



Dynamics of Technological Innovator Network

**A comparative Case Study
on Manufacturing Companies
in China, Denmark, and Switzerland**

Ju LIU

**School of Management and Economics
University of Electronic Science and Technology of China, Chengdu, China
Department of Business Study,
Aalborg University, Aalborg, Denmark
Department of Management, Technology and Economics
Swiss Federal Institute of Technology, Zurich, Switzerland**

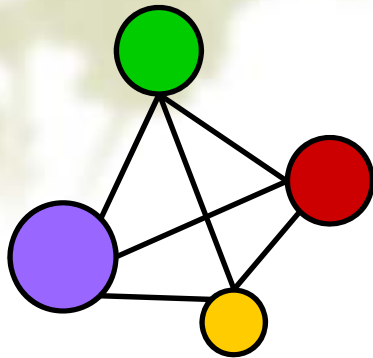
Email: liuju@uestc.edu.cn, julew@126.com



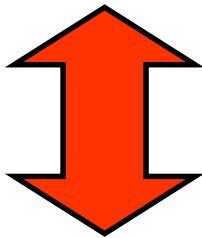
Agenda

- Introduction of my research
 - A paper on the Chinese case
- 
- 

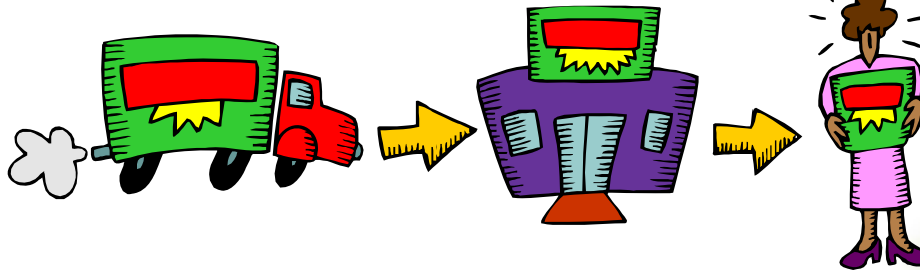
What is this research about?



Pattern and process of social interaction for technological innovation within and across organisational boundary in different organisational and economic context



Dynamic relationship



Change of technological innovation performance during the process of technological innovation

Why this research is important?

- Innovation is a process which happens in a system where **interaction** between firms, customers, suppliers, competitors and various other private and public organizations is important (Fagerberg, 2005).
- It is blind to explain economic performance without bringing into the analysis of **social relationships** and organizational structures (Lundvall and Christensen, 2004).
- The processes involved are highly **context dependent** and the best we can do is to develop models that bring to the fore differences in context as different patterns (Lundvall and Christensen, 2004).

What are the research questions?

- **What main stages in terms of technological innovation performance did these companies go through in the past?**
- **How did the TINs of these companies evolve over different stages of technological innovation?**
- **How is the dynamic relationship between the structuring and functioning of the TINs and the performance of technological innovation in these companies?**
- **What are the implications to industrial practitioners and policy makers?**

How is the research methodology?

■ Case comparison approach

■ Data collection

- ❖ Questionnaire, interviews, direct observations, archives and statistics

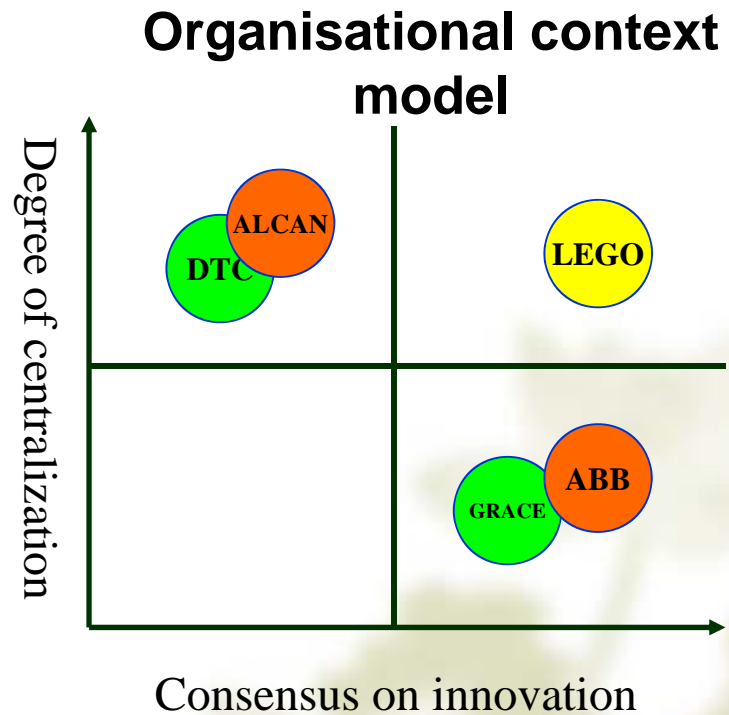
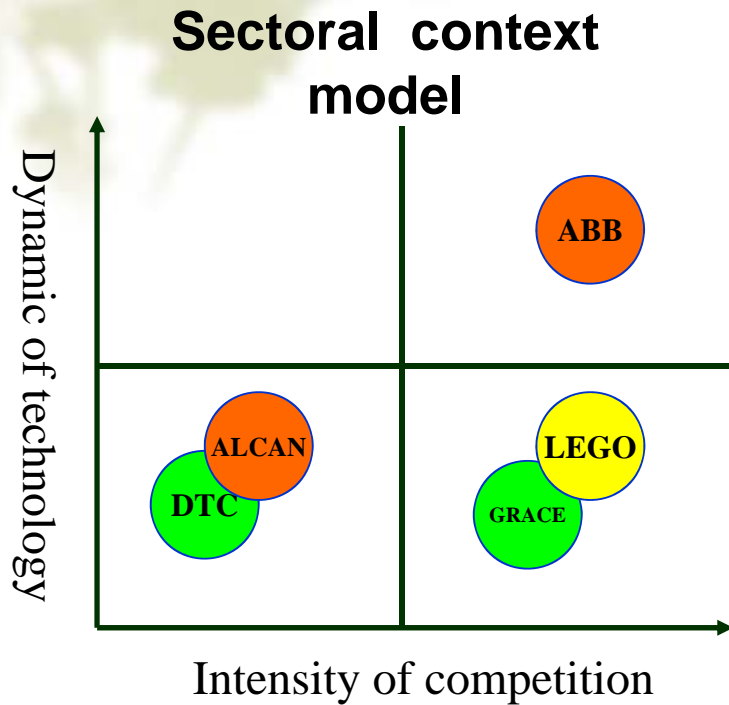
■ Data clarification and complementation

- ❖ Email correspondence
- ❖ Telephone discussions

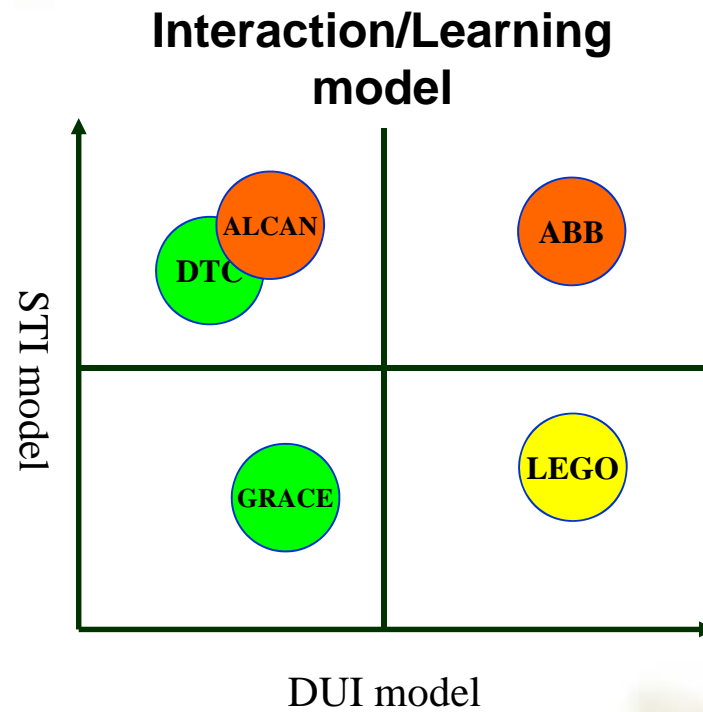
■ Social network analysis

- ❖ Visualize the TINs---Socialgram
- ❖ Explore the structural attributes of the TIN--Network parameters

Who are the company partners?

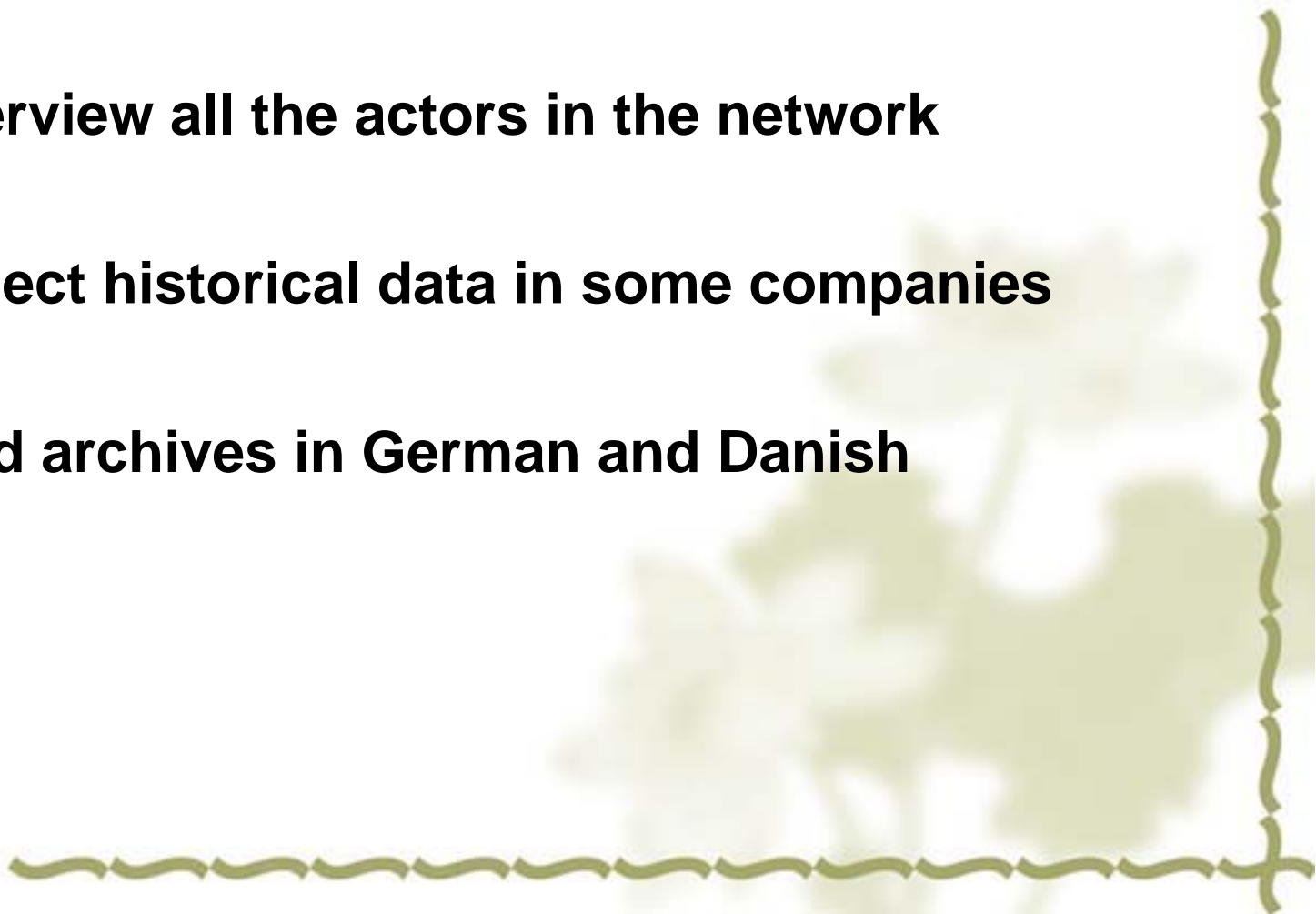


Who are the company partners?





What are the difficulties of the research?

- **To interview all the actors in the network**
 - **To collect historical data in some companies**
 - **To read archives in German and Danish**
- 



A paper of the Chinese Case

Technological Innovation and Organizational Learning: a case study on dynamics of a technological innovator network of a Chinese textile company



by Ju LIU, Yan-gao XIAO, Ying LIU

Presented in CICALICS workshop 2007



The Chinese Case ---Grace Group

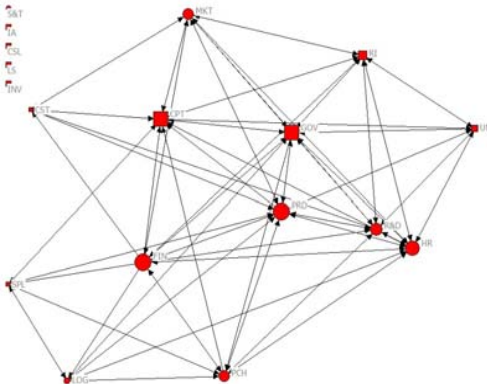
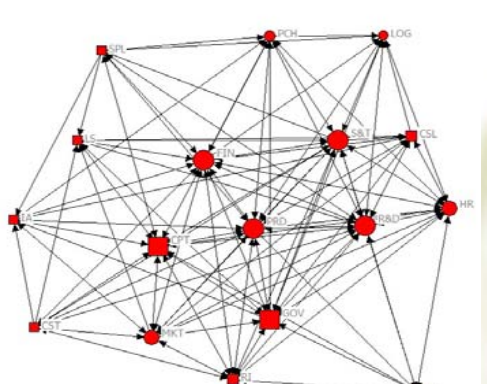
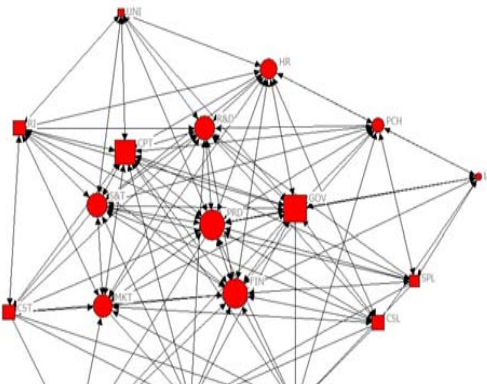
Name	Grace Group Limited (C	
Founded in	1984	
Industrial Status	Top manufacturer of v	
Total assets	390 million EUR	
Employees	12,000	
Export to	29 countries	
Annual R&D as percentage of sales	3% to 9% (2001-2006) (Textile industry's ave	
Proportion of new product to total product category	Over 50% (2003-2005)	
Average annual growth rate	35% (1997-2006)	
Location	Inland province and far from the economic cen province	

Actors of the TINs of Grace Group

Internal departments	
PRD	• Production Department
FIN	• Financial Department
LOG	• Logistic Department
HR	• Human Resource Department
S&T	• Science & Technology Department
R&D	• R&D Department
PCH	• Purchasing Department
MKT	• Marketing Department

External organisations	
CPT	• Competitors
UNI	• Universities
SPL	• Suppliers
CST	• Customers
GOV	• Government
INV	• Private investors
LS	• Legal services
CSL	• Consulting companies
RI	• Research Institutes
IA	• Industrial association

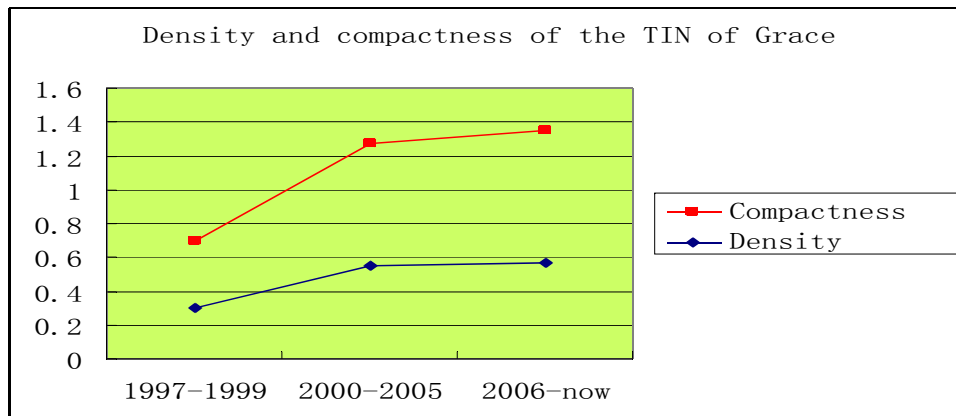
The evolution of Technological innovator network of Grace Group

TI outcome	Patents, S&T projects, new products, contribution rate of S&T to revenue		
Stages	Elementary stage 1997-1999	Booming stage 2000-2005	Plateau stage 2006-now
Historical events	<ul style="list-style-type: none"> • Change of top management • Invention of 2S • Massive recruitment of 600 new employees 	<ul style="list-style-type: none"> • A large number of influential and profitable Inventions • The establishment of S&T Dep. and IPR Office 	<ul style="list-style-type: none"> • Innovation fatigue • Decrease of quality and quantity of TI projects • Lack of technological talents
Structure of TINs			

Case Analysis---attributes of the TIN in Grace

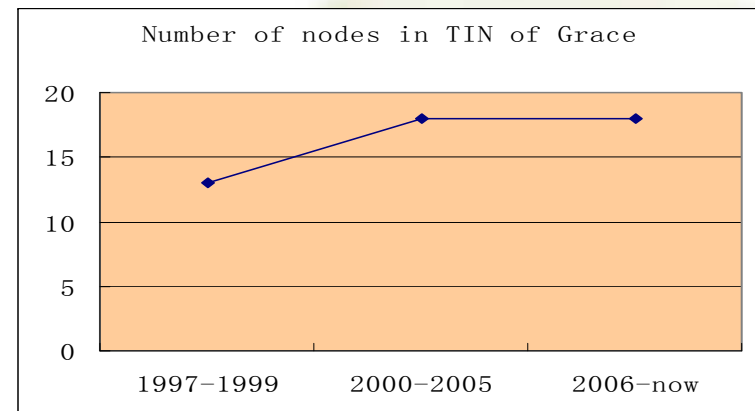
■ Density & compactness

- a measure of the connectedness between nodes in a network



■ Diversity

- measured by the number of the nodes which are diverse in nature

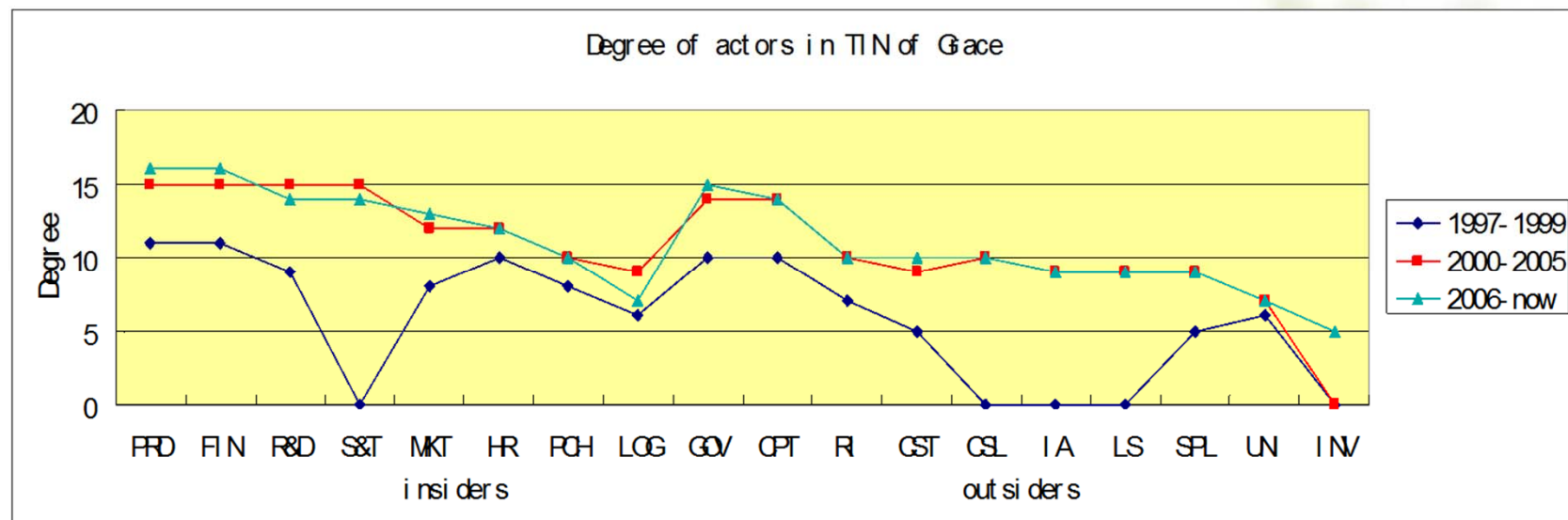


Case Analysis---attributes of the TIN in Grace

■ Centrality

■ Degree

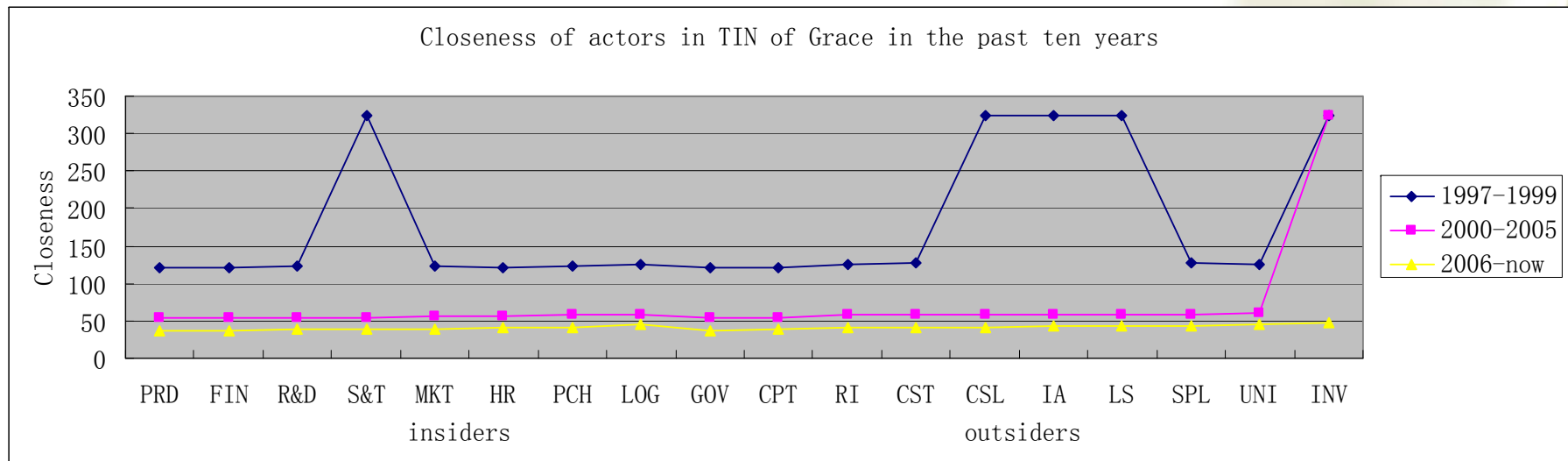
❖ reflects the how a node is connected in the local environment



Case Analysis---attributes of the TIN in Grace

■ closeness

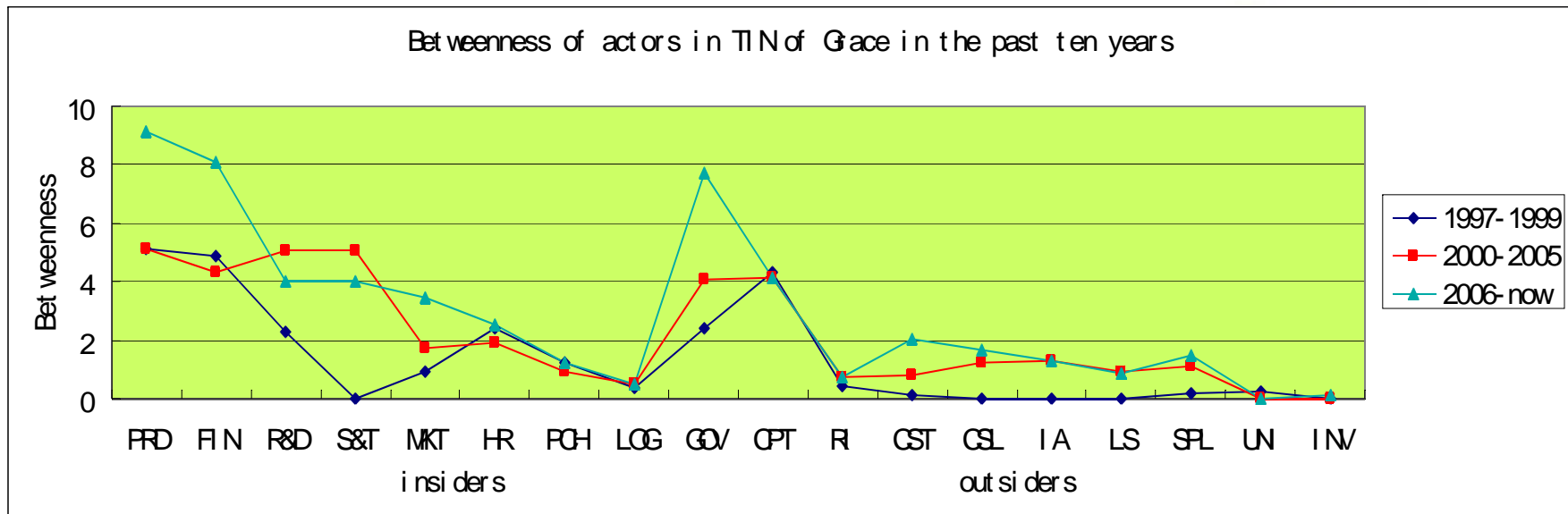
- reflects to what extent a node is the center of the network
- expressed by the sum of the distances from a particular node to the other nodes in the network.



Case Analysis---attributes of the TIN in Grace

■ Betweenness

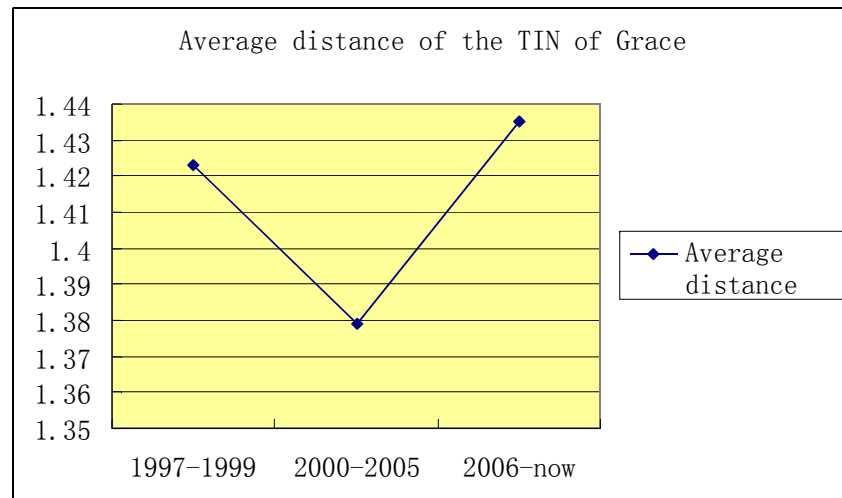
- measures the extent to which a particular node lies between the other nodes in the network



Case Analysis---attributes of the TIN in Grace

■ Efficiency

- reflects the extent of difficulty for a node to get access instantly to a large number of different nodes through a relatively small number of ties.
- measured by the average distance of the network.



Conclusions 1

- **An introverted technological innovator network (TIN) can have good production provided right technological innovation strategy in a relatively slowly changed technological environment. But how far it can go is a question.**
- **Connected networking don't necessarily mean productive organizational learning in TIN. Mutual trust and recognition is crucial to the outcome of organizational learning and technological innovation process.**

Conclusions 2

- **Density, compactness, diversity of TIN of Grace and technological innovation performance have positive relations given organizational learning as the intermediate**
- **Centrality of an actor reflects its strategic importance in the TIN and this implies a positive correlation between centrality, organizational learning, and competence building.**
- **Efficiency of the TIN of Grace is positively correlated with the performance of its technological innovation**





谢谢!

TAK!



DANKE!