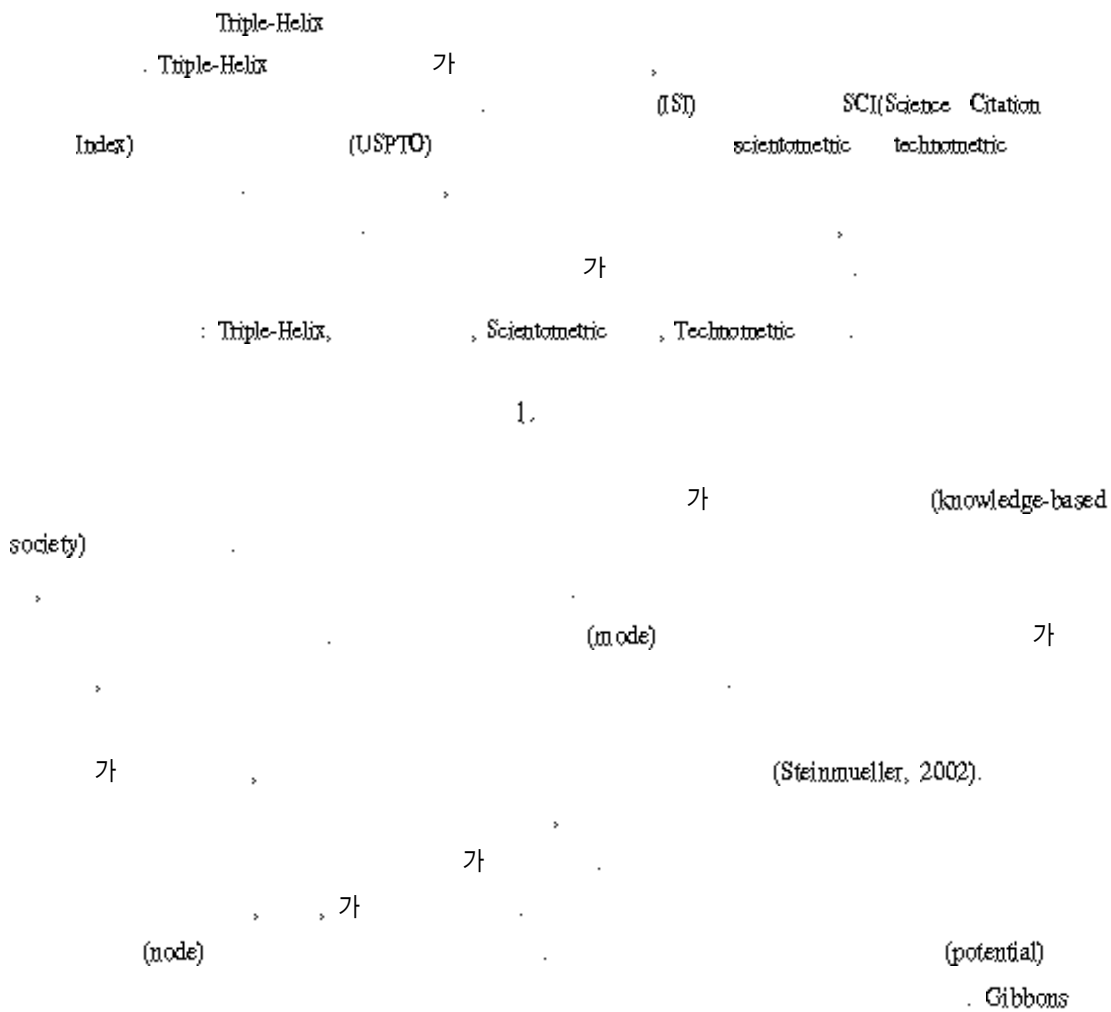


Triple-Helix

*

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(1994)

" 2(Mode2)*

(Wasserman & Faust, 1994).

1997). Triple-Helix

가

Triple-Helix

(Etzkowitz & Leydesdorff,

Triple-Helix

가

(dynamics)

가

1970-1980

(research & development)

가

가

(national system of innovation)

(Freeman, 1988; Lundvall,

1992; Nelson, 1993).

가

(Krugman, 1996; Sahal, 1981;

Schumpeter, 1964).

Triple-Helix

가

Triple-Helix

Triple-Helix

가

(, 2003;

, 2003).

(Leydesdorff, 2003, 2004).

가

가

가

)

가

NTRM(National Technology Road Map), RTRM(Regional Technology Road Map)

, Triple-Helix 가
가 .

2.

Triple-Helix (institutional)

Triple-Helix scientometric (scientific knowledge)

Scientometric (bibliographic)

Scientometric (implicit) (object)

scientometric

technometric 가

(, 2003).

3. Scientometric

3.1 SCI

Information. ISI) (Institute of Scientific
SCI(Science Citation Index)
가
(Garfield, 1979). SCI

(Van Raan, 1988).

SCI

2002 CD-ROM SCI
 ()
 ISI SCI CD-ROM 2가
 가
 CD-ROM
 () UNIV. COLL.
 가 가
 : CORP., INC., LTD., SA., AG.,
 : NATL., NACL., NAZL., GOVT., MINIST., ACAD.,
 INST., NIH., HOSP., HOP., EUROPEAN., US., CNRS., CERN., INRA., BUNDES.
 SCI

가 KAIST(Korea Advanced Institute of Science and Technology)

3.2

Scientometric
 (semantic networks)
 (concept mapping)
 (prominent)
 (Leydesdorff, 1995).
 (document) × (word) 2 (cell)
 가 (case) × (variable)
 (word) × (word) I (cosine) (symmetric)
 가
 가
 (: , 2004;
 , 2004). 가 FullText (:
 , <http://users.fmg.uva.nl/leydesdorff/software/fulltext/>.
 Pajek (:
 가 가 : <http://mrvar.fdv.uni-lj.si/sola/info4/programme.htm>.
 (co-authorship) Triple-Helix

Shannon(1948) " " Triple-Helix (Leydesdorff, 2003).
 (dynamics)
 Triple-Helix (university), i (industry), g
 (government) H T (transmission)
 (mutual) 가
 T (negative)

$$T_{uig} = H_u + H_i + H_g - H_{ui} - H_{ig} - H_{ug} + H_{uig} \quad (1)$$

(1) 가 H 가
 가 3 3
 (extent)
 2 (determine),
 (condition)

(co-variation) Shannon (formula)
 T ($H_x + H_y$)
 (overlap) (H_{xy}) (2)

$$T_{xy} = H_x + H_y - H_{xy} \quad (2)$$

H_x x (3) P (probability)

$$H_x = - \sum_x P_x \log P_x \quad (3)$$

$$H_{xy} = - \sum_x \sum_y P_{xy} \log P_{xy} \quad (4)$$

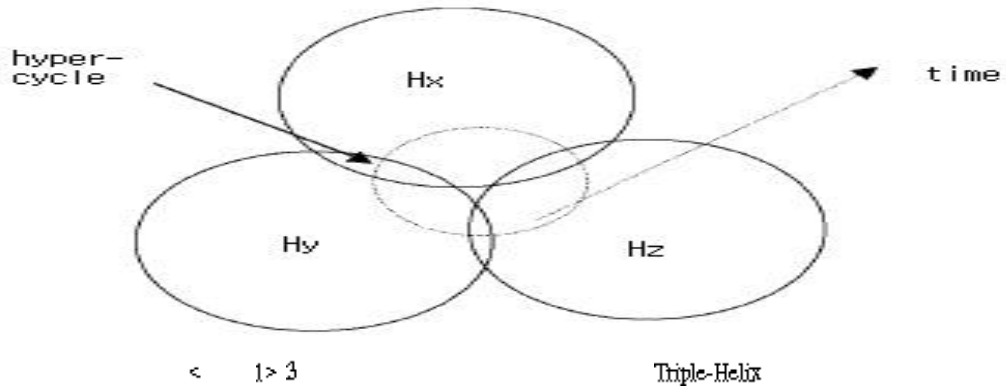
$$H_{xyz} = - \sum_x \sum_y \sum_z P_{xyz} \log P_{xyz} \quad (4)$$

Abramson(1963) Shannon 3 T (5)

$$T_{xyz} = H_x + H_y + H_z - H_{xy} - H_{xz} - H_{yz} + H_{xyz} \quad (5)$$

(bilateral) 가 (trilateral)
 가 <
 1> 3 가 가

가 (self-organizing) 가 (hyper-cycle)
3



3.3

SCI

2002 가 160

105 190 102

가 (visibility) 0.1

가 가 (visible) (old-fashioned)

< 2> < 3>

(materials), (control), (organic chemistry), (bio)

(molecular biology), (cancer) 가

(node)

2002

2000 2000

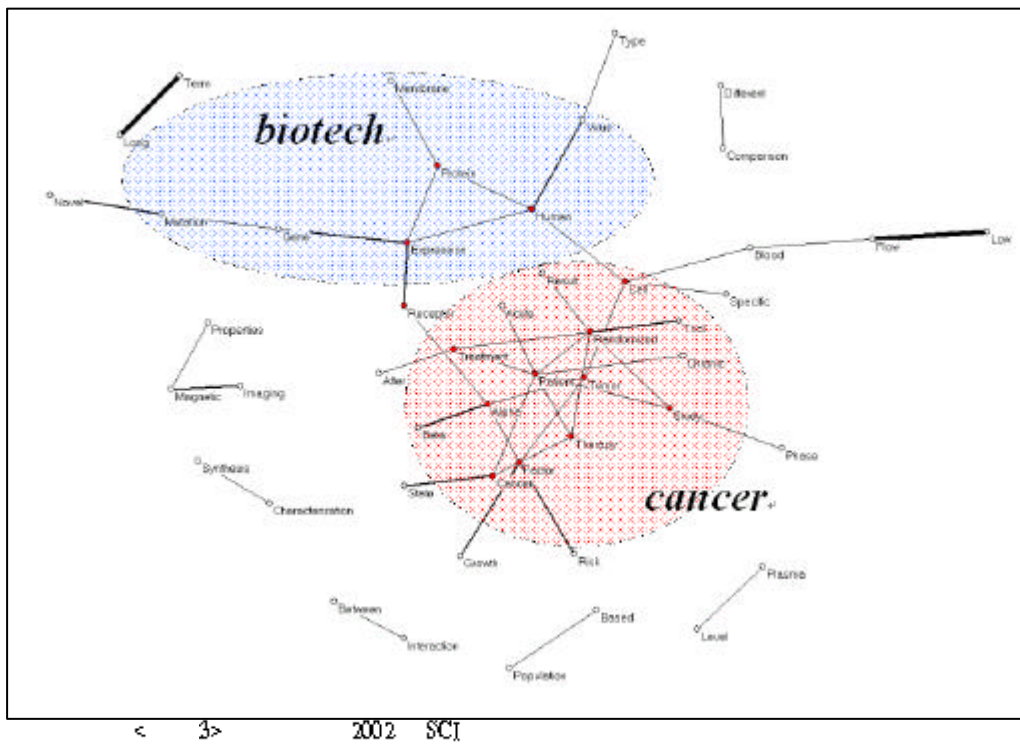
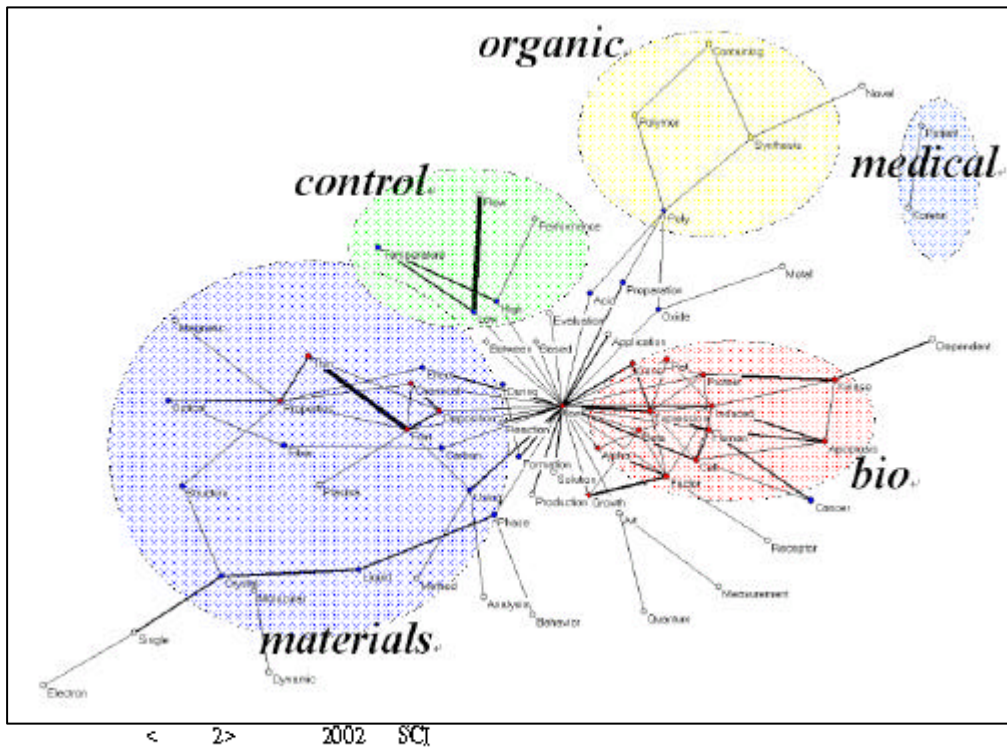
12,038 . 2 2002 14,931 가

SCI 2000 2002 가 1.78 2.19

. 2000 2002 가 가

< 1> SCI

(unique)	4005	3984
	160	105
0.1	68	49



1,000	2000	2002	2000	2002	3
가	가	가	가	가	가
14,931	가	가	가	가	2002
18,537	2000	2002	2000	2002	2000
가	가	가	가	가	17,865
가	2000	2002	가	SCI	2.74
가	가	가	가	가	2.61
가	가	가	가	가	가
26.1	가	가	2000	19.4	2002
가	가	가	가	2000	24.4
0.8	1.2	가	가	2	20.9
가	가	가	가	가	가
가	가	가	가	가	가
-> 0.8%)	(0.6% -> 0.4%).	가	가	가	(0.7% 가
2000	(: 351, : 372)	2002	(: 533, : 328)	가	가
Triple-Helix	Triple-Helix	Triple-Helix	Triple-Helix	3	가
< 2>	2000	2002	Triple-Helix	Triple-Helix	Triple-Helix
T	2000	2002	가	가	가
(: -40.1, : - 25.4)	2002	가	가	가	가
(: - 33.7, : -32.8)	가	가	가	가	가
2000	가	가	가	가	가
가	(cell)	가	가	가	가
15,927	가	2000	16,379	2002	가
가	가	가	가	가	가
(approximate)	가	가	가	가	가

< 2>

가			T	UI	UG	IG	UIG	Univ	Ind	Govt
	2000	676511	-77.0	16270	108919	4359	5201	543123	41242	232096
	2002	683222	-70.7	17095	116782	4626	5664	556370	41840	234843
	2000	12038	-40.1	351	2341	87	91	10345	676	3978
	2002	14931	-33.7	533	3115	118	183	13163	996	4904
	2000	18357	-25.4	372	4482	106	259	16379	863	6593
	2002	17865	-32.8	328	4663	78	307	15927	859	6762

4. Technometric

4.1

(The United States Patent and Trade Office, USPTO) 가가

(Cohen et al., 2002). (assignee) (inventor)

2002

(query)가 : "isd/\$\$/2002 and (acn/kr or icn/kr)"

"isd/\$\$/2002 and (acn/nl or icn/nl)". "kr" "nl"

"acn" 가 "icn" 가

(degree)가 가

Patent Literature Reference) NPLR(Non

(indicator) (Leydesdorff,

2004).

4.2

2002

40 103 7 96

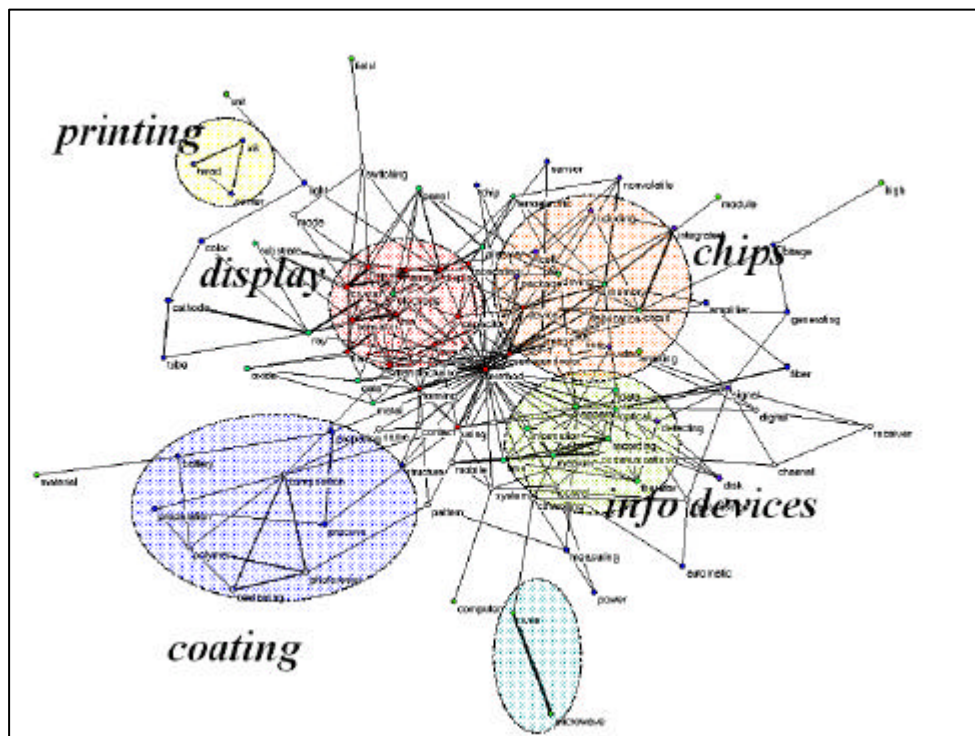
22 105

0.1 < 3>

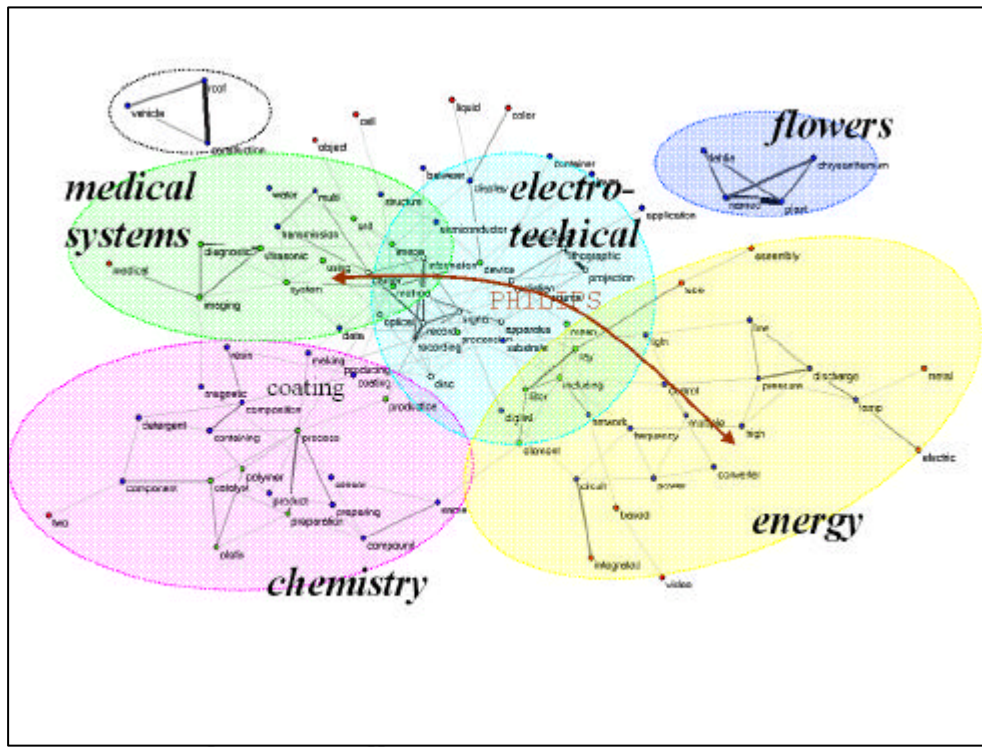
< 4> < 5> (trajectory)
 (chips), (display), (info devices),
 (coating), (printing) 가
 (electro technical) (energy), (medical), (chemistry),
 (coating), (car), (flowers)
 Philips Philips 2002 가 39.1
 (1,963 가 768) Philips
 (imaging device)
 , SCI (bi o-medical) (bio-tech) 가

< 3>

(unique)	3984	4005
	40	103
0.1	96	105



< 4> 2002



USPTO (assignee) NPLR (inventor) < 4> 2002
 2,824 가 4,200
 2,047 가 2,824 3,440
 SCI
 2002

< 4> 2002	USPTO	
	4,200	2,824
	2,047	3,440

5.

Triple-Helix 가 Triple-Helix 가 2002 (ISI) SCI(Science)

Citation Index) (USPTO) SCI
 (IT)
 SCI
 (biotech) (biomed) 가
 (BT)
 가

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Triple-Helix Indicators for the knowledge-based innovation system:
A comparison between South Korea and The Netherlands*

Han Woo Park¹, Loet Leydesdorff², Heung Deug Hong³, Sung Jo Hong⁴

Abstract

This paper elaborates on the triple helix model for measuring the emergence of a knowledge base of socio-economic systems. First, the 'knowledge infrastructure' is measured using multiple indicators: scientometric and technometric. The paper employs this methodological strategy to examine the current state of the innovation systems of South Korea and The Netherlands. These indicators are thereafter used for the evaluation of the systemness in configurations of university-industry-government relations. South Korea is becoming somewhat stronger than the Netherlands in terms of scientific and technological outputs and in terms of the knowledge-based dynamics, but South Korea's portfolio is more traditional than that of the Netherlands. For example, research and patenting in the biomedical sector is underdeveloped.

Keywords: scientometric, technometric, triple helix, knowledge-based, national innovation system.

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