Policy Analysis for High-Speed Rail in China: a Good Practice for Developing Country

Shuqing Yu
Che ye (Hangzhou) Network Technology Co., LTD, Hangzhou 330100, China.

Abstract: This paper investigates the innovation policy used by the Chinese government and tries to give recommendations to other developing countries to achieve leapfrogging. The main results are as follows: (1) summarize the main HSR-related policy theme issued by the Chinese government, mainly technology transfer, the communication and collaboration with different actors, and the state's role, (2) discuss the existing challenges and issues for HSR policies, (3) give recommended measures for other developing countries.

Keywords: Policy Analysis; Innovation Policy; China; HSR Development

Introduction

Compared to some developed countries, China started late in HSR and experienced accelerated development (Lawrence et al., 2019). And the success in China hugely depends on HSR-related policies (Li et al., 2021). Those policies develop a clear framework and ensure the sustainable and fast development of HSR in China (Shaw et al., 2014). There is a large amount of research emphasizing the effects of HSR rather than the advanced HSR-related policies published by the Chinese government. This paper focus on the complex HSR-related policies and their implementation and coordination, to achieve the followings: (1) summarize and analyze the main HSR-related policy theme issued by the Chinese government, (2) discuss the existing challenges and issues for HSR policies, (3) give recommended measures for developing countries. The results contribute to developing countries to develop a more advanced and sustainable transportation way.

1. HSR-related policy theme

Combined with open-up policy, Chinese government carries out innovation collaborations with foreign countries, especially developed countries (Sun, 2015). Refer to Lin, Qin, and Xie (2021), one important policy theme is the vast introduction of foreign technology in the early stage, and there is a significant positive impact of technology transfer on Chinese HSR innovation. Technology transfer contributes to the rapid technology development, which creates an opportunity for less-developed countries to enjoy late-entry advantages and catch up with developed countries (Chan and Aldhaban, 2009). The government uses technology transfer as one policy theme with three main measures: 1) import advanced foreign technologies and locolize them; (2) joint design and production with foreign firms and gained Chinese-style train modes, blueprints etc.; (3) finally, we have Chinese HSR brands (Sun, 2015).

Although technology transfer from developed countries could create an opportunity for China to absorb advanced technologies and experience, the lack of technology innovation capability still an obstructor to have new variations of HSR. Chinese engineers were trained and knew the advanced HSR technologies, but they did understand the principles and the reasons to use them. So, the policy emphasizes the role of universities and research institutions and the collaboration and spillovers between research institutions and industry. Because of limited resources and human capital, it is hard for HSR companies to understand the advanced technologies and even create subsequent innovations. According to Guan, Yam, and Mok (2015), the collaboration between industry and research institutions (and universities) could reduce R&D costs and facilitate resource sharing to achieve complementary capability. Thus,

industry-university/research institutions' coloration expands the benefits of technology transfer and accelerates the development of HSR in China.

However, like Lin, Qin, and Xie (2021) discussed, we cannot deny the positive role of a strong government. On the one hand, the monopoly power of HSR holds by China Southern Railway Corp. (CSR) and China Northern Railway Corp. (CNR), which are state-owned enterprises, and the government could control the HSR market. On the other hand, the strong leadership by the Minister of Railways, Liu Zhijun, is very crucial for the development of HSR, that he implemented the' Great Leap forward' plan (technology transfer) as rapidly as possible (Lin, Qin, and Xie, 2015). Referring to the study of Sun (2015) argues China is an entrepreneurial state, and the Chinese government is adept at capturing opportunities to strengthen competitive capabilities through innovation leveraging. Thus, a strong government may the driving force to ensure the implementation of HSR-related policy. The government plays multiple roles in this process (Mei and Zhang, 2020). It plays as a cultivator and commander to plan and regulate HSR construction strategies and related research projects (at early stage), and a protector and intermediator to unify negotiation and design rules and intermediate with different players.

1.1 Challenges and issues

The first challenge is brought by one of the main policy themes, technology transfer. Technology-transfer-related policies, including foreign direct investment and joint ventures, may raise competition, hurt domestic businesses (Sinani and Meyer, 2004), and generates local spillover in domestic areas. Although the negative impact may not rise significantly in China, the main reason is the state's role (as a regulator), as a solid and monopoly-power holder in HSR industry.

HSR program may raise conflicts with other stakeholders, like local citizens living along the planned roads. For example, the poor design and site choice of Beijing–Shenyang HSR led to residents' protests towards governmental authorities and project developers (He, Mol, and Lu, 2016). It was solved by opinion polls and discussion with authorities, the design and site choice this HSR changed favorably with sound screens (and other protectives measures) and more green belts. We should highlight the importance of stakeholder engagements and discussions to avoid conflicts with interests in HSR development from this event.

Following the conflicts of interest, other transportation companies, like airline, are also hurt by the development of HSR in China. Refer to Wang, Xia, and Zhang (2017), the rapid development of HSR has imposed great pressure on its competitors, especially the airline companies. Spring Airlines even withdrew from the short-haul market. To some extent, the rapid expansion and development of HSR break the balance. And this paper regards the unbalance development between different transportation methods as a challenge and recommends the government have more coordination between different sectors to have a balanced and efficient transportation system.

2. Requirements for developing countries to follow the China’s HSR development

The first requirement is a favorable business environment, one of the prerequisites for the market to be willing to absorb new technologies and innovate (Ashford, 2000). As an innovation facilitator, the government should encourage the supplier to recognize and participate in the innovation process since they are the main force to innovate (Goh, 2005). For example, the Chinese government issued China’s Medium-Long Term Railway Network Plan and the S&T Support Programs to highlight that the development of HSR became the focal point for the following period to attract attention and promote incentives. In terms of fiscal stimuli and advocation of Public-Private Partnerships (PPPs), Chinese government create a better-innovated market. Also, the government published unified the high-speed train acquisitions negotiation and the joint bidding rule to protect the development of this industry. The government attracts domestic and foreign investment and gained the opportunity to have technology transfer. So, this paper recommends developing countries build a favorable business market through those innovation-friendly policies.

The second requirement is providing a basis for innovation, which includes the communication and collaboration between companies and research institutions. Roh (2005) suggests that innovation could not depend on a single participant, highlighting the importance of technology and knowledge sharing. In the Chinese, we can find the government promotes the collaboration between businesses and research institutions (and universities), such as the collaborative R&D of CSR on re-innovation program, and the collaborative innovation projects on the indigenous HSR “CRH380”. The government promotes collaboration between companies and research institutions to accelerate the absorption and digestion of new technologies. Also, Chinese government directly facilitates

cooperation between CSR and other HSR-related companies, over-province R&D programs, including establishing business platforms and innovation hubs. Supporting knowledge-sharing between scientists and entrepreneurs could foster their capabilities to achieve innovation. Thus, establishment of intermediary platforms could be the basis for achieving technological leapfrogging in HSR and other industries.

However, developing countries have a pre-condition to lay foundations for innovation, which is the funding programs to build basic infrastructures and business platforms. For China, the new Mid-to-Long-Term Railway Network Plan (2017-2025) will incur 7.2 trillion RMB, which means 10% of Chinese GDP (2016) will put into this program. The government or companies may face a significant loss at the start period of building HSR; they must pass through the difficult period to receive revenue.

3. Policy recommendations

Based on synthesizing case analysis and case findings towards China's HSR development, this paper gives some policy recommendations for developing countries:

The government in developing countries should have a favorable market:

Establishing short-term, mid-term, and long-term frameworks.

Reducing administrative, technological, and financial barriers by providing financial and advisory support from regional government.

Providing tax credit for HSR-related businesses to encourage participation.

The government should promote the communication and collaboration between different actors:

Introducing advanced technologies and modernization of production from foreign countries.

Designing and producing jointly (domestics and foreign actors).

Absorbing and localizing the technologies.

Building universities and research institutions to support the absorption and localization of advanced technologies.

The government should have a stable long-term funding program to support the development of HSR.

The government should build a coordinated implementation mechanism to increase the links between different departments, and work as a whole.

References

[1] Ashford, NA. (2000). An innovation-based strategy for a sustainable environment. In Innovation-oriented environmental regulation (pp. 67-107). Physica, Heidelberg.

[2] Goh, AL. (2005). Promoting innovation in aid of industrial development: the Singaporean experience. International Journal of Public Sector Management.

[3] Guan, JC., Yam, RC., & Mok, CK. (2005). Collaboration between industry and research institutes/universities on industrial innovation in Beijing, China. Technology Analysis & Strategic Management, 17(3), 339-353.

[4] He, G., Mol, AP., & Lu, Y. (2016). Public protests against the Beijing–Shenyang high-speed railway in China. Transportation Research Part D: Transport and Environment, 43, 1-16.

[5] Lawrence, M., Bullock, R., & Liu, Z. (2019). China's high-speed rail development. World Bank Publications.

[6] Lin, Y., Qin, Y., & Xie, Z. (2015). International technology transfer and domestic innovation: evidence from the high-speed rail sector in China.

[7] Li, H., Dong, X., Jiang, Q., & Dong, K. (2021). Policy analysis for high-speed rail in China: Evolution, evaluation, and expectation. Transport Policy.

[8] Lin, Y., Qin, Y., & Xie, Z. (2021). Does foreign technology transfer spur domestic innovation? Evidence from the high-speed rail sector in China. Journal of Comparative Economics, 49(1), 212-229.

[9] Mei, L., & Zhang, N. (2020). Transformer in Navigation: Diverse Government Roles for Open Innovation in China's High-speed Rail. Long Range Planning, 102069.

[10] Ming, WX., & Xing, Z. (1999). A new strategy of technology transfer to China. International Journal of Operations & Production Management.

[11] Patanakul, P., & Pinto, J. K. (2014). Examining the roles of government policy on innovation. The Journal of High Technology Management Research, 25(2), 97-107.

[12] Shaw, S. L., Fang, Z., Lu, S., & Tao, R. (2014). Impacts of high speed rail on railroad network accessibility in China. Journal of Transport Geography, 40, 112-122.

[13] Sinani, E., & Meyer, K. E. (2004). Spillovers of technology transfer from FDI: the case of Estonia. Journal of comparative economics, 32(3), 445-466.

[14] Sun, Z. (2015). Technology innovation and entrepreneurial state: the development of China's high-speed rail industry. Technology Analysis & Strategic Management, 27(6), 646-659.

[15] Wang, K., Xia, W., & Zhang, A. (2017). Should China further expand its high-speed rail network? Consider the low-cost carrier factor. Transportation Research Part A: Policy and Practice, 100, 105-120.