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

overall quantity and quality of higher education/research

central & local governments’ policies and funding

the degree of knowledge intensity in the industry
Status of Collaboration

Single-factor
- Dream project
- Brain drain
- Industry-solo

Dual-factors
- Mismatched industry demand
- Intellectual support scarcity
- 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

➢ 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.
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

➢ 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

➢ **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 1980s, 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

➢ 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→G+I→G+I+U  Shenzhen IT Cluster

➢ 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.
Thank you!
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