875~)	철강, 증기기관 철제선, 토목, 전기, 구리 케이블, 캔, 제지	국제 운송(운하), 철로망, 다리, 터널, 국제전신, 전화, 전기망
4차. 석유, 자동차, 대량생산 미국, 유럽(1908~)	대량생산 시스템 자동차, 석유화학, 내연기관, 전자기기, 냉동, 냉장 식품	고속도로, 항구, 공항, 송유관, 국제 유무선 아날로그 통신
5차. 정보통신 미국, 유럽, 아시아(1971~)	정보통신, 컴퓨터, 소프트웨어, 제어기기, 생명공학, 신소재	디지털통신, 인터넷, 네트워크망

자료 : Perez(2003)에서 수정

General Purpose Technology

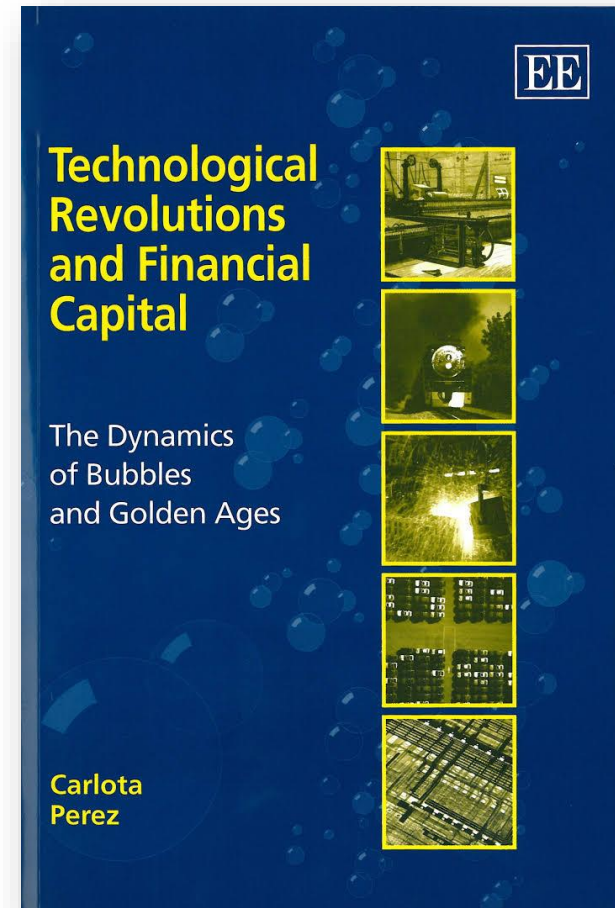


자료 : Bresnahan, T. F., & Trajtenberg, M. (1995). General purpose technologies 'Engines of growth?'. *Journal of econometrics*, 65(1), 83-108.

Lifecycle of Industrial revolution



An honorary research fellow in science and technology policy research at the University of Sussex, UK, an adjunct senior research fellow at INTECH, Maastricht, The Netherlands, and an international consultant and lecturer on changing strategies and technology policy based in Caracas, Venezuela.

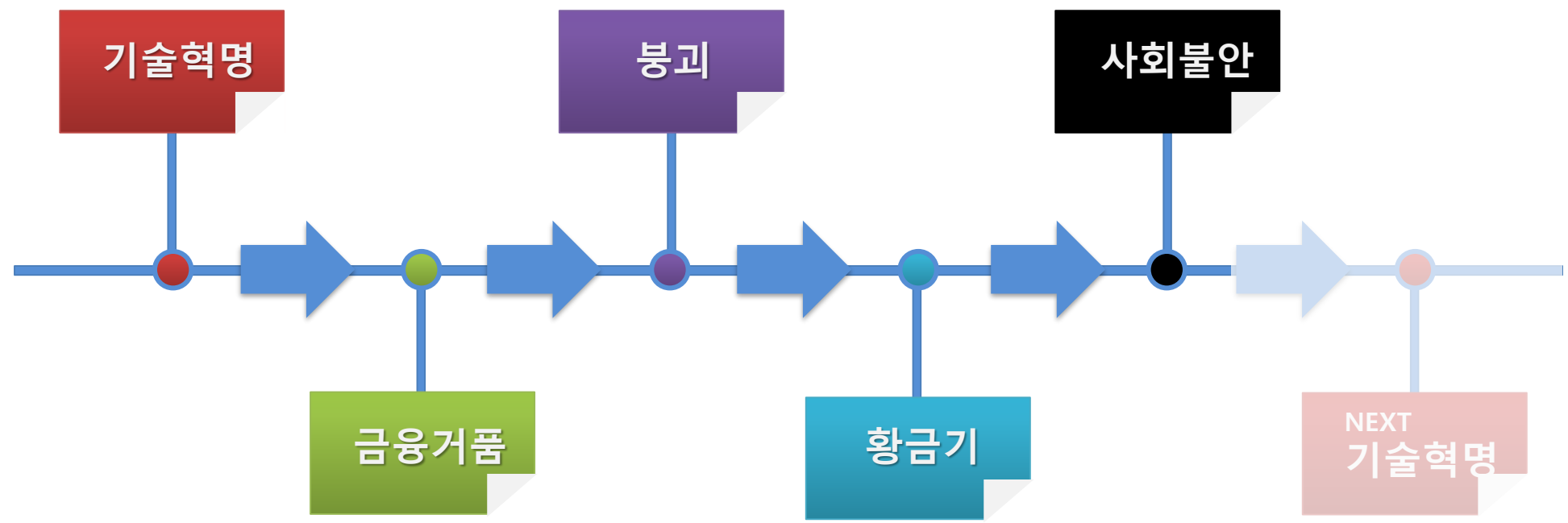


What's next?

		INSTALLATION PERIOD	TURNING POINT	DEPLOYMENT PERIOD
GREAT SURGE		"Gilded Age" Bubbles	Recessions	"Golden Ages"
1 st	1771 The Industrial Revolution Britain	Canal mania	1793-97	Great British leap
2 nd	1829 Age of Steam and Railways Britain	Railway mania	1848-50	The Victorian Boom
3 rd	1875 Age of Steel and heavy Engineering Britain / USA Germany	London funded global market infrastructure build-up (Argentina, Australia, USA)	1890-95	Belle Époque (Europe) "Progressive Era" (USA)
4 th	1908 Age of Oil, Autos and Mass Production / USA	The roaring twenties Autos, housing, radio, aviation, electricity	Europe 1929-33 USA 1929-43	Post-war Golden age
5 th	1971 The ICT Revolution USA	Emerging markets dotcom and Internet mania financial casino	2001 -???	Sustainable global knowledge-society "golden age"?

자료 :Perez, C. (2003). *Technological revolutions and financial capital*. Edward Elgar Publishing.

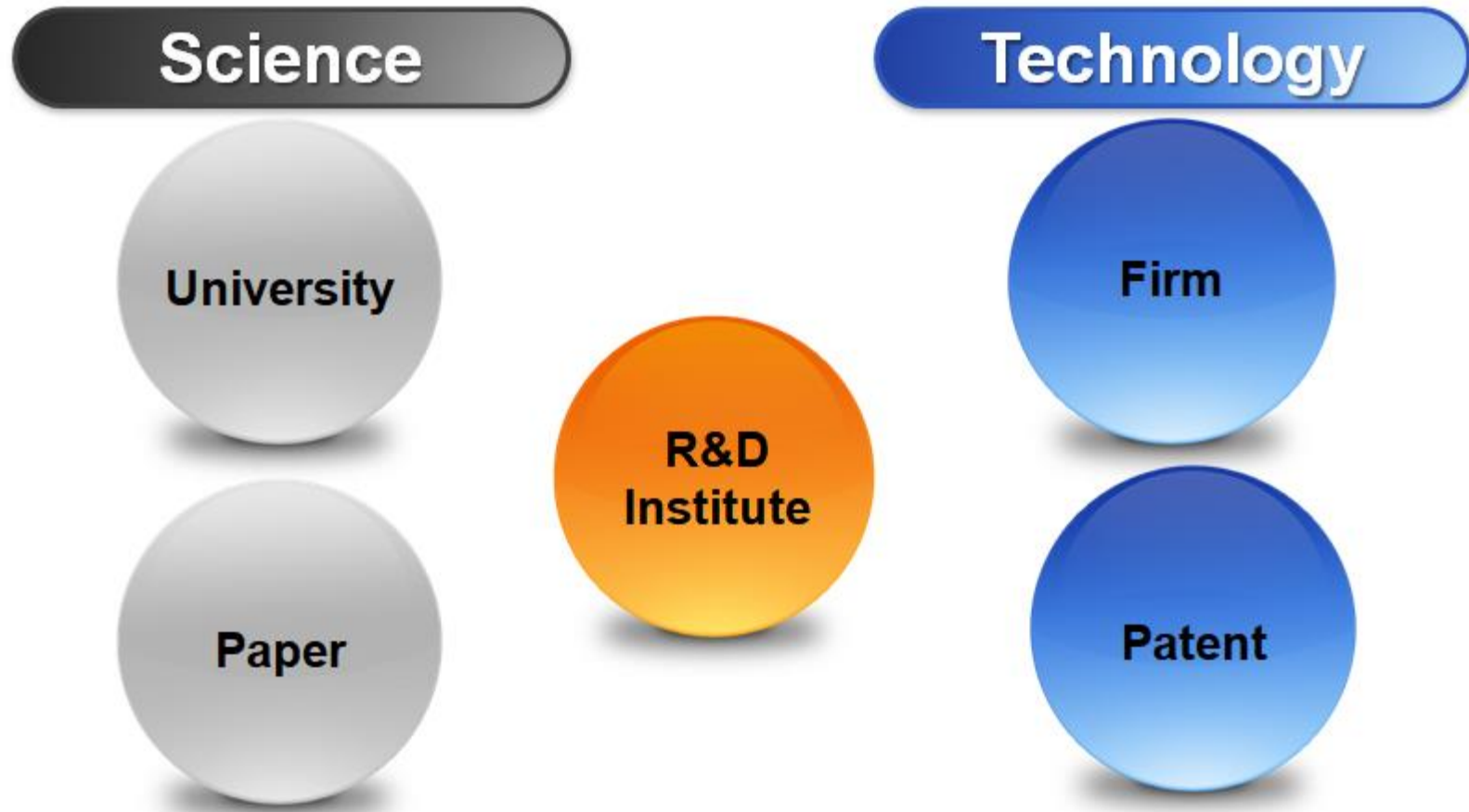
Lifecycle of Industrial revolution : What's next?



자료 : Perez(2003)에서 수정

Measurement Science and Technology

In social science...(innovation study)





Contents lists available at ScienceDirect

Technological Forecasting & Social Change



Coevolutionary cycles of convergence: An extrapolation from the ICT industry

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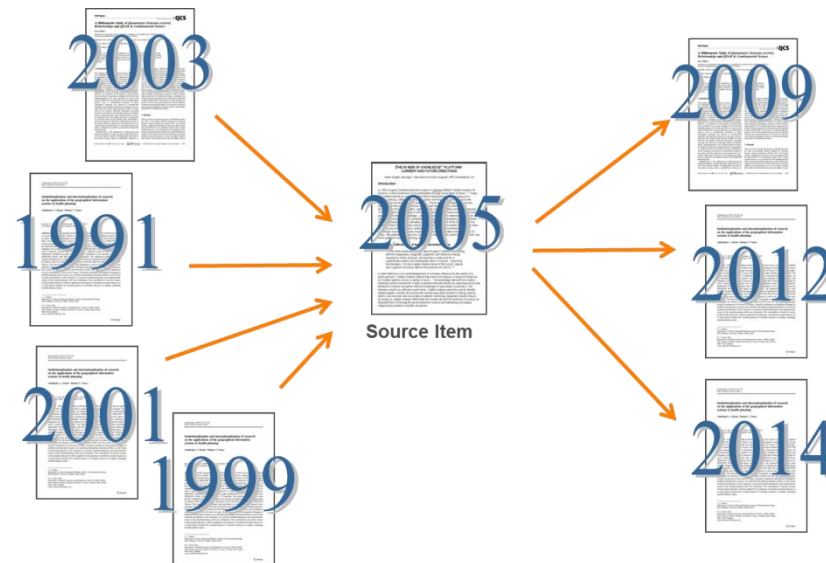
Keywords:
Convergence
Innovation process
Coevolutionary cycles

ABSTRACT

Convergence between technologies can be regarded as an increasingly emerging trend, and has received particular attention in the coming-together of previously distinct products and solutions within the information and communication technologies (ICT) industry. In previous research, the overall impact of the convergence phenomenon remains ambiguous. Whereas some scholars suggest convergence to be associated with disintegration, entry and growth, others relate the phenomenon to opposite effects, such as consolidation and shakeouts. This inconsistency in managerial conceptions on convergence formulates a need for an integrated understanding. Within a multi-case study approach, the convergence within ICT has been observed through examining the evolution of user in a converging environment and outcome in innovation

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어떠한 문제를 풀 수 있나?

과학자들의 공동연구 형태

분야별 핵심 과학자, 대학(기관), 연구성과

과학 진보의 속도 및 확산 패턴

특정 과학분야에서의 우리나라(기관) 취약 부문

특정 연구성과의 수명

기관별, 분야별 융합의 정도



US008879882B2

(12) United States Patent Conner et al.

(10) Patent No.: **US 8,879,882 B2**
(45) Date of Patent: **Nov. 4, 2014**

(54) VARIABLY CONFIGURABLE AND MODULAR LOCAL CONVERGENCE POINT

(75) Inventors: **Mark Edward Conner**, Granite Falls, NC (US); **William Julius McPhil Giraud**, Azle, TX (US); **Lee Wayne Nored**, Watauga, TX (US); **Gary Bruce Schnick**, Granite Falls, NC (US)

(73) Assignee: **Corning Cable Systems LLC**, Hickory, NC (US)

(*) Notice: Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 272 days.

(21) Appl. No.: **13/094,572**

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Related U.S. Application Data

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(51) **Int. Cl.**
G02B 6/00 (2006.01)
G02B 6/44 (2006.01)

(52) **U.S. Cl.**
CPC **G02B 6/4471** (2013.01); **G02B 6/4452** (2013.01); **G02B 6/4454** (2013.01)
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(58) **Field of Classification Search**

None
See application file for complete search history.

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Primary Examiner — Uyen Chau N Le

Assistant Examiner — Chad Smith

(57) ABSTRACT

A variably configurable fiber optic terminal as a local convergence point in a fiber optic network is disclosed. The fiber optic terminal has an enclosure having a base and a cover which define an interior space. A feeder cable having at least one optical fiber and a distribution cable having at least one optical fiber are received into the interior space through a feeder cable port and a distribution cable port, respectively. A movable chassis positions in the interior space and is movable between a first position, a second position and third position. The movable chassis has a splitter holder area, a cassette area and a parking area. A cassette movably positions in the cassette area. A splitter module holder having a splitter module movably positioned therein movably positions in the splitter holder area. The optical fiber of the feeder cable and the optical fiber of the distribution cable are optically connected through the cassette, which also may be through the splitter module. In such case, the optical fiber of the feeder cable optically connects to an input optical fiber to the splitter module, where the optical signal is split into a plurality of output optical fibers. One of the plurality of output optical fibers connects to the optical fiber of the distribution cable for distribution towards a subscriber premises. The interior space is variably configurable by changeably positioning the cassette and splitter modules in the movable chassis.

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International Search Report for PCT/US2011/030446 mailed Jul. 14, 2011, 2 pages.

어떠한 문제를 풀 수 있나?

기업간 기술 협력관계

분야별의 핵심 기업, 핵심 기술

기술 진보의 속도 및 확산 패턴

특정 기술분야에서의 우리나라(기관) 취약 부문

특정 기술의 수명

국가별, 기관별, 분야별 융합의 정도

과학-기술 연계성 분석

◆ 특허의 NPL (Non-Patent Literature) : 특허에 있는 참고문헌 중 비 특허문헌

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Page 6

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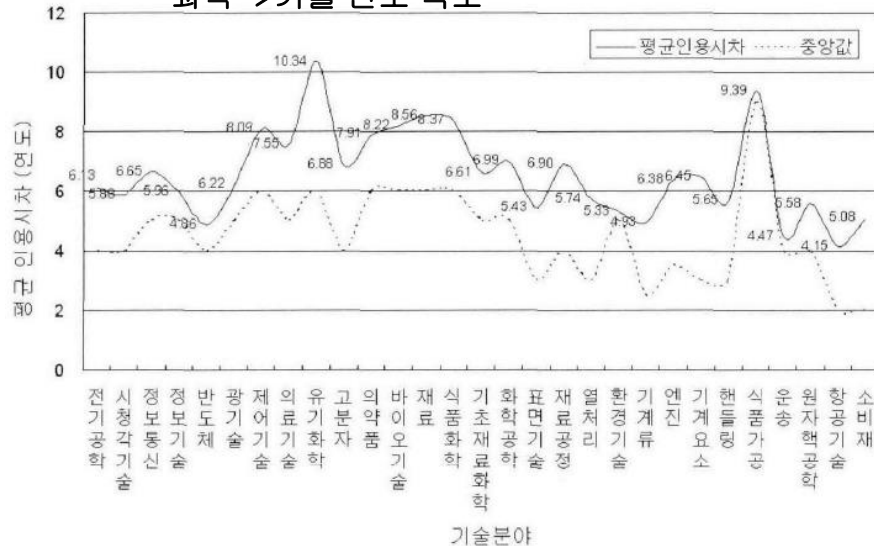
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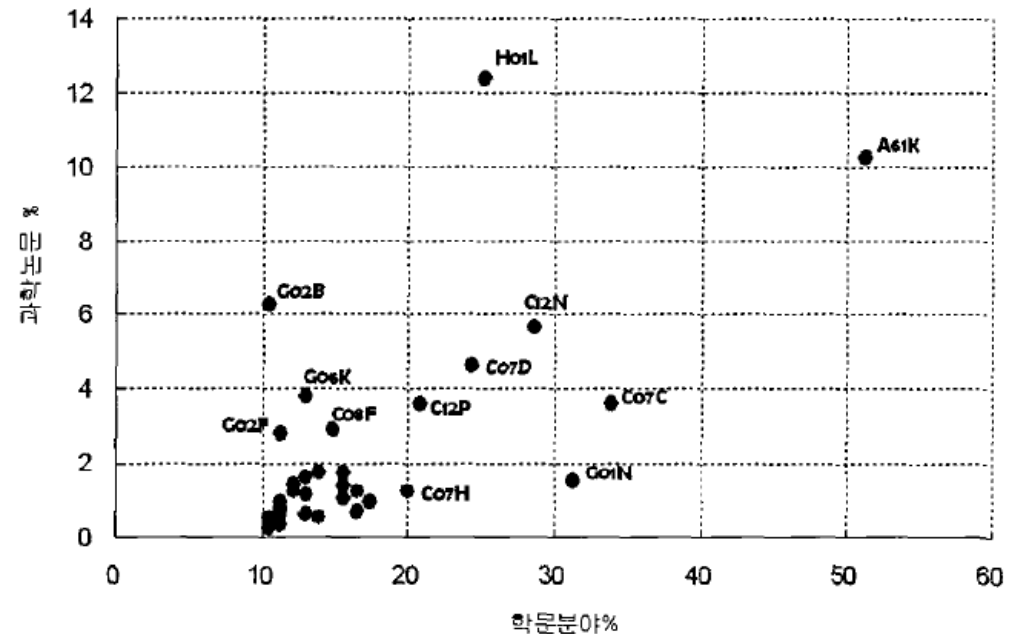
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과학->기술 진보 속도



특허 기술분야별 과학 흡수 패턴



Source : 노경란,한상완(2006)

Next class.....

1. 혁신의 원천 관련 논문 (공급, 수요, 사용자, 기술, 디지털 등)

1편 요약

Thank you
Comments & Questions

