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ASIAN DEVELOPMENT BANK



北京大学  
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# Multiple Pathways to Triple Helix: What Can We Learn from China?

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# Theories linking U-I-G

1968

**Sábato's Triangle** (Sábato, Botana, 1968) :  
the development of Latin American countries  
→government, industry, & science and technological infrastructure

1987

**National Innovation System** (Freeman, 1987):  
recovery of post-war Japanese economy  
→the network of institutions in the public and private sectors whose activities and interactions initiate, import, modify and diffuse new technologies

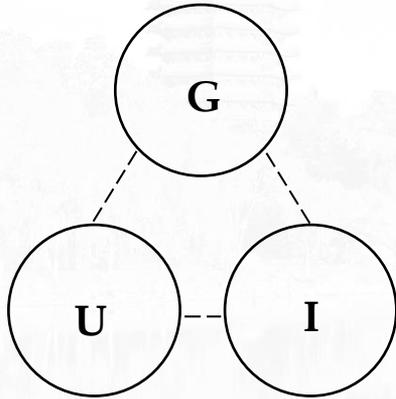
1992

**Regional Innovation System** (Cooke, 1992):  
European innovation practices  
→innovation as a regional strategy

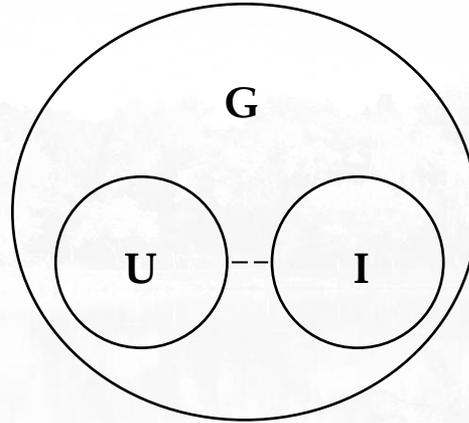
1995

**Triple Helix** (Etzkowitz, Leydesdorff, 1995):  
Silicon Valley, Route 128, Japan Tsukuba University City  
→the role of university in innovation

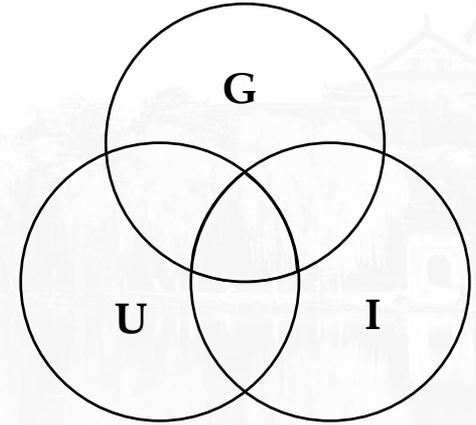
# Triple Helix Theory



**Laissez-faire**



**Statist**



**Balanced**

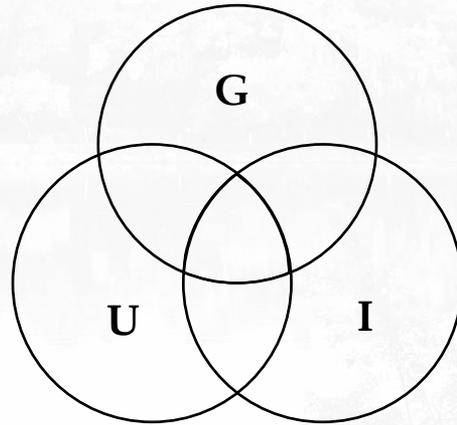
# Flaws of Triple Helix

- Lacks applicability in other institutional contexts (Cai, 2014, 2015; Cooke, 2005)
- Lacks micro-theoretical foundation, being highly-abstract (Shinn, 2002)
- Underestimates of the roles of governments

# Factor Endowments

central & local governments'  
policies and funding

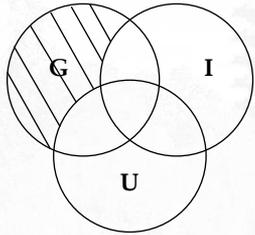
overall quantity and quality  
of higher education/research



the degree of knowledge  
intensity in the industry

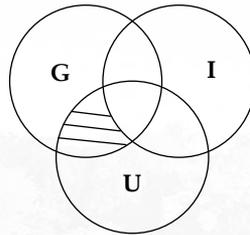
# Status of Collaboration

## Single-factor

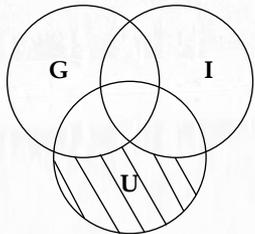


**Dream project**

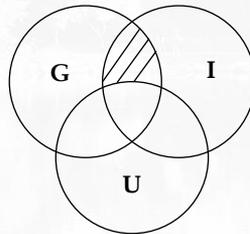
## Dual-factors



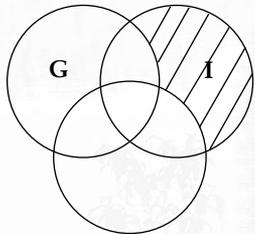
**Mismatched industry demand**



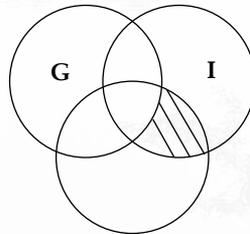
**Brain drain**



**Intellectual support scarcity**

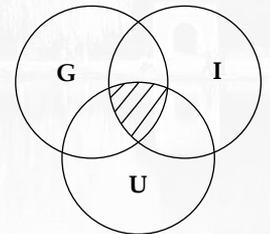


**Industry-solo**

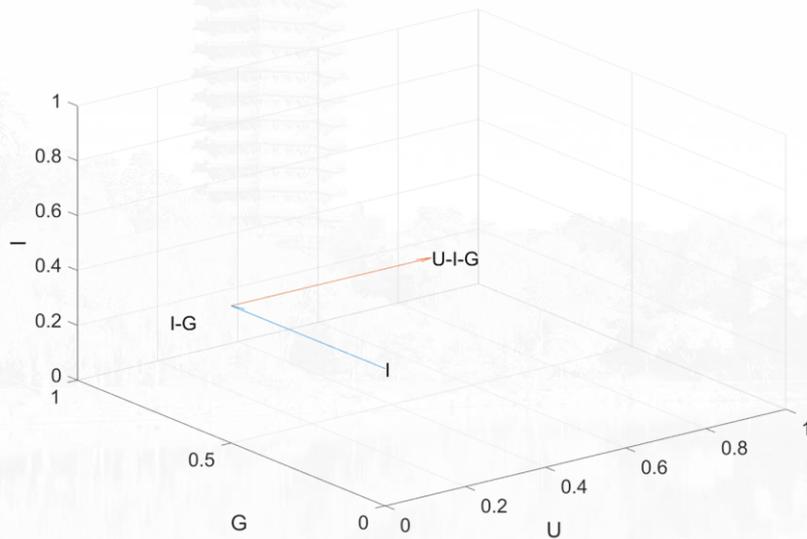


**Laissez-faire**

## Triple Helix

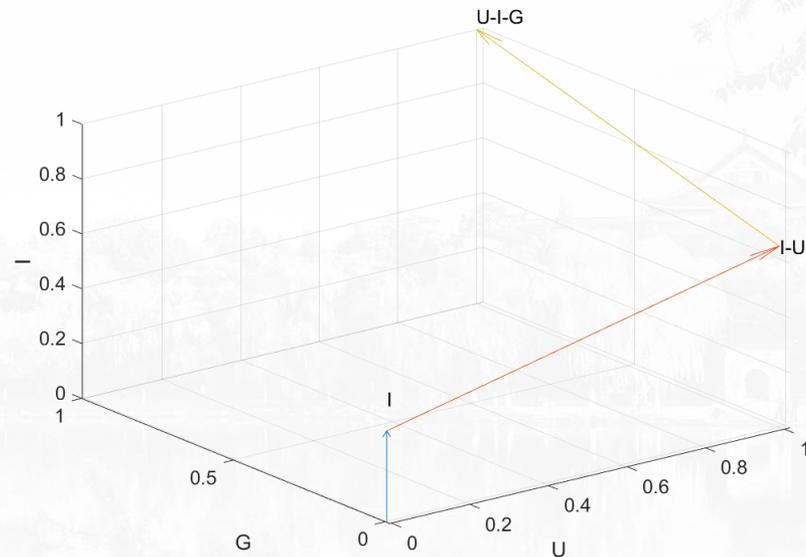


# Evolutionary Paths



## Horizontal Paths

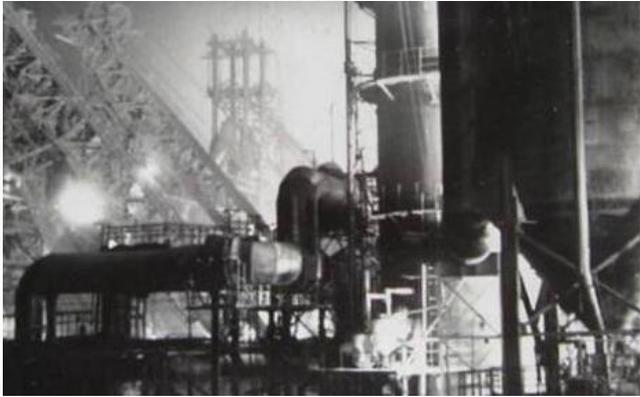
promoting other low-level endowments



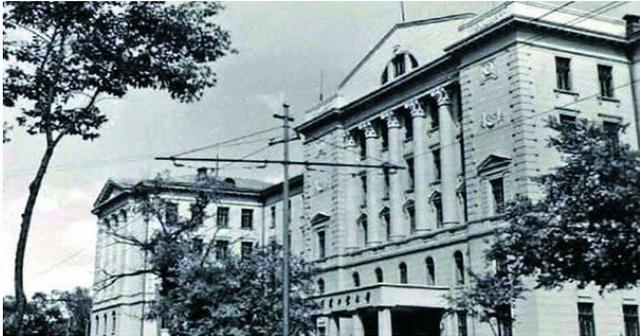
## Vertical Paths

supporting policies and higher education resources with the goal of industrial structure upgrading

# Case Studies 1: G + I + U → U Northeast China in the 1950s-1960s



1957, Angang Steel Group



1950s, Harbin Institute of Technology (HIT)

## ➤ 1950-1965:

**G→I:** Due to the needs of war preparedness and construction, the state laid out a large number of basic industries such as **machinery, steel, petroleum, automobiles** and other resource-based industries such as **timber** in Northeast China, making it an important heavy industrial center of the country.

**U:** Universities in Northeast China determined its **scale**, set up **specialties**, made **teaching plans** and tasks, and formed a relatively comprehensive socialist higher education system dominated by science and technology colleges based on the development of local industries' needs.

## Case Studies 1: G + I + U → U Northeast China in the 1950s-1960s continued



HIT Shenzhen



Dalian Taipingwan Port

### ➤ 1990s:

**I:** The economic development of Northeast China has encountered resistance due to its disadvantages in natural conditions, regional strategies, institutional mechanisms etc.

### G:

**Central G:** shifted regional development strategical focus towards the eastern and southern provinces.

**Local G:** continued institutional support for local traditional advantageous industries.

### ➤ 1999 to date:

**U:** Outflow of talents; universities opening branch campuses in southern and eastern regions.

## Case Studies 2: I→I+G Jinjiang Model



Representative Jinjiang brands



QIAODAN Sport factory

### ➤ 1978-Late 1990s:

**I:** “Small domestic foreign goods” industries, such as textile, clothing and footwear, flourished relying on overseas Chinese capital.

**G:** Jinjiang Government cancelled “three local” restrictions on raw materials, market and technology, and provided “five permits” that allowed capital raising, hiring, dividends, marketing and price changes, to protect “grassroots economy”.

### ➤ 2010 to date:

**I:** Microelectronics were developed, cooperating with UMC Taiwan.

**U:** The Intelligent Manufacturing College of the Fujian College of the University of Chinese Academy of Sciences and Fuzhou University Jinjiang Campus opened in Jinjiang.

# Case Studies 3: U→U+I→U+I+G Zhongguancun Science Park

**lenovo**  
**联想**

Lenovo

**Bai du** 百度

Baidu



Zhongguancun National Innovation  
Demonstration Zone

## ➤ 1980s:

**U:** Chen Chunxian, a researcher at the Institute of Physics of the Chinese Academy of Sciences, founded the Advanced Technology Development Service Department of the Beijing Plasma Society in the 1980, pioneering in knowledge commercialization.

## ➤ Early 1990s:

**I:** Forming of the "Zhongguancun Electronics Street", clustering nearly 100 IT firms. Famous University spin-offs including Tsinghua Unisplendour, PKU Founder were established.

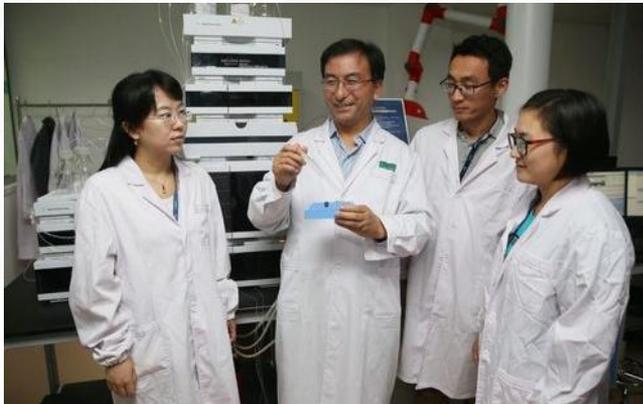
## ➤ Late 1990s to date:

**G:** In 1988, the State Council officially approved the Science Park. In 2009, it was recognized as National Innovation Demonstration Zone.

# Case Studies 4: I→I+U→I+U+G Yantai Bio-medical Industry



Shandong International Biotechnology Park



Dr. Fang in Rongchang Pharmaceuticals

## ➤ 1993-1994:

**I:** Rongchang Pharmaceuticals, Luye Pharma, CSPC Pharmaceutical were established.

## ➤ 2000-2008:

**U:** School of Pharmacy of Yantai University was formed in 2000. Binzhou Medical University opened Yantai branch campus in 2002. Rongchang achieved cooperation with Dr. Fang.

## ➤ 2000-2020:

**G:** Yantai Municipal government has shifted its strategy from "ordinary pharmaceuticals" in the 8th Five-Year Plan period (1991-1995), "biopharmaceuticals" in the 11th Five-Year Plan period (2006-2010), and to "biomedical" in the 12th Five-Year Plan period (2011-2015). In 2021, the government specifically issued the "Several Opinions on Promoting the High-Quality Development of Yantai's Biomedical Industry".

# Case Studies 5: $G \rightarrow G+I \rightarrow G+I+U$ Shenzhen IT Cluster



Shenzhen Science Park: 1985-2016

## ➤ 1980s:

**G:** Shenzhen was regarded the “window of reform & opening up”.

**I:** Labor-intensive industries & carrying-trade developed, based on cost advantages of land and labor.

## ➤ 1990s:

**U:** vocational colleges → Shenzhen University Park

## ➤ Late 1990s to date:

**I:** Forming an IT cluster including Tencent, Huawei, ZTE

**U:** Introducing top university satellite graduate campuses, PKU Shenzhen (2001), Tsinghua Shenzhen (2001), Harbin Institute of Technology Shenzhen (2002)

# Conclusions & Discussions

- **There is no one-size-fits-all Triple Helix Model. Typically, the development of a region first achieves a breakthrough in one of the three dimensions of the Triple Helix, and then seeks promotion in other dimensions.**
- **This innovation race requires continuous and more powerful policy support for the upgrading of regional industries and more innovative higher education resources.**
- **There are some misunderstandings in the world about China's innovation practices, which are generally believed to be government-led.**
- **The government may also establish an effective RIS through a statist model, especially in a state of emergency. But it may be vulnerable in the ability to adapt to changes.**
- **Triple Helix theory is not only applicable to the development of high-tech industries under knowledge production mode II, but also has implications to understand the critical role of human capital and government in promoting industrialization during economic take-off.**

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**Thank you!**  
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