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# Concentration and Separation of R&D with Production: Lessons from MNC R&D in China

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Workshop on Technology Innovation, Private Sector  
Development, and Economic Growth  
Hangzhou, China, May 25-27, 2005.





# Outline

- **Background**
- **Research design**
- **Initial Findings-nationwide**
- **Initial Findings-Beijing**
- **Implications**



## Background-literature and experience

- **innovation and production-The need for R&D activities to be closely integrated with production:**
  - Tom Allen's study about distance and technical communication;
  - “Lessons” from Xerox's PARC.



- **The need for service and manufacturing to go together:**
  - The debate about manufacturing and service in the US:
    - “Manufacturing matters”



# Background-Recent Changes

- **Global division of labor of countries and regions**
  - MNC's operation is changing from integrated operations based on individual country to global networks based on pieces of value-added chains ;
  - The rise of China as a global manufacturing center and India as a global service center challenges previous wisdoms;
- **Changes in global R&D trends**
  - MNC R&D activities are increasingly becoming global:
    - MNC R&D centers in China was less than 200 until 2001;MNC R&D centers are over 700 now in China.



## Questions

- **To what degree the new pattern of globalized R&D activities confirms or disapproves the conventional wisdom?**
- **What is the driving force behind MNC's R&D activities in China?**
- **What is the implication of the globalization of R&D for national and local governments?**



## Research design-objectives

- Supported by Ministry of S&T, and Municipal government of Beijing;
- Aimed at improving the understanding of MNCs R&D activities in China with a special focus on MNC's R&D centers in Beijing.
- A follow up study of our 1999 study when we surveyed over 30 major MNC R&D centers around China (Xue etc.2000,2001,2002).



## Research design-sample

- MNCs in the list of Business Week Global 1000 (2004) and in the industry which may have R&D activities;
- Autonomous R&D centers set up by above MNCs in China

**Table1 The number of MNCs selected for contacts**

<b>Total number of MNCs in our research industrial fields</b>	<b>Have office/operations in Mainland China</b>	<b>Contacted effectively (through phone/mail / FAX)</b>
<b>483</b>	<b>335</b>	<b>289</b>



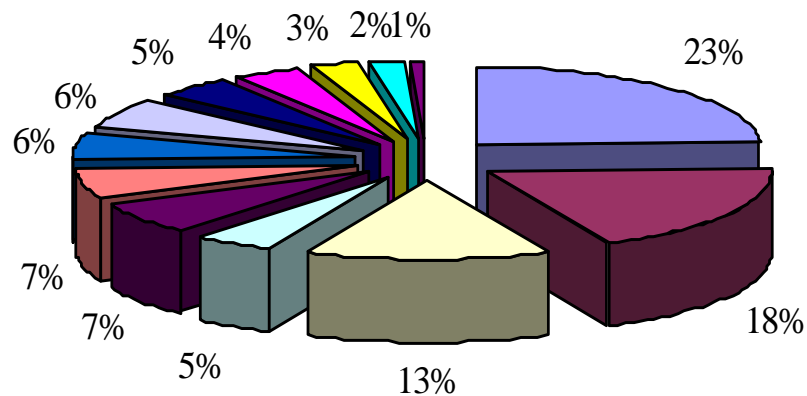
## Research design-methods

- From August to September 2004, phone interviews with managers of these 289 corporations;
  - 117 companies have set up R&D facilities in China;
  - 215 R&D centers were set up by them;
    - 107 are autonomous R&D labs;
    - 59 are R&D units in the regional subsidiaries;
    - 49 cooperative centers (with Uni. Etc.)



# Initial Finding: industrial distribution (2004):

Figure 2 The industrial distribution of independent R&D centers settled by Business Week 1000 MNCs in China (2004)



- |                       |                                      |
|-----------------------|--------------------------------------|
| Software              | Telcommunications                    |
| Semiconductors        | Industrial Equipments and components |
| Automobiles           | Commodity Chemicals                  |
| Biotechnology & Drags | Household Electronics                |
| Other IT Products     | Chemicals                            |
| Food and beverages    | Industrial Conglomerates             |
| Others                |                                      |



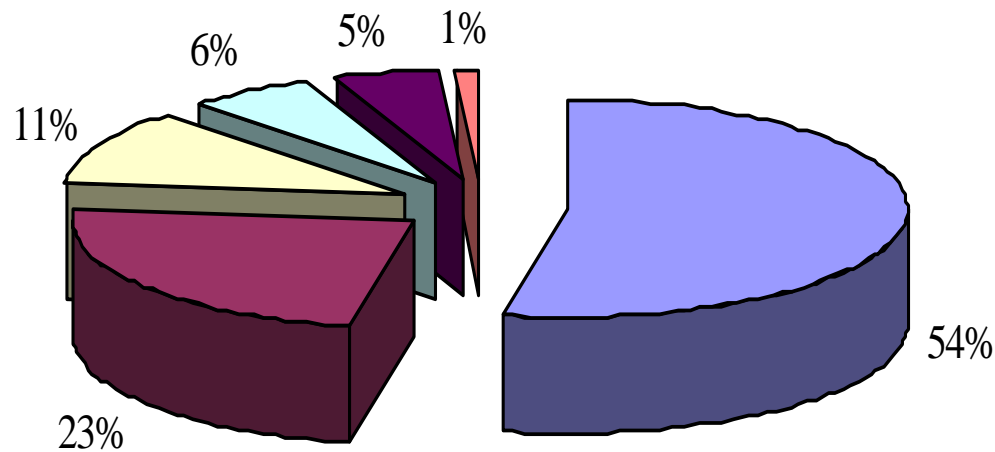
**Table. The industrial distribution of the R&D organizations settled by Business1000 MNCs in China (2004)**

Industry Name	Total R&D centers		autonomous R&D Centers		R&D un its	
	Number	Percent	Number	Percent	Number	Percent
Software	37	17.2%	26	24.3%	4	6.8%
Telecommunication	35	16.3%	20	18.7%	5	8.5%
Semiconductors	19	8.8%	15	14.0%		0.0%
Industrial Equipments and Components	30	14.0%	5	4.7%	16	27.1%
Automobiles	17	7.9%	7	6.5%	5	8.5%
Commodity Chemicals	10	4.7%	7	6.5%	1	1.7%
Biotechnology & Drugs	18	8.4%	6	5.6%	9	15.3%
Household Electronics	13	6.0%	6	5.6%	3	5.1%
Other IT Products	14	6.5%	5	4.7%	8	13.6%
Chemicals	9	4.2%	4	3.7%	3	5.1%
Food and Beverages	7	3.3%	3	2.8%	4	6.8%
Industrial Conglomerates	2	0.9%	2	1.9%		0.0%
Others	4	1.9%	1	0.9%	1	1.7%
<b>Total</b>	<b>215</b>	<b>100%</b>	<b>107</b>	<b>100%</b>	<b>59</b>	<b>100%</b>



## Initial Findings-country distribution (2004)

Figure 4 The country distribution of independent R&D centers settled by Business Week 1000 MNCs in China (2004)



■ North America

■ Japan

■ UK, France and German

■ North Europe

■ Other European Countries

■ Other Countries



**Table The country distribution of the R&D organizations settled by Business1000 MNCs in China (2004)**

Parent Countries	Total R&D Centers		Autonomous R&D Centers		R&D units	
	Number	Percent	Number	Percent	Number	Percent
North America <sup>1</sup>	103	47.9%	52	48.6%	26	44.1%
Japan	47	21.9%	23	21.5%	12	20.3%
Korea	24	11.2%	9	8.4%	8	13.6%
Europe:	40	18.6%	22	20.6%	13	22.0%
UK, France& German	24	11.2%	11	10.3%	12	20.3%
North Europe <sup>2</sup>	8	3.7%	6	5.6%		0.0%
Other European Counties <sup>3</sup>	8	3.7%	5	4.7%	1	1.7%
Other Countries	1	0.5%	1	0.9%		0.0%
<b>Total</b>	<b>215</b>	<b>100%</b>	<b>107</b>	<b>100%</b>	<b>59</b>	<b>100%</b>



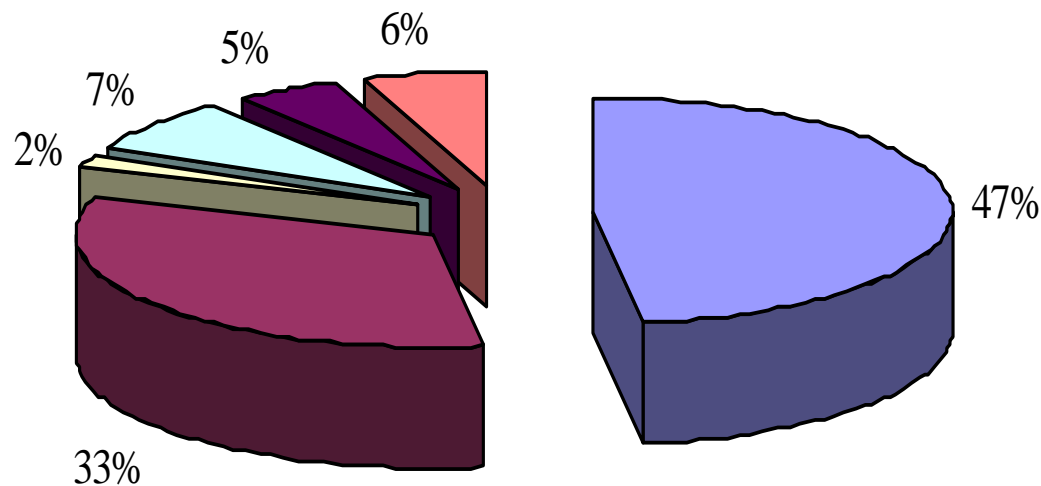
**Table4 The regional distribution of the R&D organizations settled by Business1000 MNCs in China (2004)**

Regions	Total R&D Centers		Autonomous R&D Centers		R&D Units	
	Number	Percent	Number	Percent	Number	Percent
Beijing	82	38.1%	51	47.7%	14	23.7%
Shanghai	60	27.9%	35	32.7%	14	23.7%
Tianjin	9	4.2%	2	1.9%	6	10.2%
Guangdong	23	10.7%	8	7.5%	7	11.9%
Jiangsu	18	8.4%	5	4.7%	9	15.3%
Other regions	23	10.7%	6	5.6%	9	15.3%
Total	215	100%	107	100%	59	100%



# Initial Findings-location choice (2004):

Figure 6 The regional distribution of independent R&D centers settled by BusinessWeek 1000 MNCs in China (2004)



■ Beijing ■ Shanghai ■ Tianjin ■ Guangdong ■ Jiangsu ■ Other regions



# The case of Beijing

- Survey questionnaires were sent to 74 companies in Beijing and 36 usable responses were received;
- Intensive interviews of 8 companies were conducted.
  - **The establishment and positioning of the centers;**
  - **Motivations of setting up the center**
  - **The operations of the centers**
  - **The source of knowledge**
  - **The linkages with local institutions**
  - .....

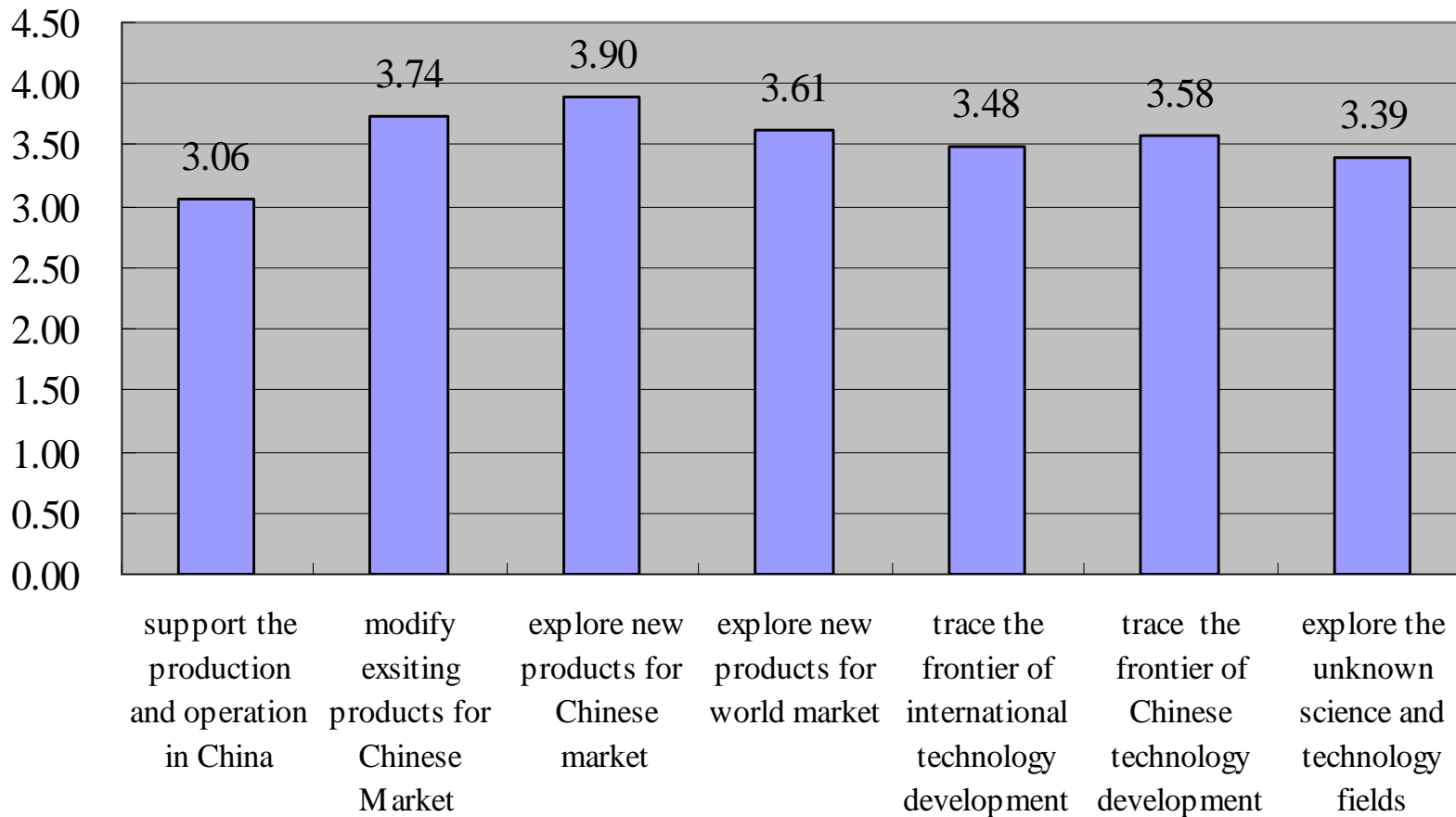


## Industrial distribution by original of R&D centers

	US	Japan	Europe	Korea	Others	Total
IT	37	11	12	4	15	79
Bio/Drug	2	1	6		4	13
Inst&Eq.	2	12	1	4		18
Chemicals	3		1			4
Auto.	3	1				4
Others	5	2		1	1	9
Total	52	27	20	8	20	127



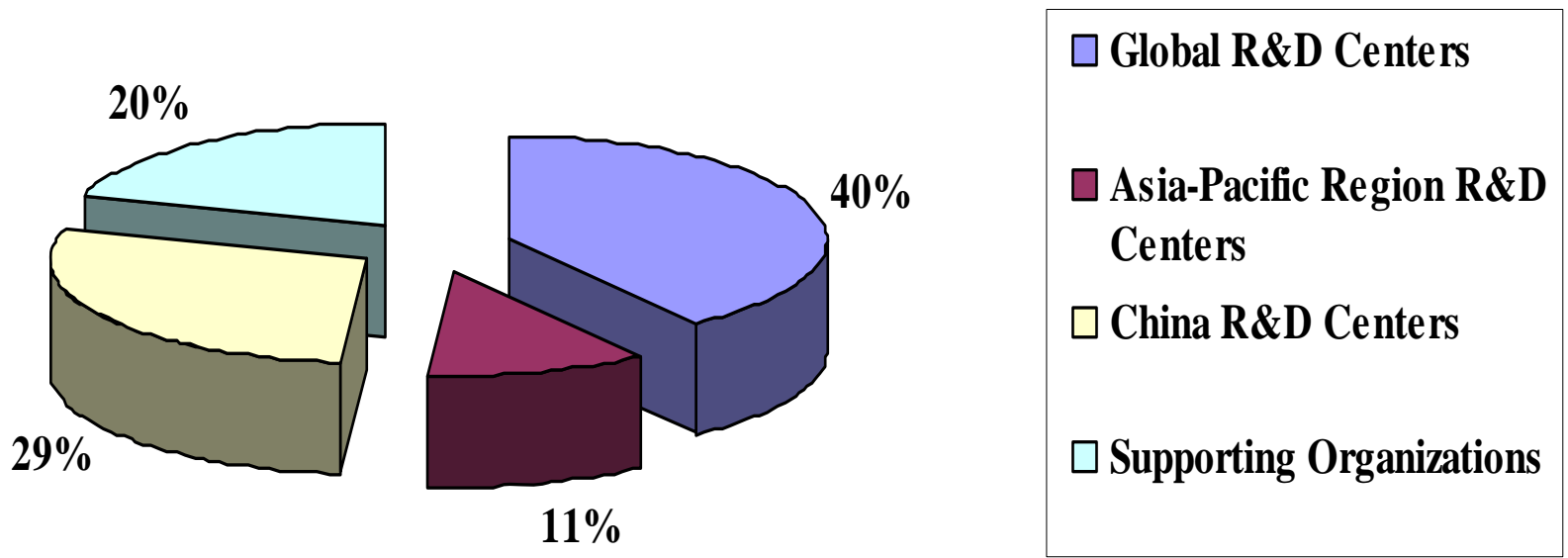
Figure 14 The importance of different objectives of the R&D institution's work(2004)





# Positioning of the R&D Centers

Figure 13 The orientation of MNCs' R&D organizations in Beijing



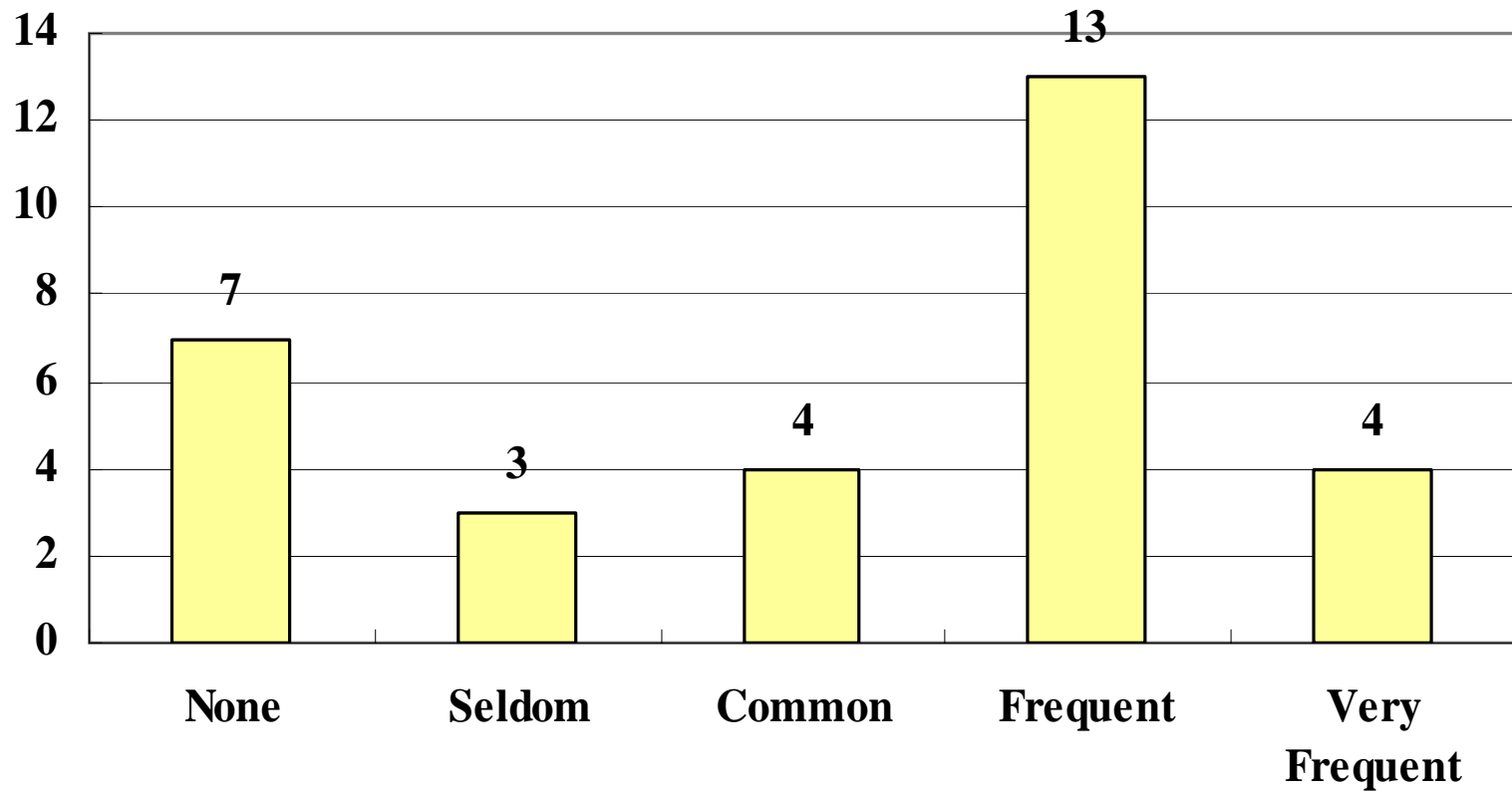


## Sources of Knowledge

Sources	N	Means
R&D Headquarter	30	3.7667
Literature	30	2.1667
Brother R&D centers	30	2.1667
Chinese Uni. Or Inst.	30	1.9333
Colleagure R&D centers	30	1.2000
Local Brother factories	30	1.1667

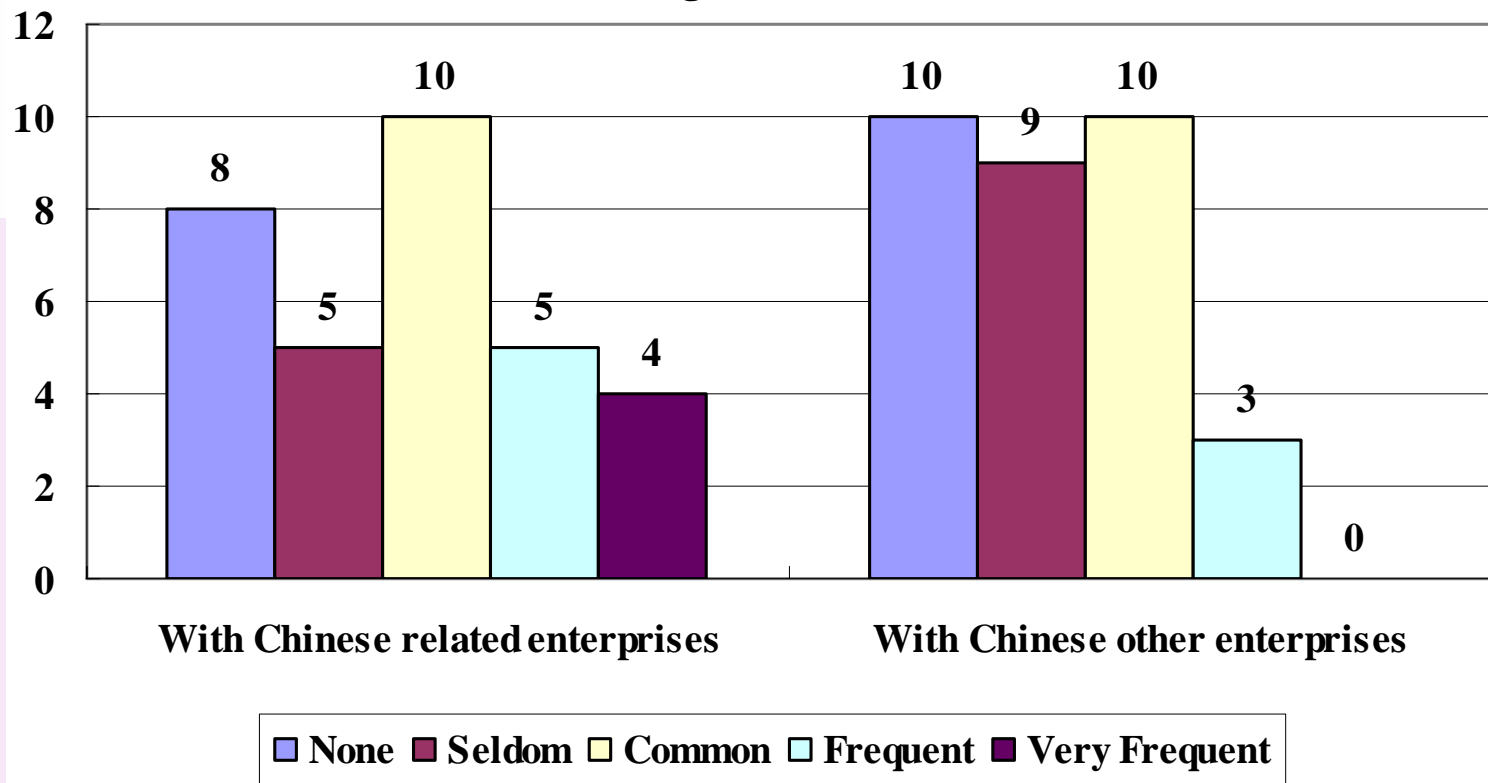


**Figure 17 The frequency of communications between MNCs' R&D organizations and Chinese University/science research institute(the number of correspondent R&D Organizations)**





**Figure18 The frequency of communications between MNCs' R&D Organizations and Chinese enterprises (the number of correspondent organizations)**





## Implications

- **The MNC R&D centers in China seems to indicate that while physically away, these R&D centers are still closely linked within the company's R&D network; They may not have close links with local operations;**
- **The low cost of high-tech labor force and China's market and are important driving force for MNC's R&D activities in China;**



- **A high percentage of these R&D centers behave more like enclaves in China, interacting mostly within the company's own network; the linkages with local companies are very weak;**
- **The impact of favorable policies of local gov't aimed at attracting foreign R&D centers is limited .**
  - Problems in policy design
  - Problems in policy implementation



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**Thank you!**