

Regional Development Scheme in China Using the Functions of University

Chen GUO*¹ and Shunji KUSAYANAGI*²

Abstract: China has been experiencing rapid transitions since economic reforms in 1978, the results of the reform have shown wide regional disparity. As China looks to sustain the past success of economic growth and poverty reduction in 21st century, it needs to make major changes in its development strategy in order to fulfill its national development targets. This paper studies the economic development situation of eastern, central, western regions in China, and the functions of Chinese universities, which include education, research and contribution to the society. A new Chinese innovation system has been emerging in terms of university-run enterprise. In recent years, science parks, incubators, and high-tech development zones have been provided with strong incentives. The commitment of Chinese government to further introduce a market economy has been elaborated with a focus on the relations between university and industry. The operation mechanism of Chinese university-run enterprise has special characteristics, which are government support, relying on university, market mechanism, and industry movement. As human society enters the knowledge and information age, education is expected to play an increasingly important role and it gives driving force to regional economic development of China by using of the functions of university.

[Keywords] Regional Development, Functions of University, University-run Enterprise

1.Introduction

Since the founding of the People's Republic of China in 1949, Chinese society has undergone great changes in its socio-economic, political, and cultural realms. Over the past two decades, China's GDP has kept an annual growth rate of about 8% on average. Together with the increased industrial labor productivity, the living standard of Chinese people has increased at about 7% each year in constant price. Twenty years of reform efforts and modernization drive have won China an international acknowledgement for its achievement in economic development. Since the beginning of 1990s, it has witnessed a bigger enhancement

in China's urbanization level. The townspeople in the year of 2001 took up 37.7% of the total population in China, a proportion of 10.3 percentage points higher over that of 1990. Along with the rapid development of the cities, they have become the major destinations for the workforce immigration from the countryside. In the meanwhile when the urbanization level is being raised, the economy in cities saw a rapid development with the economic structure tending for the better. It is well recognized that industry does contribute to economic and social development by providing more goods and service to the market, and provide more job opportunities. Just like other developed

*1 Ph.D. Candidate, Infrastructure Systems Engineering, Kochi University of Technology, Japan.
185 Miyanakuchi, Tosayamada-cho, Kami-gun, Kochi 782-8502, Japan.

Tel: 0081-90-9776-8670. Fax: 0081-887-57-2280. E-mail: 076007b@gs.kochi-tech.ac.jp

*2 Professor, Infrastructure Systems Engineering, Kochi University of Technology, Japan.

185 Miyanakuchi, Tosayamada-cho, Kami-gun, Kochi 782-8502, Japan.

Tel: 0081-887-57-2098. Fax: 0081-887-57-2280. E-mail: kusayanagi.shunji@kochi-tech.ac.jp

countries, the great economic development of China is due to its industrialization and urbanization.

Education policies in China in the past five decades have also been characterized by bold moves, major shifts and reversals. It is obvious to notice the success of Chinese education reform that substantial gain in literacy of the great masses of people, the large expansion of the education system, and the nurturing of some world-class scientists and engineers.

This study focus on the regional disparity resulted by rapid economic development in China, the role of the university in a national innovation system and the linkages between university and the society. Special attention will be given to university-run enterprises, in which the way these enterprises are created, their industrial distribution, their contribution to the development of indigenous high-tech industries. A new regional development scheme using the functions of university is considered as the effective strategy to promote regional economic development in this stage.

2. Regional Disparity

There are 22 provinces, 4 municipalities directly administered by central government, 5 autonomous regions in inland China. The eastern region covers 12 provinces such as Beijing, Shanghai and Guangdong. This region accounts for about 14% of China's land mass and 40% of its population. It has easy access to transportation, a dense population and started up at an early date in economic development. It is also rich in high-quality labor resources. For a considerably long period of time since China initiated reforms and opening up, the focus of the state investment has been given to the eastern coastal areas. As such preferential policies from central government help spur economic growth, the economic development in the region was promoted. Since the region was opened to the outside world at an early date and has all the special economic zones and most open cities in China, more than 85% of direct foreign investment has been made there. Therefore, since the initiation of reforms and opening up, the region has been the most developed area in China. It made up 66.16% of China's GDP in 2001.

China's central and western region covers 19 provinces. It accounts for 86% of China's land mass and 60% of its population. In contrast to the eastern coastal region, the central and western region is relatively backward in infrastructure such as transportation and telecommunications. Moreover, because of a relatively weak economic foundation and a slow process of industrialization and urbanization, by the end of 2000, the central region and the western region had accounted for 8.78% and 5.42% of the total amount of foreign funds utilized by China respectively. Compared with the eastern region, the central and western region as a whole is far behind in the degree of an export-led economy. So, the level of its economic development is relatively low. In 2001, it made up only 33.84% of the country's GDP.

In short, the strategy of developing the coastal region was effective, and as a consequence of development of the coastal region, the gap between that region and the central and western regions of the country widened (Fig. 1). The economic gaps among different regions represent a potential obstacle to future economic growth in China. Therefore, it is the right time for China to find its way to balance the economic development of each region.

3. Functions of University

China has difficulty in developing the central and western regions. As China's domestic market opens up, the eastern region that already has well-developed infrastructures are attracting businesses to expand their markets in China. Chinese government touched a few major areas of higher education reform in recent years, which includes the reform of the overall operation mechanism, reform the structure, reform curriculum and instruction, and reform higher education finance. Chinese government takes education as a matter of primary importance, and has made enhancing cultural quality of people as basis of the construction of China. Since the initiation of the reform and opening policies in 1978, along with the dismantling of the planned economy system and the deepening of the reform of the economic system, commodity, capital, labor service and technology markets have appeared one after the other in China.

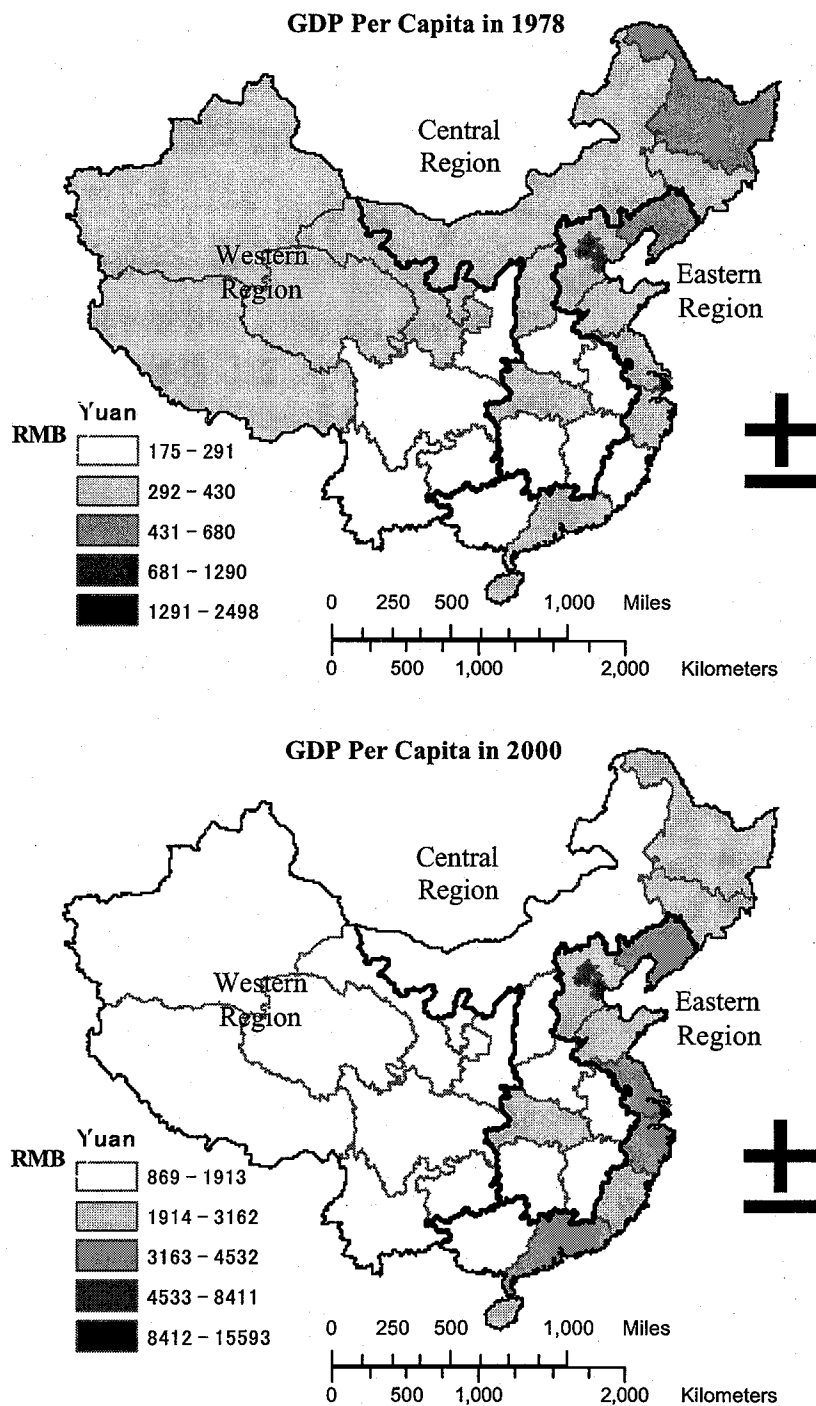


Fig. 1 GDP Per Capita by Region in China

Now China has transformed its planned economy system into an initial socialist market economy system. As a result, the regulatory function of the market has been strengthened tremendously. At the same time, China has carried out strategy of rejuvenating the nation by relying

on science and education and put education on strategic position with priority development, marked by the restoration of the higher-education examination system. With more than 20 years' development, China has attained considerable achievements attracting worldwide attention

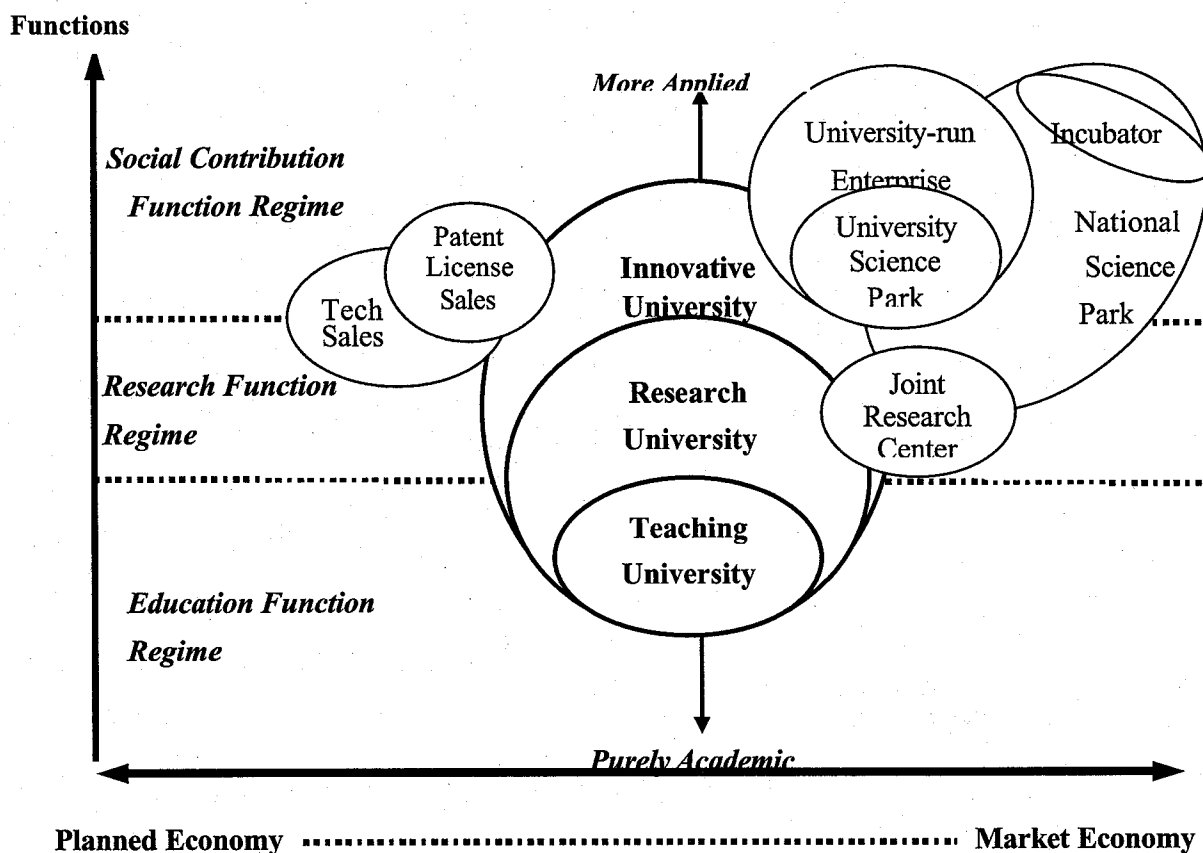


Fig. 2 Functions of Chinese University

in education and got on the road to accelerated development. A multi-level and multi-format education system comprehending all disciplines has taken initial shape to fit in with national economic and social development. It basically made 9 years compulsory primary education and universities are growing at an unprecedented rate.

Economic globalization, market forces, administrative decentralization, and information technology have extended the autonomy of social organizations, including educational institutions. New challenges have developed at every level of the education system. In the past, university had only primary task of higher education, academic research became another important function later. In recent years, university has its third function of contribution to society in forms of university-run enterprises, which have been provided with strong incentives and promoting economic development with the spring up of modern knowledge economy. S&T knowledge from academy to

industry can be mediated through alternative governance forms including technology exchange market, patent licensing, cooperative research and development between academy and industry, cooperative research center on or off campus, University Science Park and so on. China is a country, which is on the transitional way from planned economy to market economy. University-run enterprise is quite a market-like form of knowledge industrialization adopted by highly entrepreneurial academic institutions. While technology sales or patent licensing is a hierarchical form of knowledge industrialization also adopted by highly entrepreneurial academic institutions (Fig. 2).

4. University-run Enterprise

University-run enterprise refers to those enterprises, which are being owned or controlled by the universities they are affiliated with. Many of these enterprises were created by funds from universities and many universities are still the largest shareholders in these companies.

University-run enterprises came into being since 1950s. Particularly those engineering and science-based universities have had university-affiliated factories, which are mainly used for students to get short-term internship or apprenticeship in a real production environment. Also under the 'self-sufficient organizational system' for enterprises, universities, and other social institutions in China after the founding of the People's Republic of China, many universities had its own service providers such as print shops, publishers, guesthouses, and so forth.

The further development of university-run enterprises is from early 1980s to 1990s. During this period of time, China just began to implement its reform and open door policy, which includes encouraging the educational institutions to engage in the economic and social development. Faced with the commercial opportunities in the society and their internal financial need, the traditional university affiliated service providers began to open up to the general society while many new services were also created. Most of their operations were focused on technology transfer, technology development, technology consulting, and technology service.

In the year of 2000, there were 5451 university-run enterprises in China and several dozen of them are already listed on the stock markets. They are being run under three models. The first one is university affiliated factories or print shops. The second model is to bring university technologies to create joint commercial entities with enterprises outside universities. The third model is companies or firms of technology development created by universities and departments. Over the past several years, university-run enterprises have maintained their growth momentum in terms of sales, profit, and tax paying. Of the 5451 enterprises, 2097 were classified as Science & Technology enterprises. While the number of university-run S&T enterprises was less than half of the total, these enterprises accounted for over three quarters of the total sales in 2000. Also the growth rate of sales, profits, and tax paid for S&T enterprises were higher than other enterprises. They are the backbone of the university-run enterprises.

Among these university-run enterprises, in terms of

business orientation, about half were engaged in production and trade, with the rest in other businesses such as running a guesthouse. It is clear that enterprises in production generated more income, profit and tax on a per capita basis. In terms of ownership structure, 88% of these enterprises were owned by universities, with some domestic and international joint ventures. In addition, about 80% of the enterprises were managed at university level. These enterprises performed much better than those managed at the school or department level (Table 1).

5. Regional Development Scheme

While there are many university-run enterprises in China, large proportion of the enterprises are concentrated in Eastern Region, and successful and influential enterprises are concentrated in a small number of selected universities. In fact, the total sales of top ten universities in terms of enterprise sales reached 26.7 RMB¥Billion in 2000, accounting for over 55% of entire sales generated by university-run enterprises in China. Therefore, to analyze the growth of university-run enterprises, their parent universities must be examined in order to understand the characteristics of Chinese university-run enterprises. They can count on government support in order to solve problems at the interfaces between the economic forces of the market, legislation, and knowledge input. The Chinese government has chosen the role of making the political system supportive of the introduction of a market economy and a knowledge-based society.

China is a huge country with great disparities in resources. The conditions underpinning development in each locality are different, and results vary greatly. However, some common factors, which contribute to high growth as well as those that inhibit growth can be identified. There are large disparities of education and research level in higher education institutions among eastern, central and western provinces, and between key and non-key universities, especially in the function of university-run enterprise.

The transformation in the functions of university, industry, and government is taking place as each institution can increasingly assume the role of the other. The 'university-government-industry relations' states that knowledge

Table 1 General Statistics of Chinese University-run Enterprise (Year: 2000)

Category Items		Ratio (%)	Income (RMB¥Billion)	Profit (RMB¥Billion)	Tax Paying (RMB¥Billion)
Type of Business	Manufacture	36.6	28.61	2.66	1.54
	Trade & Related Service	15.6	4.35	0.24	0.16
	Others	47.8	15.50	1.66	0.85
Type of Ownership	University-owned	87.9	32.18	2.51	1.61
	Joint Ventures with Domestic Partners	10.2	14.37	1.81	0.83
	Joint Ventures with Foreign Partners	1.9	1.90	0.24	0.11
Type of Management Control	Belong to University	77.4	45.53	4.38	2.41
	Belong to School, Department or Institute	22.6	2.93	0.18	0.13

infrastructure can be explained in terms of these changing relationships. Arrangements and networks among the three institutional spheres provide input and sustain to science-based innovation processes. In this new configuration, academia can play a role as a source of firm-formation, technological, and regional development, in addition to its traditional role as a provider of trained persons and basic knowledge. The changes in the position of the university in a knowledge-based regime require an ongoing process of rethinking their functions at the strategic level in terms of evolving university-run enterprise.

Therefore, the functions of university in today's regional economic development of China can be summarized as innovation base for combination between universities and industries, driving force for mutual development of organizations and cradle for human resources.

(1) Contribution to Technology Innovation

Universities have resources such as technologies, brand, human capital, network, and they have to choose whether to internalize the resources by starting university-run enterprises or externalize them by transferring the resources to the manufacturing firms. Given this situation, the Chinese universities have decided to make their own firms because they were highly motivated to make money

by the reform of S&T system in 1985, which drastically cut down the government fiscal support for academic institutions, and because they felt they were more competent in industrializing knowledge than the outside manufacturing firms.

The transfer of technology from university to industry is not the simple process of technology exchange, but it is the process of technology innovation on the basis of introduced technology. This process needs the support of human resources who are teachers and students from university. University-run enterprises give employment priority to college graduates, these graduates are not only the backbones of industries, but also the ligament between industry and university. Industry can realize the trends of advanced science and technology, the newest idea, production and method through the close relations with university. Industry can exploit it by inviting college teachers and students to work as their part-time jobs. During this process of two-way intervention, industry fulfills innovations according to the requirement of market competition, and university technology transfers to industry step by step, which can be turned into productivity at last. University acquires necessary information from the feedback of industrial manufacture and market so that it can increase the research level and

promote the close link between technology and market. Therefore the two-way technology innovation chain between university and industry comes into being.

(2) Contribution to Mutual Development

The operation of university-run enterprise attracts other social organizations such as finance, law, and consultation inevitably. University science parks are most productively organized as a cooperative venture among one or more universities, a local government authority, and a consortium of financial institutions interested in enhancing the local innovation environment. Under certain circumstances, the university can take the role of industry, helping to form new firms in incubator facilities. Government can take the role of industry, helping to support these new developments through funding programs and regulations. The initial conditions are different in various countries. In the United States, university, industry, and government are becoming less isolated from each other. In many Latin American countries, industries and universities, formerly under strict governmental control, are gaining relative autonomy from the state. In Europe, the unification process paradoxically leads to enhancement of the regional and transnational levels of governance simultaneously, with different effects in the various member states.

(3) Contribution to Education Reform

Comparative advantages of parent universities, strong engineering research and talented faculty and students, are an important source of strength for the university-run enterprises. Academic strengths and reputation is another important contributor to the strong growth of university-run enterprises.

Dramatic changes have taken place in the human resource sector, which is closely related to the higher education system. In the new market economy, it is the market demand and supply that play the fundamental role in resource allocation and utilization. The labor market plays the fundamental role in human resource development and allocation. In such transitional stage from planned economy to market economy in China, higher education institutions need to gear their programs to meet the human resource needs of the labor market. This does not mean that all teaching and research should shaped by market force, but socioeconomic development as signaled by labor market supply and demand will be of primary importance to universities. University-run enterprises are taking on the task of students' study practice as well as promoting economic of education system. It is beneficial for improving students' ability of applying book theory into practice, reform of subjects, and enrichment of teaching

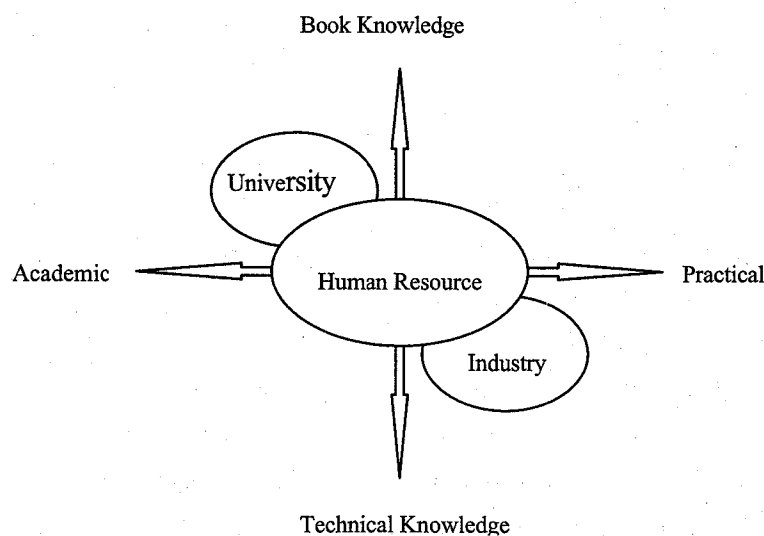


Fig. 3 Human Resource Training Using the Functions of University-run Enterprise

(Source: Professor Shunji KUSAYANAGI, Kochi University of Technology, Japan)

contents because there is increasing demand in society for qualified college graduate students who are not only good at book theory, but also good in practical field. Under such circumstances, industry can take the role of the university in developing training and research, often at the same high level as universities (Fig. 3).

6. Conclusions

The network of regional development by using of the functions of university needs the mutual collaboration among university, industry, research institute, other organizations in society and government. The core of this task is that fulfilling close integration of education, science, technology, economy and politics. The functions of university in today's economic development of China need policy support of promotion, macro planning, guide and harmonization from local and central governments. From the aspect of Chinese central government, the Ministry of S&T, Ministry of Education has the responsibility to guide the development of University Science Park. The regional government gives strong support to Science Park through the regulations. However, the whole process should obey to market rules because such social contribution function by using of university-run enterprise can brought into play in socialist market economy, not planning economy. Human resources should have the capacity of innovation thinking, study ability, practice experience and strong dedication energy. They use the mother institutions' resources exclusively or at least in very preferential terms compared with other firms. This is true even in cases of national or provincial universities. Thus, university-run enterprises don't actually spin "off" from their mother institutions, they just spin "around" or even spin "in" their mother institutions. Therefore, it is very hard to regard them as purely private firms.

Giving priority to the development of education is the basis of the two major national strategies of improving the quality of people and rejuvenating the nation by relying on science and education and realizing sustained development.

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