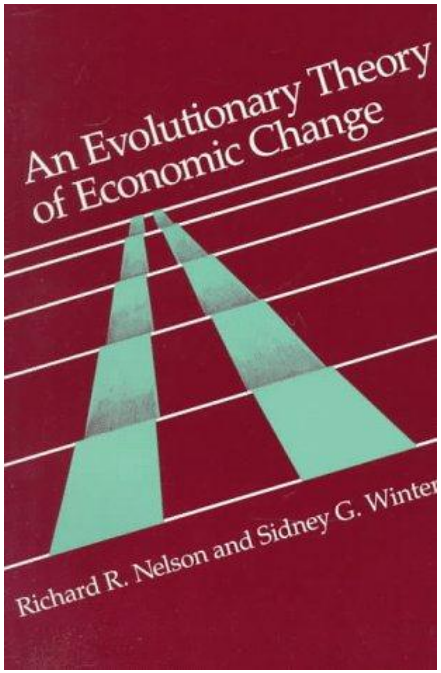
Innovation Studies

An Introduction to the Main Issues



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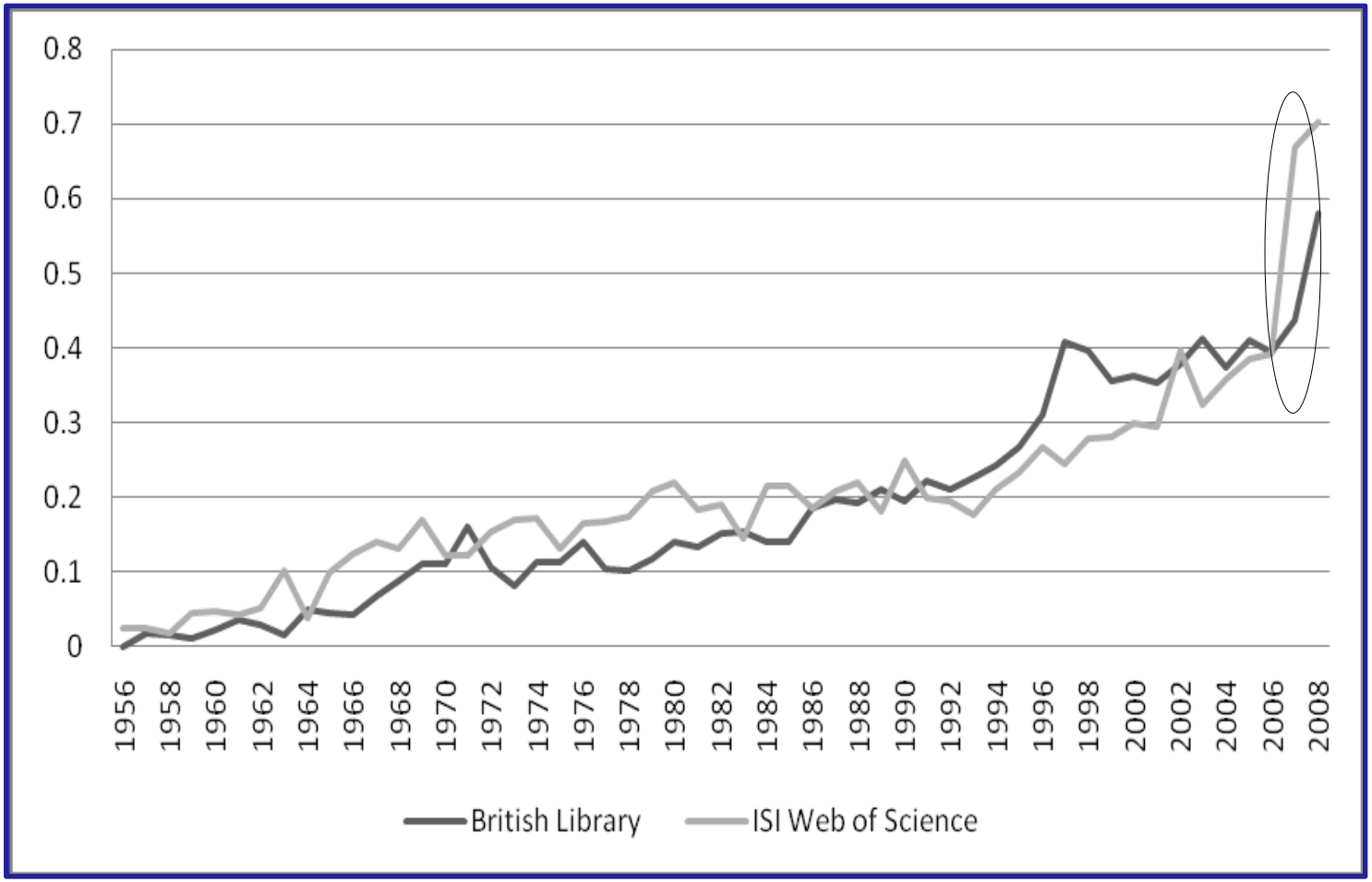
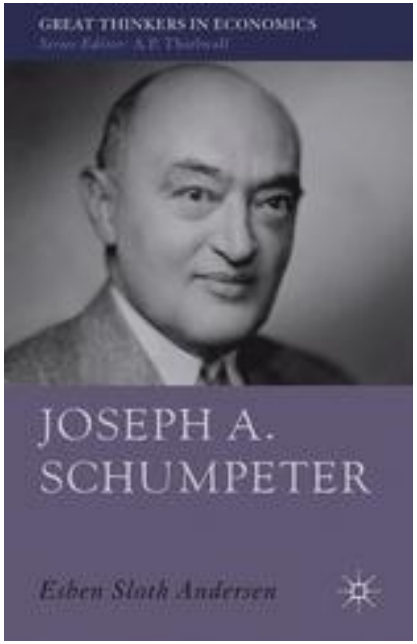
Norwegian Research School in Innovation (NORSI), BI, Oslo
September 24, 2012

The growth of the innovation literature 1956-2008



Publications with Innovation in title, as a percent of annual additions



Joseph Schumpeter (1883-1950) : Innovation as the driving force of economic and social evolution

Central works

- Theory of Economic Development (1912/1934)
- Business Cycles (1939)
- Capitalism, Socalism and Democracy (1942)

Central mechanism: technological competition

Schumpeter on technological competition

“But in capitalist reality as distinguished from its textbook picture, it is not that kind of competition that counts but the competition from the new commodity, the new technology, the new source of supply, the new type of organization (…) - competition which commands a decisive cost or quality advantage and which strikes not at the margins of the profits and the outputs of the existing firms but at their foundations and their very lives. ” (Schumpeter 1942, p. 84)

Innovation: Some lessons from Schumpeter

Perspectives on Innovation

- Introducing **novelty** into the socio-economic system (not only in theory but in practice)
- Making ”**new combinations**” – combining existing ideas, skills, resources in a novel way
- Breaking the **”routine”**, overcoming social inertia” (role of entrepreneurs)

Typologies of Innovation

Type;

- product,
- process,
- supply,
- market,
- Organization

Effect;

- Revolutionary (GPT),
- Radical,
- Marginal (incremental)

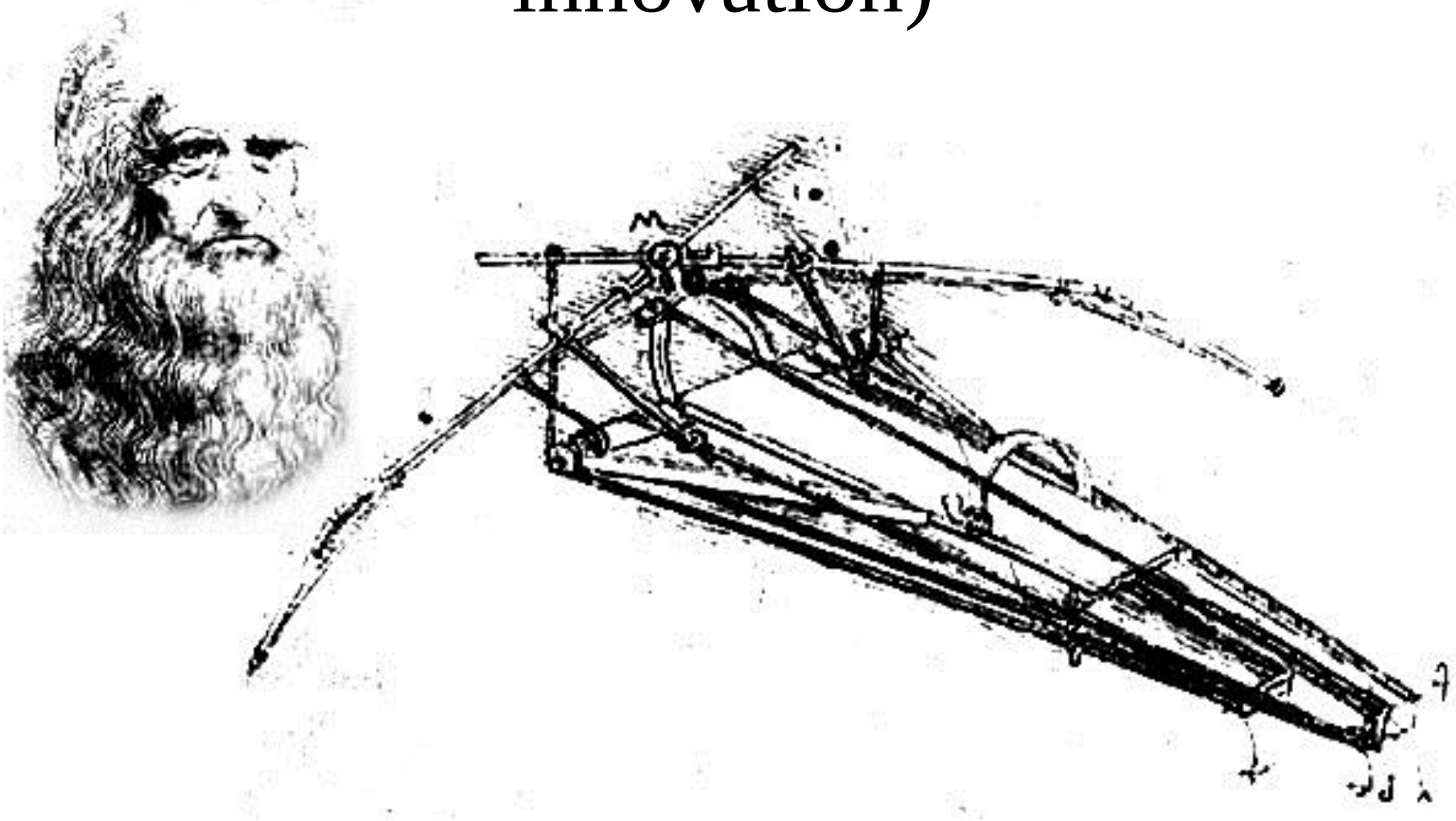
Next: Some central insights (by way of example)

Innovation = uncertainty

“I think there is a world market for maybe 5 computers”

- Thomas Watson, IBM boss, 1943 ?

Theory & practice (or invention and innovation)



Leonardo da Vinci

Design for Flying Machine, c. 1488

Kline and Rosenberg (1986)

“it is a serious mistake to treat an innovation as if it were a well-defined, homogenous thing that could be identified as entering the economy at a precise date – or becoming available at a precise point in time. (…) The fact is that most important innovations go through drastic changes in their lifetimes – changes that may, and often do, totally transform their economic significance. The subsequent improvements in an invention after its first introduction may be vastly more important, economically, than the initial availability of the invention in its original form” (Kline and Rosenberg 1986, p.283)

Inertia at work: Xerox's Palo Alto Research Center (PARC)

The Xerox Alto II XM Computer (1973)

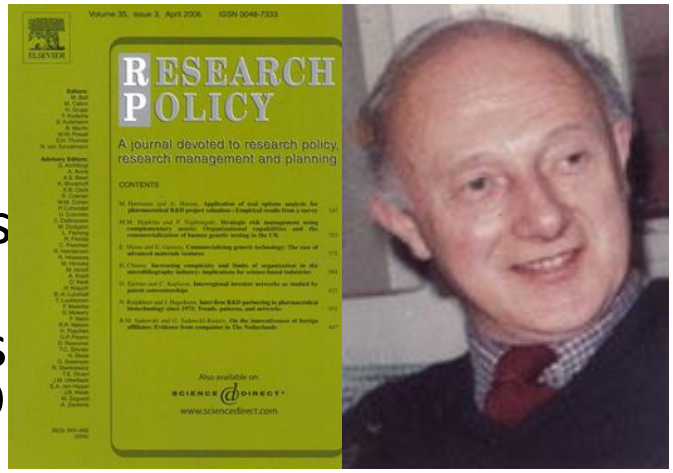
Summary: Innovation

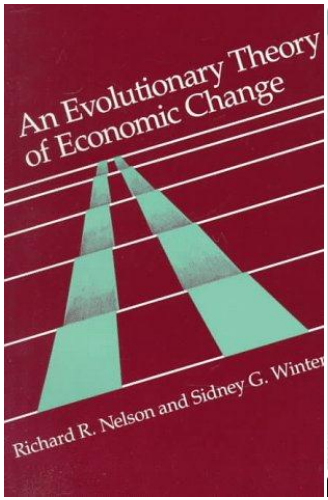
- Is highly **uncertain** (defies planning…)
- Takes **time** (long lags)…
- Meets **resistance** ….
- Comes in many **different shapes**, all of which matter ..
- .. And different **sizes**,
- Is **everywhere** (not only ”high tech”)

Innovation Studies:

A short history …

- **50&60s**: The ”linear” model, **science (**R&D) as driving force, **science policy**, OECD starts to collect **R&D statistics**
- **70&80s**: Increasing focus on **technology** as ”problem solver”, **technology policy (**OECD and EC), **firm & industry** perspectives
- **90s and beyond**: **innovation** attracts attention, socio- economic aspects (EU), **system** perspective, **innovation policy**, Eurostat collects **innovation statistics**,
- **Innovation studies** develops as **new crossdisciplinary field** with centres/departments, journals and ”meeting places” (SPRU 1966, Research Policy 1971, Schumpeter Society 1986,TIM 1987, DRUID 1995, Globelics 2002
- From a **small activity in a few countries** to a **global** movement (Fagerberg & Verspagen 2009, Fagerberg, Fosaas and Sapprasert 2012, Research Policy)

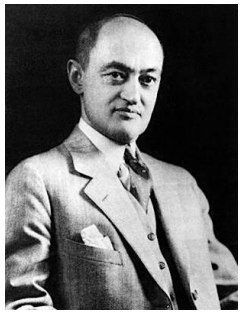




Innovation Studies: Top contributions

No	Author	Country	Title	Citations Handbooks	Citations (Journals)
	Before 1970				
1	Rogers (|1962)	USA	Diffusion of Innovations	14,1	204,3
2	Schumpeter (1934)	Austria/ USA	The Theory of Economic Development	14,1	56,3
3	Arrow(1962)	USA	Economic welfare and the allocation of resources for invention	10,5	26,0
4	Schumpeter (1942)	USA	Capitalism, Socialism, and Democracy	7,9	81,3
	1970-1989				
1	Nelson & Winter (1982)	USA	An Evolutionary Theory of Economic Change	18,8	165,0
2	Freeman (1974)	UK	The Economics of Industrial Innovation	12,6	30,4
3	Pavitt (1984)	UK	Sectoral patterns of technical change	11,6	23,2
4	Freeman (1987)	UK	Technology Policy and Economic Performance	9,7	20,2
	1990-2009				
1	Nelson (1993)	USA	National Innovation Systems	15,7	61,0
2	Porter (1990)	USA	The Competitive Advantage of Nations	14,4	166,9
3	Lundvall (1992)	Denmark	National Systems of Innovation	13,4	59,3
4	Cohen & Levinthal (1990)	USA	Absorptive capacity: A new perspective on learning and innovation	11,9	124,3

Source: Fagerberg, Fosaas and Sapprasert (2012), based on references in Handbooks

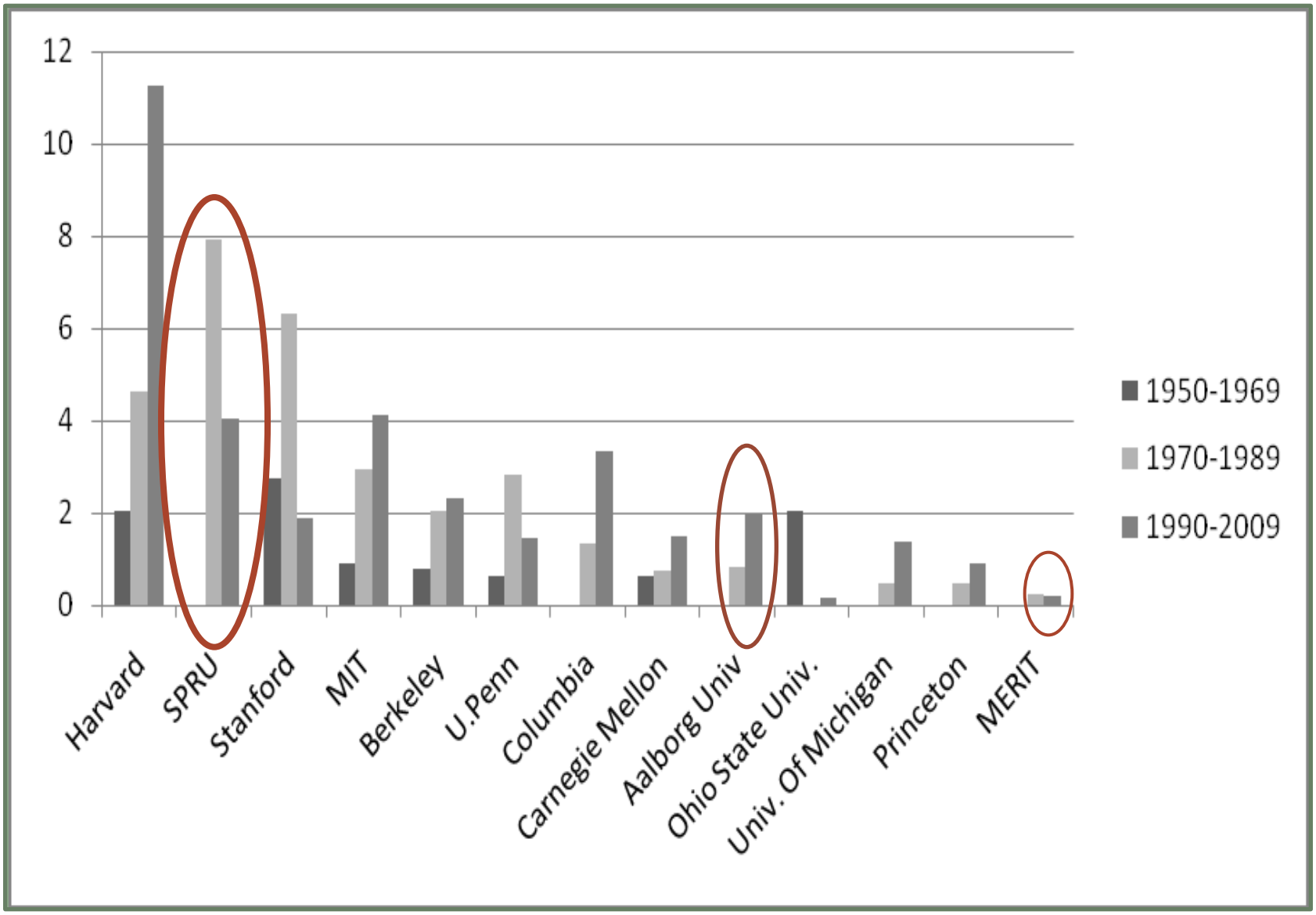


(*Brackets: Fagerberg and Verspagen 1999, RP*)

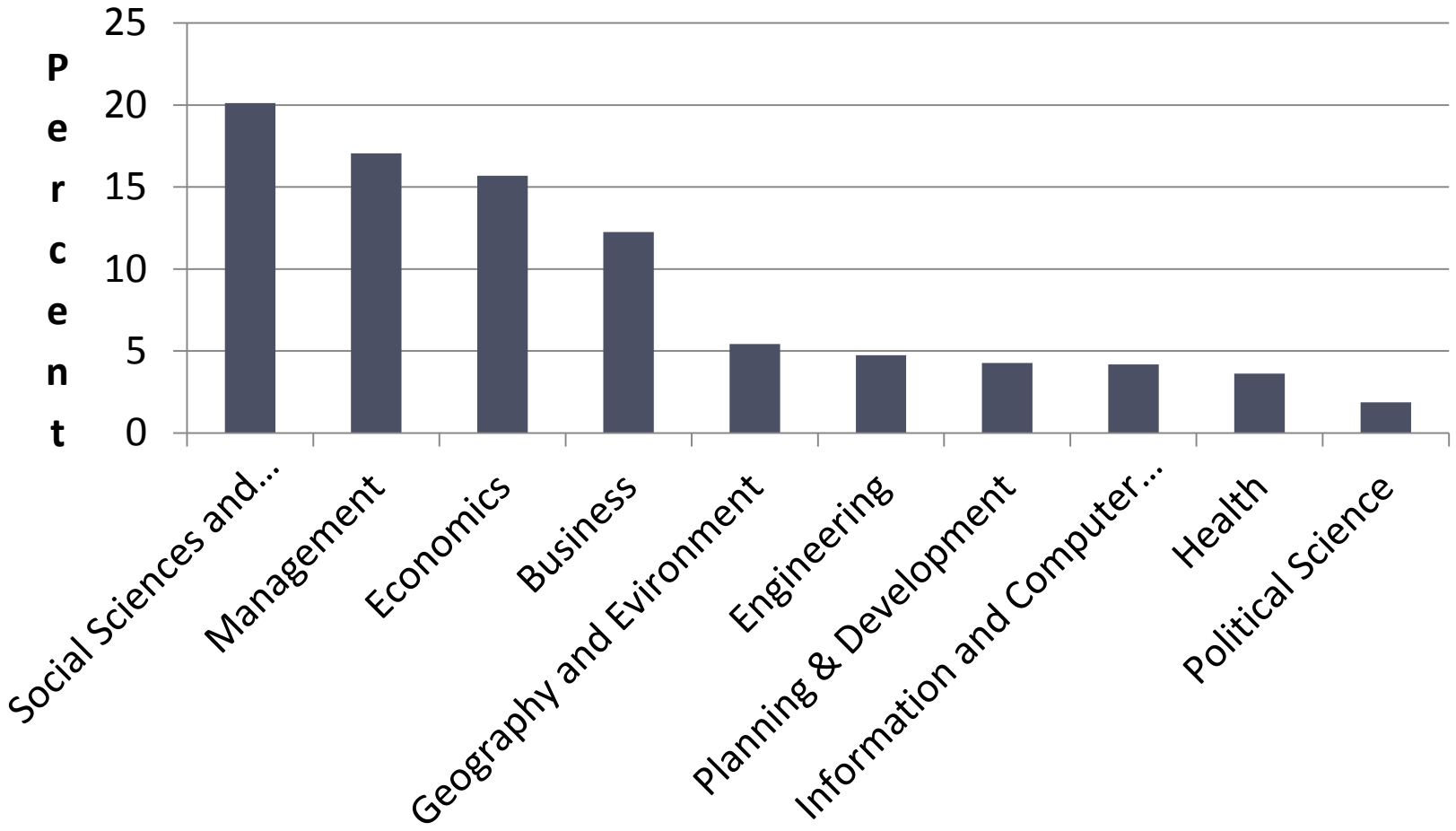
Innovation Studies: Core contributors

Rank	Name	Country	Total J-index	Total ISI/year
1 (2)	Nelson, R	USA	37,6	175
2(3)	Freeman, C	UK	35,5	88
3(5)	Rosenberg, N	USA	33,4	95,9
4(1)	Schumpeter, JA	USA/Austria	27,4	160
5	Porter, M	USA	24,9	353
6 (9)	Griliches, Z	USA	24,2	93,7
7	Von Hippel, E	USA	20,2	54,3
8(4)	Lundvall, B-Å	Denmark	19,1	76,9
9 (6)	Pavitt, K	UK	15,5	44,5
10	Chandler, AD	USA	14,8	182

Central research environments

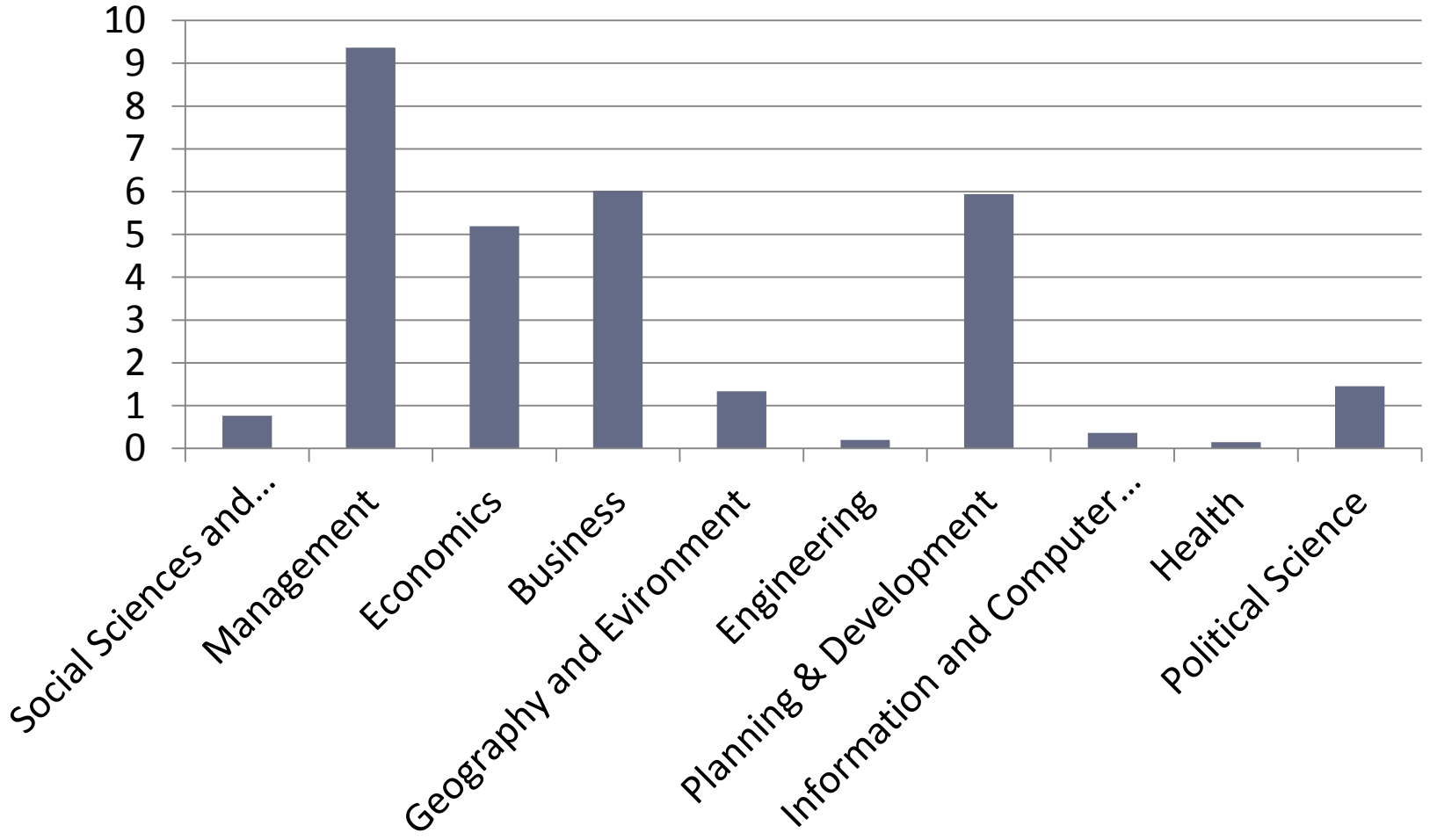


Disciplinary orientation of innovation literature users (journal citations)

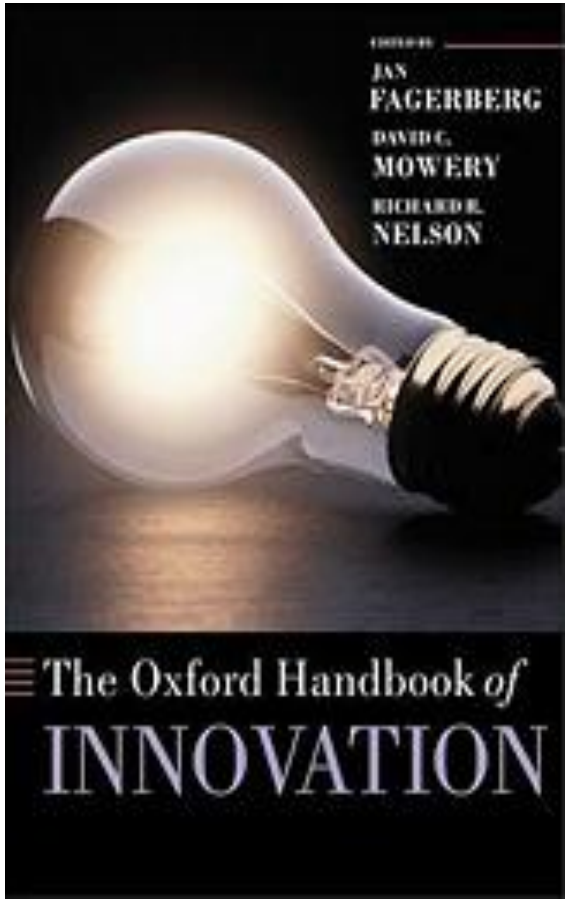


Some use it more than others

Disciplinary Specialization (index, average = 1)



Central topics in innovation studies



A holistic understanding is a challenge: The Oxford Handbook of Innovation (2005)

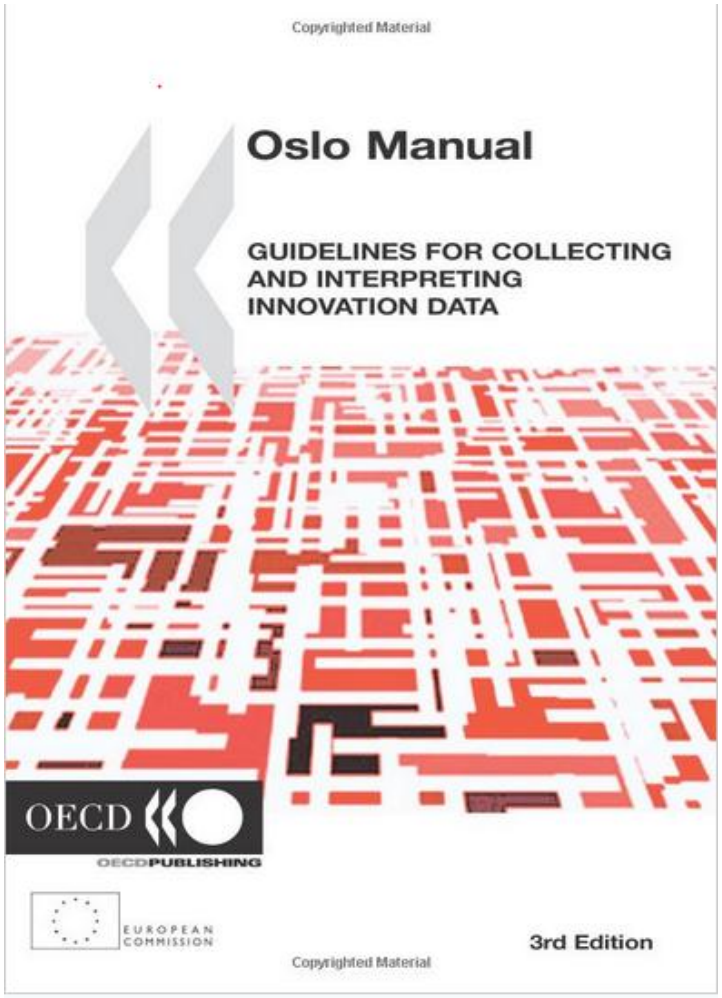
- The **making** of innovations and its **measurement**
- Innovation **systems**
- The **effects** of innovation (on the economy, social and environmental change)
- Innovation and **politics**

The making of innovations

- The innovative firm: **Schumpeter Mark I** (small firms) and **Mark II** (large firms) (Freeman 1974)
- From **organizational memory & routines** (Nelson and Winter 1982) to **dynamic capabilities** (Teece et al 1997)
- Openness: **Absorptive capacity** (Cohen and Levinthal 1990), **open innovation** (Chesbrough 2003) and **democratic innovation** (von Hippel 2005)
- **Path dependency** & lock in (Arthur 1994)

Further reading: Lazonick in Oxford Handbook and Teece 2010 (ch. 16 in Handbook by Hall and Rosenberg)

Measurement of innovation:
From Patents and R&D statistics to the Community innovation Survey (CIS)



*An **innovation** is the implementation of a new or significantly improved product (good or service), or process, a new marketing method, or a new organisational method in business practices, workplace organisation or external relations.* (page 46)

Innovation Systems

"Popular folklore notwithstanding, the innovation journey is a ***collective achievement*** *that requires key roles from* ***numerous entrepreneurs*** *in both the* **public and private sectors***" (Van de Ven et al. 1999, p.149)*

- **Technological** and/or **sectoral** systems (Carlsson and Stankiewicz 1991; Malerba 2004)
- **National** systems (Lundvall 1992, Nelson et al 1993)
- **Regional** systems (Braczyk et al.1997)
- **Issues** in system analysis: Actors, links, interactions, borders, functions, feedbacks, path dependency and lock in?

Further reading: Chapters by Edquist , Asheim/Gertler and Malerba in Oxford Handbook

Innovation effects:

growth, employment and the environment …

- Innovation, “spillovers” and **economic growth** (Verspagen in Oxford Handbook)
- Innovation, **”techno-economic paradigms**” and ”long waves” (Perez 1983,1985, Freeeman and Perez 1988)
- Innovation , catch-up and **development** (Fagerberg and Godinho in Oxford Handbook)
- Innovation and **employmen**t (Pianta in Oxford handbook)
- Innovation and the **environment**?
- Is innovation always “**good**” ?

Innovation & Politics

From science to technology to innovation policy

- From "the linear model" (science drives growth) to a **systemic perspective** (Kline and Rosenberg 1996, Lundvall 1992)
- **Outdated policy**? The 3% target for R&D in Europe (Lisbon-Barcelona agenda).
- From an exclusive focus on **manufacturing, product and process innovation and "high tech"** to a broad perspective that includes **organisational** innovation, innovation in **services**, innovation in the **public sector** and innovation in **developing** countries
- **Broad versus narrow approach** to innovation policy: Policies that **influence innovation** versus policies created for that purpose

Further reading: Chapter by Lundvall/Borras in Oxford Handbook

More: www.innoresource.org