

Analysis on the Development Elements of IT Industry in India

Qiming Hu^{1,2}

School of Economics, Sichuan University, Chengdu 610065

Keywords: India; IT Industry; Elements

Abstract: This paper establishes a new interpretation framework to explain the reasons for the development of IT industry in India. It mainly improves the elements of the "Diamond Model" and concludes six elements of the development of the Indian IT industry: "production factor", "government", "industry cluster", "demand condition", "trust condition", and "opportunity". Moreover, it emphasizes that these six elements are a system. In the long run, it is just the intertwined use of these six elements that India has the advantage of self-reinforcing and the rapid development of the industry.

1. Problem Presentation

How did the Indian IT industry develop? Some people think that the advantage of the development of Indian IT industry lies in the abundant and cheap IT labor force³. However, why do other high-tech industries in India not use the cheap, abundant and efficient labor force to enter the international market like the IT industry? Moreover, the labor cost of the Indian IT industry is also increasing, and in the future it will also face the problem of insufficient labor⁴; Others believe that the success of Indian IT industry is driven by various government policies, especially the policies of science and technology parks, exchange rate, tax and export incentives that are good to the export of IT industry⁵. In fact, India's "liberalization, marketization, globalization and privatization" in the "new economic policy" in 1991, has determined that the Indian government is not a strong government. If government intervention can achieve such remarkable results in the secondary industry, it can be extended to other industries. Although we also recognize the influence of the government, in fact, the industry development that is often strongly intervened by the government is not satisfactory; Besides, from the micro perspective to discuss the internationalization of Indian software enterprises, it is believed that Indian software enterprises mainly use the elements of government, economy, society and culture to achieve international success⁶. However, this does not explain how the various elements are related to each other, nor can it explain the fact that the competitiveness of most of Indian IT enterprises is far behind the international leading competitors; Others use the six elements of the theory of competitive advantage to explain the development of Indian IT development⁷. However, they apply the theory without any amendment and over-emphasize the "commercial environment", thus neglecting to some degree the inherent elements of industrial development. In all of these, we need a new framework for interpretation to explain the development of the Indian IT industry.

¹ Ph.D. candidate, School of economics, Sichuan University, Tel: 18977336918, E-MAIL: 549476652@qq.com

² Guangxi Key Research Base of Humanities and Social Sciences, Research Center for Government Digital Communication and Cultural Soft Power

³ Chacko E. From brain drain to brain gain: reverse migration to Bangalore and Hyderabad, India's globalizing high tech cities[J]. *GeoJournal*, 2007, 68(2-3): 131-140.

⁴ Kundu S C, Mor A. Workforce diversity and organizational performance: a study of IT industry in India[J]. *Employee Relations*, 2017, 39(2): 160-183.

⁵ Kapur D. The causes and consequences of India's IT boom[J]. *India Review*, 2002, 1(2): 91-110.

⁶ Dai Yonghong. Research on the Internationalization of Indian Software Enterprises[D]. Sichuan University, 2006.

⁷ Heeks R. Using competitive advantage theory to analyze IT sectors in developing countries: a software industry case analysis[J]. *Information Technologies & International Development*, 2006, 3(3): pp. 5-34.

2. Six Elements of the Development of Indian IT Industry

Porter, an American scholar, once put forward the "Diamond Model". He believes that to gain an advantage in international competition, a certain industry of a country should be examined from four environmental elements that each country has: "strategies, structures and competitors of enterprises", "production elements", "relevant and supporting industries", and "demand conditions". In addition, there are two supporting elements, namely, opportunities and government, so as to build a complete "Diamond Model"[1-3].

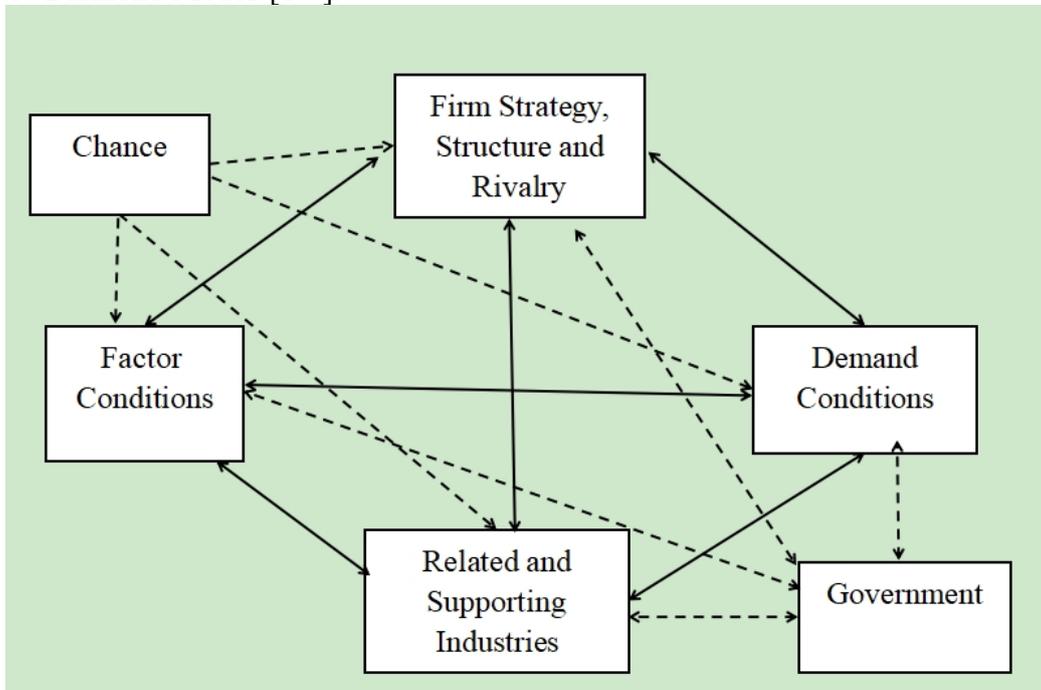


Fig. 1 Porter's "Diamond Model"

Source: Michael Porter. The Competitive Advantage of Nations[M]. Beijing: Huaxia Publishing House, 2002, P119.

The specific theoretical framework of "Diamond Model" cannot be simply applied or the function of each element can be analyzed in isolation. It is necessary to improve the development process and characteristics of Indian IT industry, absorb the reasonable elements of "Diamond Model" and adjust it.

(1) Concerning the development process of Indian IT industry, from the beginning of the "hunting" system to an outstanding departments of software and IT services, India has completed the transformation from an agricultural country to a major exporter of software and IT services in about 40 years. However, the "enclave effect" in the early stage of its development is rather obvious, and this industry is relatively independent. According to Porter's interpretation of relevant and supporting industries, relevant industries cannot be regarded as a key element in the development of Indian IT industry.

(2) The development of Indian IT industry is closely related to the government. Its IT industry is not only a product of the Indian government from regulation to semi-regulation to liberalization, but also a comprehensive cumulative result of the Indian government's strategies and policies in various aspects of educational technology, industrial policy and economic development. In Porter's "Diamond Model", whether the role of government is positive or negative depends on its impact on the whole system. This needs to be considered with reference to the status of other key elements, so it is in a supporting position, which does not obviously suit the development of Indian IT industry.

(3) Throughout the development of Indian IT industry, it has shown a very significant feature of the IT industrial cluster. Besides, the cluster of the seven IT industries form a unique environment

for competition and cooperation in the Indian IT industry, and enterprises in the cluster are sensitive to demands and changes. In order to meet the needs of customers, these IT enterprises are forced to constantly update products and their performance at a lower cost. This puts higher demands on technology and brings greater innovation pressure to enterprises. IT industry cluster transforms into "innovation cluster" of knowledge-intensive communication through knowledge spillover and information diffusion, and finally brings industrial innovation and progress. Indian IT industry cluster has incubated a large number of new IT enterprises, encouraged mutual learning and even took joint action in solving problems, and improved the speed and success rate of innovation in the professional framework. As a result, Indian IT industry, especially its internationally dominant service outsourcing, has not been fixed at the lower end of the global value chain⁸. Through innovation, Indian IT enterprises have realized the transformation from BPO to KPO (knowledge process outsourcing). Indian IT enterprises have become strategic partners of European and American contracting enterprises, jointly formulated innovative industrial solutions, and realized the rise of the value chain. They lead from service levels, agreements and return on investment to providing customers with innovation-driven growth. Although "Diamond Model" mentions industrial cluster and its innovation, it is mainly demonstrated from the perspective of enterprises seeking competitive advantages. It does not put the innovation in the dynamic system of the technical and institutional level of the industrial cluster to discuss. Combined with the actual development of Indian IT industry, we regard industrial cluster as a key element in the development of its industry.

(4) From the very beginning, the Indian IT industry has adopted an "export-oriented" approach, actively implemented a globalization strategy and integrated into the industrial chain of global information technology. Thus, the main part of its industry is the software and service departments, and the hardware department is mainly reflected in the domestic market in the whole industry, with exports accounting for the majority of the total value of the industry. It can be seen that as a labor-intensive and knowledge intensive industry, India IT industry mainly deals with non-material products and services. The non-material transaction process highly relies on information transmission, sharing and cooperation among enterprises⁹. For European and American customers, trust acts as a bridge to the risks that enterprises must face by outsourcing work to distant destinations. In the initial stage of the industry, its reputation for quality and delivery is not sound, so it is inhibited. However, the performance of Indian IT engineers in European and American countries has won unprecedented respect and admiration for India and Indians. Trust produces a positive expectation among Indian enterprises, Indian enterprises and customers. Thus, trust has become an important element in the development of the Indian IT industry.

(5) Enterprises are in the forefront of international competition. The country is committed to creating a competitive environment, but it cannot guarantee the success of every enterprise. "If an enterprise is in a strong, well-informed and interactive industrial cluster, it will be more likely to trade with foreign traders." ¹⁰ Actually, the development of Indian IT industry has shown clustering characteristics, and the agglomeration effect is obvious, which lays a foundation for India to develop a world-class IT industry. Some studies have found that 80.5% of top IT enterprises in India are gathering in Bangalore, Hyderabad, Chennai, Mumbai and Delhi¹¹. It is the unique geographical concentration and cooperative competition of industrial clusters that form a strong and sustainable competitive advantage for Indian IT enterprises [4].

In conclusion, this paper attempts to use the six elements of "Diamond Model" to explain the reasons for the development of Indian IT industry, namely:

⁸ It usually refers to maintenance, software coding, testing and other information technology outsourcing services.

⁹ Wu Lin. Research on the Development of Software Outsourcing Industry[D]. Party School of the Central Committee of CPC, 2009.

¹⁰ Michael Porter. The Competitive Advantage of Nations[M]. Beijing: Huaxia Publishing House, 2002, P577.

¹¹ Kumar N, Joseph K J. Export of software and business process outsourcing from developing countries: Lessons from the Indian experience[J]. Asia-Pacific Trade and Investment Review, 2005, 1(1): 91-110.

Firstly, opportunities: All kinds of unexpected elements in the development of Indian IT industry;

Secondly, the government: The development strategies of Indian national IT industry, various policies imposed on its development and intervention to other elements;

Thirdly, the industrial cluster: The competition and cooperation of Indian IT enterprises stimulate the innovation of enterprises in the cluster, and interacts and strengthens with other elements. In this process, the organizational structure of the information technology industry tends to be reasonable and the quality of enterprises is gradually improved, so as to change the competitive advantage of the Indian IT industry;

Fourthly, the production elements: the production-related performance in the Indian IT industrial competition, such as unique human resources;

Fifthly, demand conditions, including the demand for products or services provided by Indian IT industry in the international and domestic markets;

Sixthly, trust conditions: social resources and capital that are trusted in the development of the Indian IT industry.

It is necessary to emphasize that the six elements of its development are a system, not an isolated one. In the process of strengthening each element, the boundary among them is gradually blurred, and the change of one element may affect the state of other elements. In addition, the advantages of a certain element of the industry may also create or improve the advantages of other elements, and even a compensation effect. It is the intertwined use of these six elements that India has formed a self-reinforcing advantage and formed a situation in which the industry has developed rapidly.

3. The Level of the Six Elements of the Development of Indian IT Industry

In the dynamic process of industrial development, the role of elements in different stages to promote its development is not the same. The influencing elements have multiple levels, and the six elements can be further summarized into three levels.

3.1 Basic Level

The industrial development of each country depends on some basic elements, such as labor, capital, infrastructure, etc., which is also the premise of trade theory; The nature of an industry will have a big difference on whether the basic elements it depends on are formed naturally or created. The basic elements not only have a positive incentive effect on the development of the industry, but also may inhibit the development. Sometimes if the deficiency of basic elements can be avoided, a new industrial development strategy can be developed to achieve success. In the development of Indian IT industry, human resources, capital resources and infrastructure reflected in the "production elements" of the six are often mixed and effective, which is also the most basic element of industrial development. Thus, "production elements" is called the element at the basic level.

3.2 Key Level

Why is India able to succeed in the IT field? From a static perspective, India's basic level of production elements is fixed. The country must be able to provide an industrial environment in which enterprises innovate and progress faster than their competitors in order to improve productivity and gain a long-term competitive advantage. In a broad sense, "environment" not only creates a good industrial development environment through economic, political and legal means, but also includes market demand, historical tradition, identification trust and industrial cluster environment. These elements play a key role in the development of Indian IT industry. Therefore, "government", "industrial cluster", "demand conditions" and "trust conditions" become the key elements at the key level. In particular, in the interaction with other elements, the competition and cooperation among IT enterprises caused by Indian IT industry cluster stimulates the innovation of enterprises within the cluster. In this way, the organizational structure of the IT industry is

increasingly reasonable and the quality of IT enterprises is improved, which will bring a long-term development of the Indian IT industry.

3.3 Auxiliary Level

Opportunity can only be found by accident and not through seeking. For example, the millennium bug at the turn of the century caused numerous defects in software date code. In order to avoid the global system crisis, the majority of western companies have sought the help of Indian IT companies, which has caused a sharp increase in market demand. Opportunity is relative, and India has seized this "opportunity" on the basis of other elements. For this reason, "opportunity" becomes an element at the auxiliary level.

4. The Interaction of Six Elements in the Development of Indian IT Industry

The competitive advantage of Indian IT industry is due to the mutual reinforcement and interaction of six elements. Single element cannot promote the success of its industry, so it is impossible to deeply understand how the Indian IT industry develops and the relationship between the various elements of its development from the analysis of a single element. The specific mode of mutual reinforcement mainly includes the following aspects. The influence on production elements mainly lies in: Firstly, Indian IT industry cluster promotes the creation of advanced production elements and attracts their input; Secondly, the domestic and international IT market demand influences the priority of investment production factors; Thirdly, the Indian government's IT strategy has strengthened the allocation of production elements. The influence on demand conditions mainly lies in: Firstly, India's cheap and efficient IT human resources greatly meet the needs of foreign customers; Secondly, the learning and innovation effect of the industrial cluster will strengthen the international demand of industrial products and stimulate domestic demand; Thirdly, the opportunity creates demand; Fourthly, the national IT development strategy subdivides market demand and stimulates and guides domestic expected demand. The influence on trust conditions mainly lies in: Firstly, the protection legal system of intellectual property issued by the government provides a constantly improved development environment for the development of IT industry, and also provides good psychological expectations for foreign customers; Secondly, trust is a kind of sharing resource which is hard to imitate, hard to replace and scarce; Thirdly, the demand characteristics of Indian IT industry, especially its software outsourcing, give birth to trust. The influence on the government mainly lies in: Firstly, the condition of production elements is the basis for the government to formulate strategies or policies; Secondly, the expected demand of overseas market is the premise of Indian IT strategy. The influence on the industrial cluster lies in: Firstly, production elements are the basic conditions for the formation of its industrial cluster in India; Secondly, market demand influences the scale of its IT industry cluster; Thirdly, trust produced by social capital effect enhances the competitiveness of Indian enterprises in the IT cluster; Fourthly, the government promotes the development of IT industry cluster in India. The last element of opportunity can only be found by accident and not through seeking, and the government cannot control the opportunity, but can take the initiative[5-7].

In conclusion, it is in the interaction and correlation of these elements that the causal relationship of each element is gradually blurred, and forms a joint force to act on the development of Indian IT industry.

References

- [1] Michael Porter. The Competitive Advantage of Nations[M]. Beijing: Huaxia Publishing House, 2002.
- [2] Chacko E. From brain drain to brain gain: reverse migration to Bangalore and Hyderabad, India's globalizing high tech cities[J]. GeoJournal, 2007, 68(2-3): 131-140.

- [3] Kundu S C, Mor A. Workforce diversity and organizational performance: a study of IT industry in India[J]. *Employee Relations*, 2017, 39(2): 160-183.
- [4] Kapur D. The causes and consequences of India's IT boom[J]. *India Review*, 2002, 1(2): 91-110.
- [5] Dai Yonghong. Research on the Internationalization of Indian Software Enterprises[D]. Sichuan University, 2006.
- [6] Heeks R. Using competitive advantage theory to analyze IT sectors in developing countries: a software industry case analysis[J]. *Information Technologies & International Development*, 2006, 3(3): pp. 5-34.
- [7] D'Costa A P. Uneven and combined development: understanding India's software exports[J]. *World Development*, 2003, 31(1): 211-226.