

MNC R&D Labs in China

IP Protection and Innovation for the Global Market

Xiaohong (Iris) Quan
SPRIE Fellow

Stanford Projects on Regions of Innovation and Entrepreneurship

Shorenstein APARC, Stanford University
November 29, 2005

Copyright © 2005

Do not cite without permission.

Introduction

□ Globalization of R&D

R&D expenditures of foreign affiliates worldwide

US \$30 B (1993) → \$67 B (2002) (UNCTAD, 2005)

US offshore R&D to developing countries

US \$700 M (1994, 7.25%) → \$4,000 M (2000, 20.73%) (OECD)

US 7.6%, 1994 → 13.5%, 2002 (UNCTAD)

□ Surge of MNC R&D labs in China since the late 1990s

“Within five years, China could overtake UK, Germany and Japan as a base for corporate research, leaving it second only to the US.”

(NYTimes, 2004; von Zedtwitz)

Top locations for offshore R&D:

- ◇ China, US, India, UK (The Economist Intelligence Unit, 2004)
- ◇ China, US, India, Japan, UK (UNCTAD, 2004)

Theoretical background

- Traditional product life cycle theory
Kuznet, 1930; Burns, 1934; Vernon, 1960, 1979; Norton and Rees, 1979
- Spatial division of labor theory
Massey, 1979; Frobel *et al.*, 1978
- Rejection of MNC R&D only in home country
Cantwell, 1995; Mansfield *et al.*, 1979; etc.
- Rejection of MNC R&D only in developed countries
Reddy, 2000; Walsh, 2003; von Zedtwitz, 2004; Gassmann and Han, 2004; etc.
- Location incentives and activities of MNCs' R&D abroad
Reddy, 2000; Gassmann & von Zedtwitz, 1998; Bartlett & Ghoshal, 1991; Behrman and Fischer, 1980; Pearce, 1989, 1999; Hikanson & Nobel, 1993; Florida, 1997; Nobel & Birkinshaw, 1998; Kuemmerle, 1999a,b; Cantwell, 1989; Dunning, 1977, 1992, 1994; etc.
- Organization and management of MNCs' global R&D network
Bartlett & Ghoshal, 1991, 1998; Archibugi & Michie, 1995; Casson, 1991; Medcof, 1997; Zander (1999); Gassmann & von Zedtwitz, 1998; Pearce, 1999; etc.
- Impact study

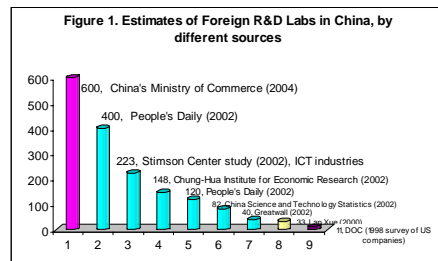
My research setting

- **What kinds of R&D activities take place in China, and why? Concerns on IP ...**
(focus of this talk)

- **MNC R&D labs' interaction with the local innovation system** (local firms and universities in particular)

Data and methods

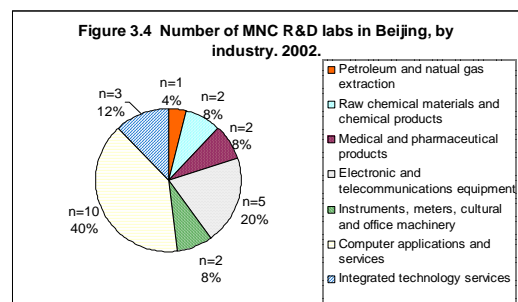
- Inconsistency in data on the number of MNC R&D labs in China
- IT industries
- Beijing as case region, +Shanghai



Qualitative Methods: Triangulation

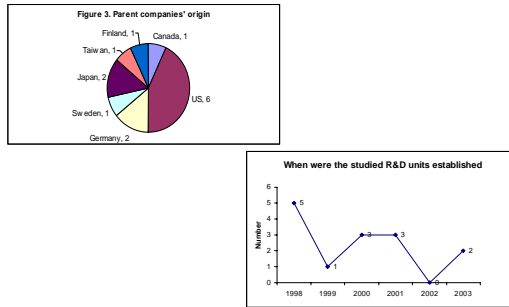
- Archival research
- Focus group
- In-depth interviews (60+, 200+)
 - Interviewees: MNC R&D lab managers, university professors, government officials
- Face-to-face survey: 14 R&D labs
- Case studies: 4 labs

Overview of MNC R&D labs in Beijing



Data source: Beijing R&D survey (2002)

Background information of my surveyed MNC R&D labs



Findings: global market orientation

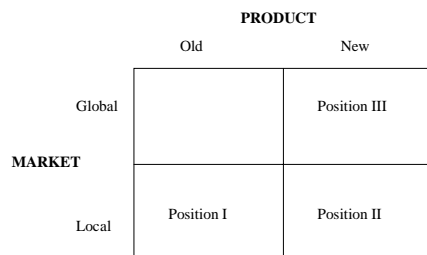
Global-market-oriented product development is one most important function of MNC R&D labs in China.

MNC R&D labs in developing countries are not just focusing on local adaptation of imported products, local technical supports, or product development for the local market.

Data not yet publicly available, contact author later.

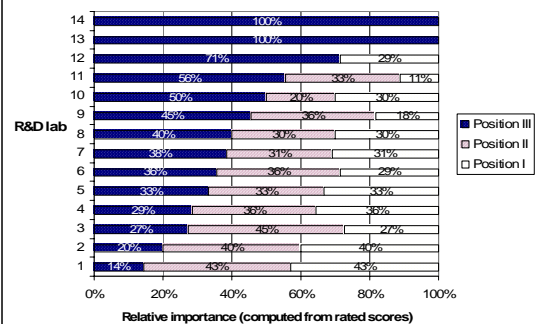
My positioning theory—

Positioning MNC R&D labs in an MNC's spatial innovation strategy



Source: Xiaohong Quan. PhD dissertation. University of California at Berkeley, 2005.

Figure 3.9 Positions of MNC R&D labs in Beijing



Source: Xiaohong Quan. PhD dissertation. University of California at Berkeley, 2005.

Location incentives

Not surprisingly, “availability of R&D personnel” is listed as the most important location incentive for MNC R&D labs in China.

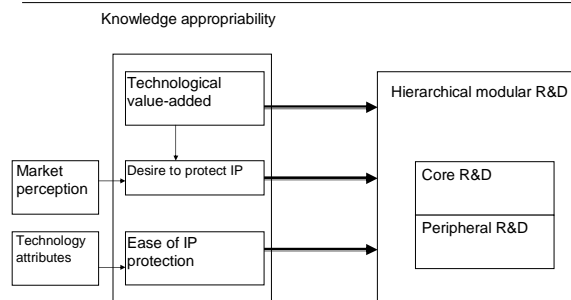
Other important factors that attract MNC R&D labs to locate in China include “proximity to regional and local markets”, “low cost of R&D”, etc.

Data not yet publicly available, contact author later.

Internal motivation

- **Benefits from attractive local resources such as low cost R&D labor may not be sufficient for relocated MNC R&D to be economically successful. Further analysis from MNCs’ internal motivation is necessary.**
- **Proposition: A hierarchical modular R&D structure can be an effective way for MNC R&D labs to protect their intellectual property and thus facilitate appropriation of returns in developing countries with weak IPR regimes.**

Knowledge appropriability and hierarchical modular R&D

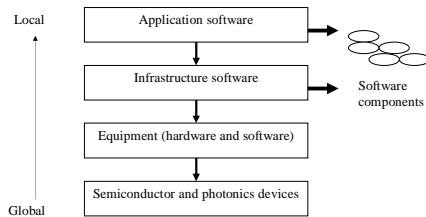


Hierarchical modular R&D and location preference

		Technological Value-added	
		High	Low
Protectability	Low	Core R&D; Developed Countries	Possibly developed Countries. Case A.
	High	Possibly developing countries	Peripheral R&D; Developing Countries

Source: Xiaohong Qian. PhD dissertation. UC Berkeley, 2005.

Perception of market

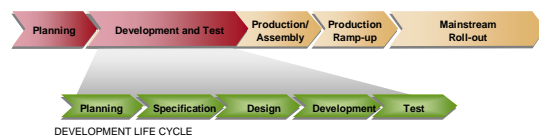


Adapted from Messerschmitt & Szyperski, 2003, *Software Ecosystem*, (p. 24)
 Note: The thick black arrows mean "built on".

Case study-MNC R&D Lab A

- Software company.
- In China since 1997. Now 130 employees in Beijing and Shanghai. It's one of the eight largest labs of MNC A in the world. 99% are local Chinese.
- The lab focuses on product development.
- Global market orientation.
- Distributed development strategy (30% offshore)
- Its labs worldwide "create different parts for the same product and share knowledge." (Interview with the VP)

Hierarchical modular R&D structure and IP

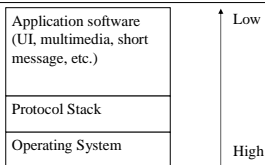


- The geographical configuration of R&D among different labs helps protect IP.

Case study-MNC R&D Lab B

- Listed in top 10 semiconductor firms in the world.
- Officially established in Shanghai in 2003.
- 50 employees. >90% are local Chinese.
- The lab focuses on Asia-Pacific market and world market.
- Mobile application software development in the Shanghai R&D lab. No chip design.
- Distributed R&D strategy. In China: Beijing, Shanghai, Xi'an, Suzhou

Hierarchical modular R&D structure and IP



- IP infringements are not uncommon.
- A lack of IP knowledge in China.
- "Most danger of IP infringement is seen from customer side" (interview).
- Employees leaving labs are not threats to the parent lab
- Reverse-engineering isn't a problem for IP owners since the software is mostly related to the MNC's own products.

Interaction with local universities and firms

- Channels of interaction
 - Active linkages
 - Project cooperation, subcontract, internship, etc.
 - Passive linkages
 - Personnel turnover rate, conference attendance, etc.
- MNC R&D labs more actively interact with local universities than with local firms.

Interaction with local universities

Number of MNC-involved science and technology projects in Tsinghua, 1995-2002

	1995	1996	1997	1998	1999	2000	2001	2002
Number	10	35	41	54	52	80	56	60

Source: Tsinghua University Science & Technology Office.

Note: Data here are not restricted to cooperation with MNC R&D labs in Tsinghua University.

Number of foreign-involved R&D projects in BUPT

YEAR	NUMBER OF PROJECTS
2003	22
2002	27
2001	32
2000	10

Data source: BUPT Science & Technology Office

Interaction channels between MNC R&D labs and local universities

- Donation
- Outsourcing
- Sponsored research
- Joint-lab model
- Internship, training, etc.

- Benefits and incentives

Summary: Key findings

- MNC R&D labs in China do product development for the global market, not just local adaptation or product development for the local Chinese market.
- Low cost R&D labor is the most desired resource for MNC R&D labs in China.
- R&D can be further specialized. MNCs tend to keep core R&D at home, while moving peripheral R&D offshore. A hierarchical modular R&D structure can be used as an effective method to protect IP. That is, proper R&D strategy can complement institutional inefficiency such as weak IPR regime.
- There are several channels of interaction between MNC R&D labs and local Chinese firms and universities (such as joint labs, sponsored research, employee turnover). MNC R&D labs more actively interact with local universities than with local firms.

Thank you!

irisquan@stanford.edu

Composition of IP disputes in China, 1990~2000

