

# A Resource-Based View on Nurturing Digital Innovation Ecosystem in a Region: Case Studies of Four Cities in China

Chaonan Yi

Ph.D., Nanjing University of Science & Technology, China

Email: njlgdx10095@njust.edu.cn

Lei Ma(Corr.)

Prof. Researcher, Nanjing University of Science & Technology, China

Email: maryma2009@njust.edu.cn

Kaitong Liang

Ph.D., Nanjing University of Science & Technology, China

Email: liangktong@njust.edu.cn

Xiaojing Huang

Ph.D., Nanjing University of Science & Technology, China

Email: huangxiaojing@njust.edu.cn

## Abstract

**Purpose:** Digitalization has become an important mode for regional economic development. Nonetheless, influenced by talents, firms, government, capital and other factors, the development of digital economy is unbalanced and faces many challenges in different regions. Several case studies about cities in China have been conducted in the context of digital economy to explore their paths to develop digital economy, which provides experience for relevant regions in other developing countries.

**Key Literature Reviews:** Accompanied with scholars' gradual recognition, quadruple helix framework plays an important role in the rapid development of science and technology era. The spirals of university, government, enterprises are interconnected with each other and a regional innovation ecosystem has been cultivated, which promotes the nonlinear development of regional economy. **Paredes Frigolett (2016)** has made research intensively on the quadruple helix model, including the theoretical model, measurement method, analytical modeling and empirical research. Driven by the trend of "Innovation 2.0" to "Innovation 3.0", the continuous development of the quadruple helix model and innovation ecosystem theory has gradually influenced the thinking of industrial development. **Miller (2016)** has analyzed and considered the relationship among the quadruple helix under the open innovation ecosystem. **Carayannis (2018)** believes that through the interaction of

resource flow and information transmission among the quadruple helix, independent subsystem formed by each helix can play the positive effects and fulfill the overall virtuous cycle. **Barykin (2020)** has proposed a concept of digital ecosystem and emphasized the leading role of digital technology in its formation. He concludes that the emergence of digital ecosystem is reasonable, and the direction is the cooperation between different types of economies. **Saleh (2020)** proposes that the development of regional economy can be promoted by optimizing natural resources and using technology. **Tolstykh (2021)** has chosen two different cities to study the sustainable development of regional economy in combination with ecosystem theory. In China, there is a trend to identify the quadruple helix in the context of digitalization. According to the release of 《White Paper on The Development of China's Digital Economy》 from China Academy of Information and Communications Technology(CAICT) in 2021, this paper defines the quadruple helix as the digital helix, including "industrial digitization helix, digital industrialization helix, digital value helix and digital governance helix". The report finds that in the process of exploring paths to develop regional digital economy, one digital spiral is selected as domain to drive regional development with the coordination of other digital spirals.

**Methodology:** Due to the explorative essence on the emergence of quadruple helix in the context of digitalization, case study will be used in this paper to describe and analyze a deep understanding on the "how" and "what" during this process (Yin, 2010). We select different cities in China as cases for the following reasons:

- (1) the leading digital spiral is different as the development of digital economy in cities are different, which forms their own characteristics;
- (2) It is inevitable to choose the leading digital spiral to develop regional economy in different cities according to their characteristics.
- (3) Cities in China are at different stages of developing digital economy, thus it is necessary to develop a leading digital spiral to drive regional economic development based on local environment. The data collection process includes document reviews and semi-constructed interviews. Since the digital economy stages in germination in China in 1994, the data and analytic duration will be from 1994-2021. Archival data was collected from the government official websites, company annual reports, government reports and enterprise official website. Semi-constructed interviews were conducted to in different cities in China.

**Findings:** After the analysis, this paper has the following findings:(1) Different regions are at different stages in China to develop digital economy, which needs to find their own paths. (2) The number of talents in the field of digital technology will become the bottleneck restricting the development of cities' digital economy in China.

**Research limitations:** (1) This paper has proposed a macro-perspective on the urban digital economy development, yet the micro-perspective has not explored. (2) Although we have tried our best to collect the data and reflect the basic outline, there still leave a space further to add more details and information during the analysis.

**Keywords:** Quadruple Helix; Industrial Digitization; Regional Innovation Ecosystem;

**Reference:**

1. Paredes-Frigolett H . Modeling the effect of responsible research and innovation in quadruple helix innovation systems[J]. Technological Forecasting & Social Change, 2016, 110(9):126-133.
2. Miller K, Mcadam R, Moffett S, et al. Knowledge transfer in quadruple helix ecosystems: An absorptive capacity perspective[J]. R&D Management, ,2016,46(2):383-399.
3. Carayannis E G, Goletsis Y, Grigoroudis E. 2018. Composite innovation metrics: MCDA and the quadruple innovation helix framework[J]. Technological Forecasting and Social Change, 131:4-17.
4. Barykin SY, Kapustina IV, Kirillova TV, Yadykin VK, Konnikov YA. Economics of Digital Ecosystems. Journal of Open Innovation: Technology, Market, and Complexity. 2020; 6(4):124.
5. Saleh H, Surya B, Annisa Ahmad DN, Manda D. The Role of Natural and Human Resources on Economic Growth and Regional Development: With Discussion of Open Innovation Dynamics. Journal of Open Innovation: Technology, Market, and Complexity. 2020; 6(4):103.
6. Tolstykh T, Gamidullaeva L, Shmeleva N, Woźniak M, Vasin S. An Assessment of Regional Sustainability via the Maturity Level of Entrepreneurial Ecosystems. Journal of Open Innovation: Technology, Market, and Complexity. 2021; 7(1):5.
7. Robert, K.Y. Case Study Research: Design and Methods; Chongqing University Press: Chongqing, China,2010.