

The Drivers of Technology Development in “New Silicon Valley” Hangzhou: a Resource-Based Perspective

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Abstract—This study takes the “New Silicon Valley” Hangzhou as an example to discuss the relationship between resources and development. The resource-based view provided a systematic approach for analyzing the role of Hangzhou in terms of its potential sustained competitive advantage in technology development. In this study, it is suggested that each resource can enhance the technology development, but the potential of each resource should not be viewed in isolation. Two intervening variables are talents and capabilities. This paper not only integrates three resources, but also studies their interface. Thus, it puts forward eight propositions including the interplay, isolated impact and combined affect.

Keywords—Technology Development; RBV; New Silicon Valley; Combination; Resource

I. INTRODUCTION

Hangzhou is the capital of Zhejiang province and it's a political, economic and cultural center. The city has persisted in the implementation of the strategy of “Reviving the City through Science and Education” and promoted the development of science and technology through innovation. The city has encouraged the establishment of hi-tech enterprises and R&D centers actively. Over 80% colleges, universities and research institutions of Zhejiang Province are gathered in Hangzhou. The city has 36 general colleges and universities with 409,600 undergraduate students and 29,700 graduate students. Among them, the prestigious Zhejiang University enjoys abundant research resources. There are over 80 national-level research institutions and over 300 thousand scientific and technological professionals working in Hangzhou.

II. LITERATURE REVIEW

Resource-based review (RBV) is a major theory in strategic management [Liang et al., 2010]. The RBV focused on competitive advantage stemming from specific internal firm resources while traditional strategy research focused on advantages deriving from industry and competitive positioning [Wernerfelt 1984; Acedo, Barroso, and Galan 2006; Turba 2011]. According to the RBV, a firm's resources can provide a sustainable competitive advantage if those resources are valuable, rare, imperfectly imitable, and non-substitutable (VRIN) [Barney, 1991]. It has been widely used to analyze

attributes under different terms such as resources, capabilities, and routines [Goh et al., 2007] and competitive advantage. Resource is classified into tangible, intangible, and personnel-based resources. Capability is defined as competency that is built by combining resources [Grant 1991]. The RBV literature discusses a variety of isolating mechanisms, which act to preserve the sustained competitive advantage. We choose the three representative resources to study the drivers of technological development in Hangzhou.

After a detailed reading of literature, the author selects three main resources including policy, fund and university. In our model, talents and capabilities essentially link resources and the development of technology (shown in Figure 1). Below, the author describes the interplay of the three resources (p1, p2, p3). Moreover, the author discusses the relationship between three resources and development (p4, p5, p6). As combination, the author clarifies the talents and capabilities contribute to the development (p7, p8).

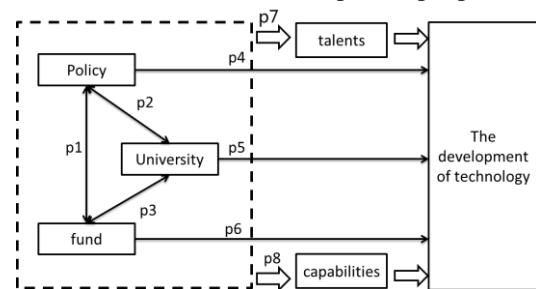


Figure 1. Theoretical Model Linking Resources and the Technological Development

A. *Proposition 1: Policy support brings more funds to technological development. Otherwise, fund promotes the government to formulate and execute more policies about the development.*

Policy plays an important role in the development. In Hangzhou, the government builds three towns and three valleys named “New Silicon Valley”. In fact, this policy attracts more enterprises to locate in Hangzhou, especially the information technology enterprises. Three towns are called Cloud Town, Dream Town, Fund Town, and three valleys are called Cloud Valley, Xixi Valley, and Sensing Valley. Otherwise, the three towns and valleys make the

government pay more attentions to the technological development.

B. Proposition 2: Policy impacts the development of university by employment, entrepreneurship support and so on. The university promotes the development of the city by the knowledge and graduates.

Political is an intangible competitive advantage. For example, a lot of preferential policy for financial talents, it is will be advantage for the financial college. Otherwise, the university affects the government. One way is knowledge effect because the university is the brain trust of the government. The university gives suggestions of development for government through theoretical research. Another way is graduates play an important role in the development of technology.

C. Proposition 3: (Zhejiang) University attracts funds from the government, society and schoolfellows. The funds contribute to the development of university.

In 2014, the R&D fund of Zhejiang University was \$4.89 billion in total. There are three main sources, the government, society and schoolfellows. Zhejiang University gained 739 national natural science foundation projects in 2014, reaching \$88 million. The scientific research funds from society reached \$0.3 billion. The donation is almost from the schoolfellows, also reached \$38.7 million. Otherwise, the fund promotes the development of university. Based on the Essential Science Indicators, 17 subjects ranked top 1% of the world's academic institutions.

D. Proposition 4: Policy is more likely to lead to the development of technology by finance, incubation platform and patent protection.

The policy is one of the most important resources for technological development. First, the government supports the innovation of science and technology by finance. During 2014 in Hangzhou, the venture capital guiding funds totaled \$0.62 billion. The finance gives the enterprises big support because the capital is the core for small and medium-sized enterprises (SMEs). Second, the government promotes the construction of incubation platform to cultivate enterprises. The incubation platform in Hangzhou involves 8,133 enterprises among which 4,336 are still incubating. Third, the policies of Patent protection give the technology inventor power to study.

E. Proposition 5: (Zhejiang) University is more likely to lead to the development of technology by innovation system and science parks.

Zhejiang University plays an important role in the technological development in Hangzhou. Its innovation system is called the system of "2 + 2". It means two systems and two platforms. Two systems are knowledge innovation system, and the scientific research innovation system. Two platforms are industry-university-institution platform, and martial industry platform. In 2014, the total research budget of Zhejiang University was ¥3.121 billion, among which 739 projects were approved by the national natural science fund, accounting for about ¥561 million. It got the second prize of national scientific and technological progress award.

The science parks are to provide start-up businesses with a range of resources and services related to inaugurating the firms. Zhejiang University National Science Park was founded in December, 2008, and established its branches in Ningbo, Nanchang of Jiangxi province, and Binjiang of Hangzhou according to the principle of "one park more places". With a total area of 113 hectares, the park serves as a real radiating source and incubating base for the university faculty and students to start high-tech business and industrialize their research achievements. At present, over 100 hi-tech incubating enterprises have set up their branches in the park, and more than 10 agencies have moved into the park to provide entrepreneurs with service and consultation regarding law, finance, investment, patent application and technological transference. There are many successful cases in science parks that the enterprises win a great deal of development. In Xihu Park, Hangzhou Chixiao Technology Co., Ltd. was founded in 2011, focusing on the machine vision technology to provide the solutions to detect surface quality for many manufacturers, achieving sales of ¥1.4 million. Another enterprise named Zhejiang Pearlcare Medical Technology Co., Ltd. was founded in November 2011, focusing on the development and production of high-value medical equipment and consumable materials, and having a center of independent technology development and a modern production base. Other cases like Jiangxi Soft Cloud Technology Co., Ltd in Jiangxi Park, Mingzhan Network Technology Co., Ltd in Binjiang Park, and Sibaishu New Material Technology Co., Ltd in Ningbo Park also become the role models of others.

F. Proposition 6: Fund is more likely to lead to the development of technology by government support, angel investment and fund platform.

Sufficient fund is the biggest competitive advantage of enterprises. Where does the fund come from? There are three ways. One way is governmental support. Hangzhou government compensates loan interest, provides re-lending support, and sets up a pool fund for small and medium-sized enterprises to reduce credit risks. The second way is the angel investment. There are many venture capital institutions, and many Angel investors in Hangzhou. Another way is the fund for the platform as technology center, R&D center and enterprise institute. The fund for enterprises' technology innovation strategy is for industry-university-institution alliances, funding for Science and technology projects.

G. Proposition 7: The combination of three resources brings the talents of technology and management who play the most important roles in the development.

The combination of policy, university and fund brings the talents. The university provides array of talents, the policy gives the talents protection, the fund attracts talents to work in the city. There are mainly two types of talents, one is scientific talent, and the other is entrepreneur. The symbol of the technological development is the quantity of the scientific talents. The medium and long term development plan of human resources in Hangzhou (2012-2020) will support 40 excellent entrepreneurial talents and invite more than 40 doctors to post-doctoral programs. Talent aggregation effect is apparent. A

number of high-level innovative entrepreneurial teams, which own independent intellectual property rights, or master core technologies, are coming to Hangzhou. The other type of talents is entrepreneur, because of the special condition in Hangzhou, the ones come from Alibaba and universities occupy the majority. According to statistics, about 30,000 former Alibaba employees are starting to establish business. And more than 19,000 university students set up about 8,876 enterprises.

H. Proposition 8: The combination of three resources means the capabilities of development. The capabilities divided into political capability, economic capability and cultural capability.

The combination of policy, university and fund means the capabilities. The capabilities can be divided into three types, the political capability, the economic capability and the cultural capability. The political capability makes it possible for the enterprises to be connected with the government, and gain the support of them. The political capability is competitive advantage for enterprises but it is not sustained. Others can gain this advantage through imitation. The economic capability comes from the fund, money for enterprises like the blood of body. Economies of scale is based on money, it can reduce the cost of enterprise and improve the economic benefits of enterprises. The cultural capability is Heterogeneity of competitive advantage. It could not be imitated easily. The education and the social environment will impact the culture. To be highlighted, integration is the fourth kind of capability, which is tacit. The three capabilities are not isolated, we shall study their roles of science and technology development from systemic view.

III. CONCLUSIONS

In this paper, the author analyzes the relationship between the resources and the development in "New Silicon Valley" in Hangzhou. The author's theorizing not only helps integrate three resources, but also offers contributions to further study at their interface.

Contributions. This paper has enriched the literature with an RBV analysis of the resources and technological development. There are three main contributions.

First, this paper clarifies and defines the role of each resource in the technological development. For better or worse, each resource is important for the development. Yet, thus far, many studies have explicitly modeled the role of the resource. This paper selects the most important resource from previous studies. Therefore, these three resources are representative.

Second, the author discusses the interplay of each resource. Each resource is not isolated, they have impacts each other. What is more, the framework gives the impact mechanism of them. The paper also uses some samples to prove the propositions.

Third, the author discusses the relationship from combined perspective. The discussion is based on the

resource-based view, integrates three resources to find two most important variables. The result shows that the talents and capabilities are intervening variable. The discussion contributes to this literature by proposing the combination of the three resources, it is the key competitive advantage of Hangzhou.

Further research. For the limited collection on data, this paper lacks empirical studies. The future study should try to retrieve more directly materials to research the mechanism not only between the resources and the development, but also the interface of resources. In addition to data, the author can also use cases to prove the propositions.

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