

NETWORKING AND INNOVATION

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MNE's innovative capabilities: Comparative studies of patenting strategies and inventors' countries of origins

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Abstract

- The paper examines patenting strategies of MNEs and their original sources of innovation in order to see how these factors affecting MNEs' innovative capabilities in the global market. It compares MNEs from Japan, South Korea, China, and Europe to provide contemporary MNEs' geographically dispersed knowledge creating activities.

Agenda

- Many previous studies assume that technology development is mainly led by Europe, United States, and Japan.
- Some previous studies often use the number of patents as the scale of estimating the capability of R&D.

Research Questions

- According to *the WIPO Report 2012*, there are not only the European and Japanese MNEs but also some Asian MNEs in “the Top Companies of International Patent Application Ranking”.
- Why are Asian MNEs possible to apply a lot of patents in recent years?

PCT(Patent Cooperation Treaty) Patent Application Ranking

	Company	Country	2009	2010	2011	2012
1	ZTE	China	517	1,868	2,826	3,906
2	PANASONIC	Japan	1,891	2,153	2,463	2,951
3	SHARP	Japan	997	1,286	1,755	2,001
4	HUAWEI	China	1,847	1,527	1,831	1,801
5	BOSCH	Germany	1,588	1,301	1,518	1,775
6	TOYOTA	Japan	1,068	1,095	1,417	1,652
7	QUALCOMM	U.S.	1,280	1,675	1,494	1,305
8	SIEMENS	Germany	932	830	1,039	1,272
9	PHILIPS	Netherland	1,295	1,433	1,148	1,230
10	ERICSSON	Sweden	1,241	1,147	1,116	1,197
11	LG	Korea	1,090	1,297	1,336	1,094

USPTO, Patent Granted Ranking

	Country	2000	2011	2000->2011 Growth Ratio
1	U.S.	85,068	108,626	1.28
2	Japan	31,295	46,139	1.47
3	Korea	3,314	12,262	3.70
4	Germany	10,235	11,920	1.16
5	Taiwan	4,670	8,781	1.88
6	Canada	3,419	5,012	1.47
7	France	3,819	4,531	1.19
8	U.K.	3,662	4,307	1.18
9	China	119	3,174	26.67
10	Israel	783	1,981	2.53

Source: United States Patent and Trademark Office, the number of patents granted as distributed

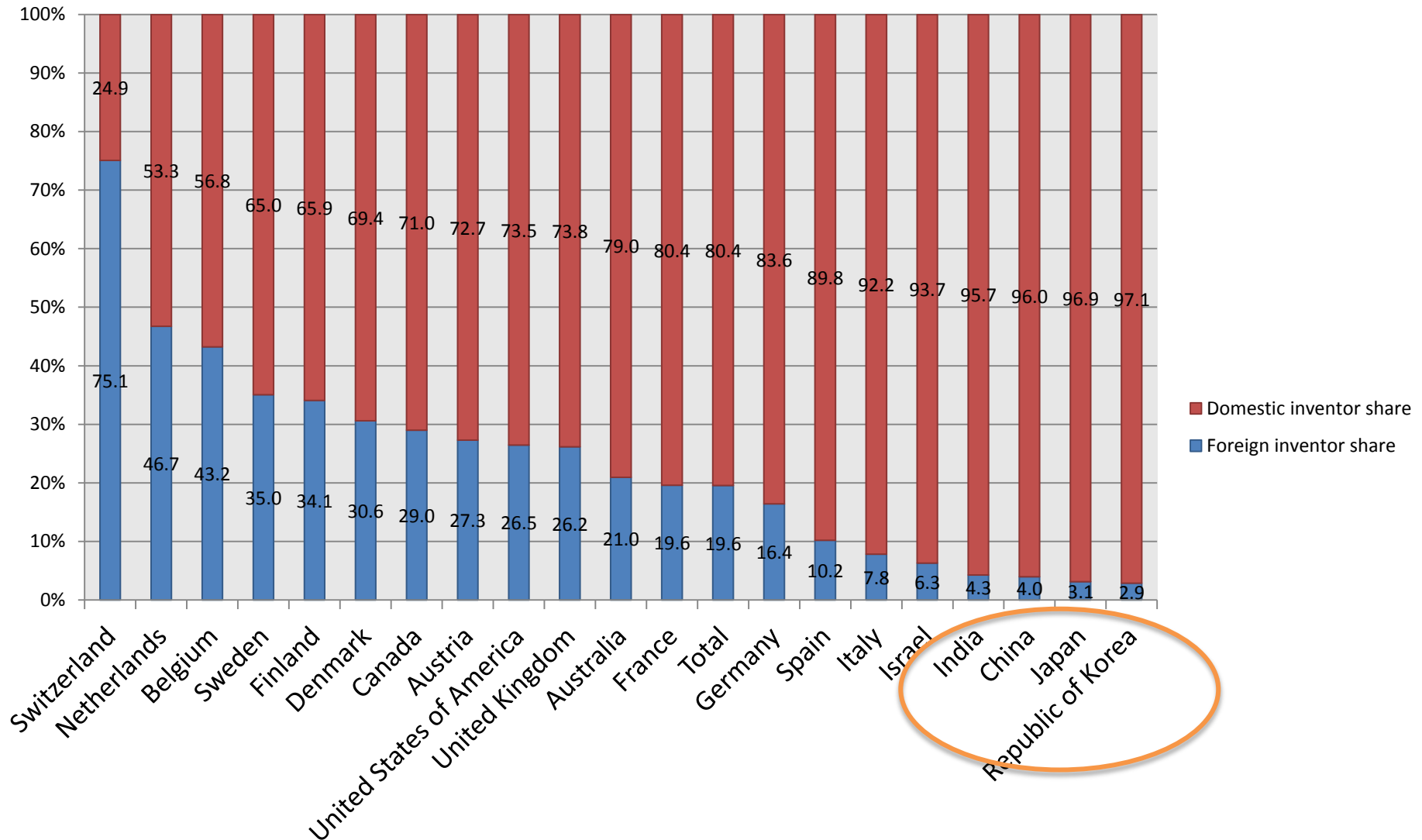
Assumption

- Did foreign engineers who are in developed countries support Asian MNEs' technological development?

Country-based data

- Look into the macro data.

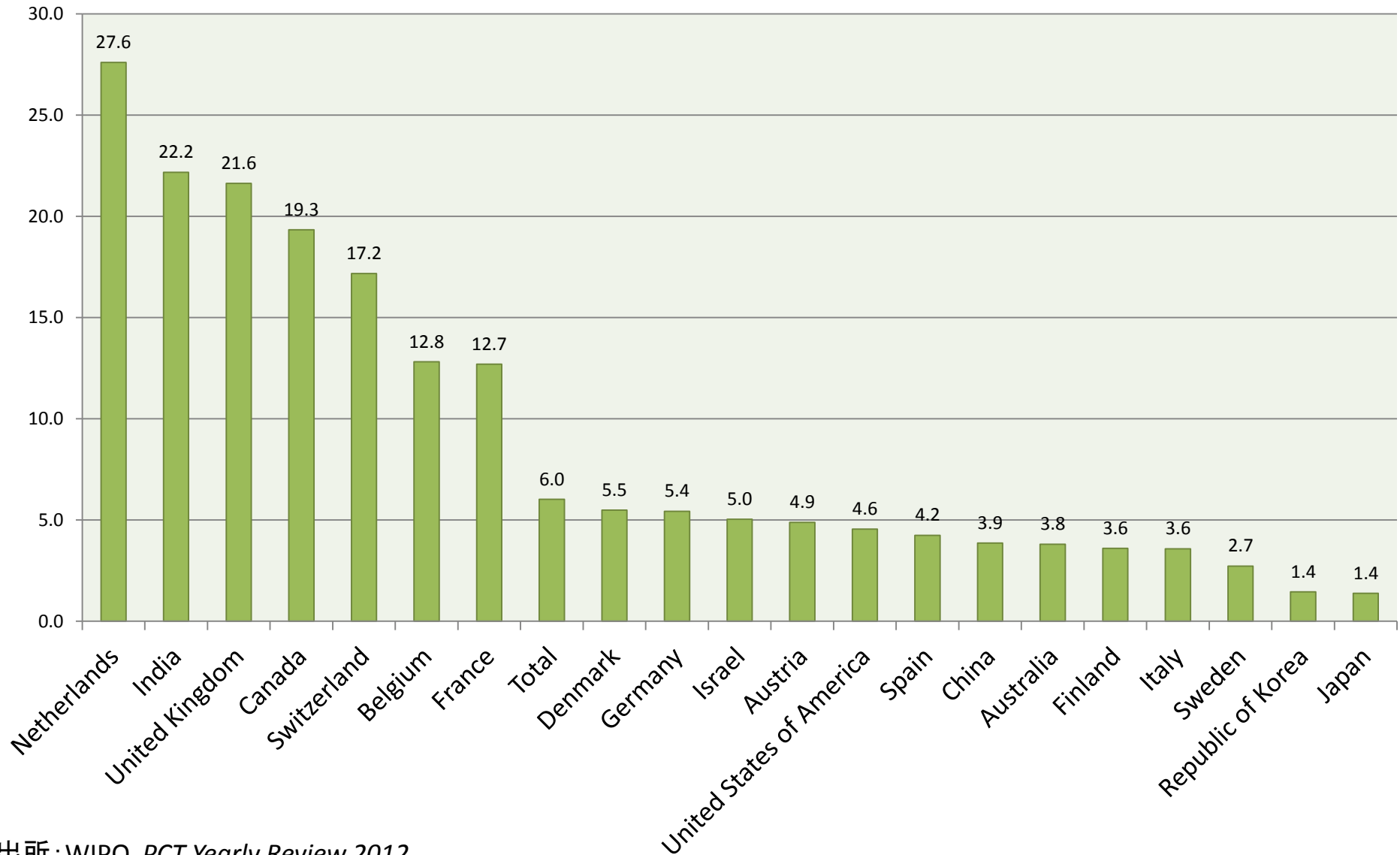
Share of Domestic and Foreign Inventors for Top 20 Origins, 2011



出所: WIPO, *PCT Yearly Review 2012*,

Share of Domestic and Foreign Inventors for Top 20 Origins, 2011

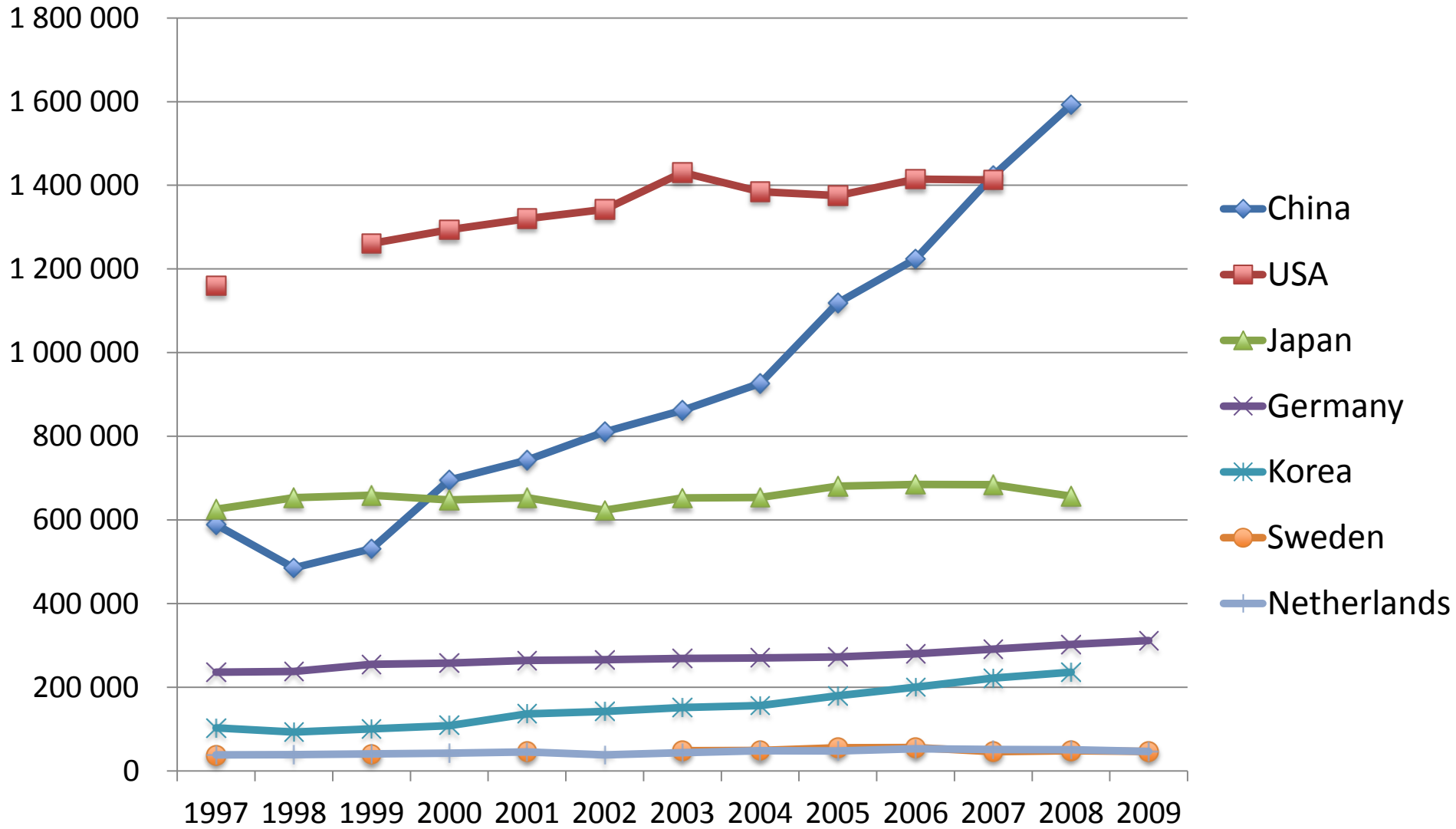
Share of PCT Applications with At Least One Foreign Co-Applicant for top 20 origins, 2011



出所: WIPO, *PCT Yearly Review 2012*,

Share of PCT Applications with at Least One Foreign Co-Applicant for Top 20 origins, 2011

Transitions of the Number of Researchers



The data picked up only “Researcher(Full-Time Employee)”, excluding “Supporting Staff”.

Source: UNESCO Institute for Statistics, Data Centre.

Company-based data

Research Methodology

- Using data: “Patent full-text and image database” and “Patent Application full-text and image database” from USPTO.
- Choose the 7 companies (ZTE, Huawei, Panasonic, LG, Philips, Ericsson, Siemens) in Asia and Europe from the electrical machines and the communication industries.
- Set the period of data: from 2002 to 2011 (the total number of patents in 10 years).
- Check the “inventor’s country” in each patent specification whether it is the home or other country.

Result

1. ZTE (China)

Inventors' Country	The number of Granted Patents	Ratio	The number of Patent application	Ratio
China	70	83.3%	931	97.7%
Japan	0	0.0%	0	0.0%
Korea	0	0.0%	1	0.1%
Netherlands	0	0.0%	0	0.0%
Sweden	0	0.0%	1	0.1%
USA	15	17.9%	49	5.1%
Germany	0	0.0%	0	0.0%
India	0	0.0%	0	0.0%
Total	84		953	

Source: USTPO, Patent full-text and image database, and Patent Application full-text and image database

Result

2. Huawei (China)

Inventors' Country	The number of Granted Patents	Ratio	The number of Patent application	Ratio
China	807	98.5%	2,654	97.7%
Japan	0	0.0%	1	0.0%
Korea	1	0.1%	0	0.0%
Netherlands	1	0.1%	11	0.4%
Sweden	6	0.7%	63	2.3%
USA	9	1.1%	69	2.5%
Germany	1	0.1%	25	0.9%
India	0	0.0%	4	0.1%
Total	819		2,716	

Source: USTPO, Patent full-text and image database, and Patent Application full-text and image database

Result

3. Panasonic (Japan)

Inventors' Country	The number of Granted Patents	Ratio	The number of Patent application	Ratio
China	23	0.1%	84	0.6%
Japan	20,291	96.1%	14,197	95.3%
Korea	6	0.0%	8	0.1%
Netherlands	18	0.1%	6	0.0%
Sweden	2	0.0%	1	0.0%
USA	623	2.9%	541	3.6%
Germany	115	0.5%	222	1.5%
India	0	0.0%	2	0.0%
Total	21,124		14,895	

Source: USTPO, Patent full-text and image database, and Patent Application full-text and image database

Result

4. LG (Korea)

Inventors' Country	The number of Granted Patents	Ratio	The number of Patent application	Ratio
China	2	0.0%	3	0.0%
Japan	26	0.3%	24	0.3%
Korea	8,983	98.0%	8,815	98.2%
Netherlands	12	0.1%	3	0.0%
Sweden	0	0.0%	0	0.0%
USA	187	2.0%	170	1.9%
Germany	33	0.4%	24	0.3%
India	1	0.0%	3	0.0%
Total	9,168		8,974	

Source: USTPO, Patent full-text and image database, and Patent Application full-text and image database

Result

5. Philips (Netherland)

Inventors' Country	The number of Granted Patents	Ratio	The number of Patent application	Ratio
China	80	0.9%	277	2.4%
Japan	88	1.0%	59	0.5%
Korea	6	0.1%	11	0.1%
Netherlands	3,701	43.7%	6,440	56.6%
Sweden	17	0.2%	27	0.2%
USA	805	9.5%	2,063	18.1%
Germany	1,257	14.8%	2,109	18.5%
India	13	0.2%	71	0.6%
Total	8,468		11,383	

Source: USTPO, Patent full-text and image database, and Patent Application full-text and image database

Result

6. Ericsson (Sweden)

Inventors' Country	The number of Granted Patents	Ratio	The number of Patent application	Ratio
China	8	0.30%	57	3.4%
Japan	39	1.48%	29	1.7%
Korea	3	0.11%	2	0.1%
Netherlands	123	4.68%	25	1.5%
Sweden	1,756	66.74%	1,200	70.6%
USA	265	10.07%	192	11.3%
Germany	231	8.78%	97	5.7%
India	1	0.04%	0	0.0%
Total	2,631		1,700	

Source: USTPO, Patent full-text and image database, and Patent Application full-text and image database

Result

7. Siemens (Germany)

Inventors' Country	The number of Granted Patents	Ratio	The number of Patent application	Ratio
China	70	0.96%	30	0.79%
Japan	14	0.19%	17	0.45%
Korea	4	0.06%	1	0.03%
Netherlands	15	0.21%	6	0.16%
Sweden	34	0.47%	9	0.24%
USA	255	3.51%	168	4.41%
Germany	6,852	94.25%	3,476	91.21%
India	9	0.12%	10	0.26%
Total	7,270		3,811	

Source: USTPO, Patent full-text and image database, and Patent Application full-text and image database

Conclusions

- In this research, we were NOT able to find the significant effects that foreign engineers who are in developed countries support the Asian emerging MNEs' technological development.
- Because Asian MNEs' R&D activities for patenting are strongly concentrated on home, Asian MNEs' R&D capabilities would be growing stronger recent years.
- R&D activities of European MNEs tend to disperse and depend on engineers of other countries compared to Asian MNEs.

References

- Heller, M. A. and Eisenberg, R. S. (1998), “Can Patents Deter Innovation? The Anticommons in Biomedical Research,” *SCIENCE*, Vol.280, 1 May, pp.698-701.
- Joe Tidd, Keith Pavitt, John Bessant(1997)“*Managing Innovation*” John Wiley & Sons (後藤 晃, 鈴木 潤訳『イノベーションの経営学』,2004年,NTT出版).
- Patel, P. and Pavitt, K. (1994) “Uneven (and Divergent) Technological Accumulation among Advanced Countries: Evidence and a Framework of Explanation”, *Industrial Corporate Change*, Vol.3, No.3, pp.759-787.
- Pavitt, K. and Patel, P. (2000) “National Systems of Innovation under Strain: the Internationalisation of Corporate R&D” in: Barrell, R., Mason, G., O’Mahony, M. eds., *Productivity, Innovation and Economic Performance*, Cambridge University Press, pp.217-235.
- 荒井将志(2010)「グローバル業界における標準化と知的財産権管理の進展」『多国籍企業研究』第3号、2010年7月、1-22頁(査読付論文)。
- 江藤 学(2007)「知的財産と標準化」梶浦雅己編著(2007)『国際ビジネスと技術標準』文眞堂所収、182-229頁。
- 加藤 恒(2006)『パテントプール概説』発明協会。
- 菊池純一(2008)『標準化と知的財産法』マイクロソフト社寄付講座「標準化ビジネスの法と実務II」第4回, 2008年10月23日。
- 佐藤幸人(2010)『アジアの産業発展と技術者』アジア経済研究所。