



A Study of Education Investment and Xinjiang Economic Development

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Abstract

As a main form for human capital investment, education has irreplaceable effect on national or regional economic development. This paper, based on the relationship between Xinjiang regional economic development and education, analyzes the present conditions of Xinjiang educational investment, the scale and problems of Xinjiang education, the contribution of education to Xinjiang economy, and how to drive Xinjiang regional economic development. Finally, this paper puts forward relevant policy suggestions as future references.

Keywords: Human capital, Education investment, Industrial structure adjustment, Economic development

1. Review of education investment

1.1 Main contents of human capital theory

In T. W. Schultz's opinion, the concept of capital in traditional economic theories merely includes some physical matters, such as production materials and money, and ignores an important production factor --- man's competence, what is incomplete and could not make reasonable and reliable explanation for economic growth. According to his idea, to study the economic growth, it is necessary to absorb the concept of human capital into the traditional capital concept, instead of just considering the tangible material capitals. Both human capital and material capital have the properties of capital. But they are different. He thinks that there are two kinds of capitals in economic production process. The capital embodied by material forms is material capital. And the capital embodied by laborers is human capital. The two kinds of capitals have production effect on economy, what will contribute to the rise of income of people. The practices of western economic development have already proved that the return from human capital investment is higher than that of material capitals. Under the market economy condition, people will response to the different returns on investments reasonably and make the right economic choice. Then, social economy will grow quickly and national income will be increased. Therefore, to enhance the human capital investment and improve the population quality turns into the key for driving economic development. In social economic development, it is extremely important to improve the population quality by education and medical care. T. W. Schultz thinks that what determine the future of human being are not space, land, and natural resources, but population quality, techniques, and knowledge level.

T. W. Schultz lists five main forms of human capital investment: The first is medical care. Extensively, it includes all expenses concerning human longevity, power, hardiness, energy, and vitality. The second is the training for employees. The third is the formal primary, middle, and high education. The fourth is the learning project provided by non-enterprise organizations for adults (includes the technology popularization project that is common in agriculture). The fifth is laborers' adaptation to the transfer of employment opportunity. Then, expenses for migrants entering a new area and investments in improving enterprises' competence are added. T. W. Schultz regards the education investment as the most important part of the whole human investment. He points out: People invest in themselves to improve the production capability and consumption capability. School education is the largest investment for human capital. The effect of education is far greater than that of material capitals, such as buildings, facilities, and stocks.

T. W. Schultz emphasizes on the "human capital" in technological progresses. The human capital is embodied by human being with their techniques and production knowledge. It is resulted from the investments in education, trainings, and medical care. T. W. Schultz advances the human capital model concerning economic growth: $Y=F(K, AL, H)$. Here, K means capital. L stands for laborers who are not educated. H means human capital. Apparently, the human capital, as an independent source for economic growth, is becoming more important. The increasing return to human capital serves as the reason for economic growth.

The human capital theory has a prominent driving and promoting effect on economic development. Firstly, human capital can help to improve the use efficiency of materials, capitals, and technologies. Same materials, capitals, and technologies can produce more high-quality products. Secondly, human capital can direct the rise of materials, capitals, and technologies investment. For example, enlarge the investment scope of factors, increase the investment types of factors, and make best use of foreign resources, leading to the rise of quantity and the improvement of quality. Thirdly, changes of laborers structure and general improvement of laborers' quality will improve the use efficiency of laborers. Then, under the condition without increasing laborers and other factors, the quantity and quality will be improved together. Economics of development shows that human capital has an extremely important effect on economic development. As a developing country, we should pay more attention to human capital, comparing with material capitals. The absence of human capital serves as the fundamental reason for the lagged-behind economy and culture of developing countries, which has already been proved by the developing countries' economic development and social progress after the World War II. Especially, during the early and middle development in developing countries, the developing factor in great short is material capital, which is also the most effective factor. However, it is only one side of the problem. As a matter of fact, it is the human capital that is in real short for developing countries.

1.2 The key point of human capital investment ----- education investment

Education investment, also education resource, education input, and education economic condition, refers to the sum of people, materials, and capitals invested in education field by a country or region according to the requirements for developing education cause.

Education investment is the material base for developing intelligence and the education cause, an important factor for economic and social development, and the key for the success of modernization construction. For the long run, education investment has the largest benefit. Today, all countries in the world emphasize on investments in education. Especially for undeveloped regions, they should pay more attention to education investment.

During the development process of one country, education investment is usually increasing. Along with the development of national economy and society, on one hand, the need for all kinds of specialized talents and skilled laborers is larger and the level of national culture tends to be higher. It requires for relevant development of education. On the other hand, the gross national income and the income per capita keep in rising, what may share the constantly increasing education investment.

In China, education investment includes daily expenses for education and infrastructure expenses for education. The daily expenses for education are used for teachers' wages and welfare, and teaching facilities. The infrastructure expenses for education are used for school buildings and large equipments.

Chinese education investment is from many resources, including the financial appropriation from the central government and local governments, the special education fee from state-owned enterprises, collectivity-owned enterprises, and institutions, and the education fees from common people. As main form of human capital investment, the education investment accounts for a vital percentage. It is also an identification mark for the human capital in different country or region.

2. The effects of education investment for Xinjiang economic and social development

As an important way for human capital investment, education development directly restricts laborers' knowledge and citizens' quality in one country or region. The formation of human capital determines the economic development level. The importance of education gains more and more attention in the world today. The distance between countries or regions is in economic aspect superficially. In essence, the ultimate distance relies in education.

2.1 Human capital investment ----- education investment can help to realize industries' increasing returns in Xinjiang

The decreasing marginal revenue means that as certain factor investment reaches certain amount in production under certain unchanging technological condition, the output will be decreasing. However, human being, as a living factor, will contribute to the change of technological conditions due to the enhancing education investment in the accumulation and update of knowledge, the development and perfect of capability, and a series of self-enriching and improving processes, causing the increasing marginal revenue. Because of the special location, Xinjiang is short of talents, capitals, and materials. In special, the loss of talents restricts the economic development to a great degree. The present talent structure is quite unreasonable, what exerts a harmful effect on Xinjiang economic development. Therefore, Xinjiang local government should be aware of the inferior position of education there, increase investments in education, and make best use of talents in Xinjiang.

2.2 Education investment can benefit the optimization and upgrade of Xinjiang industrial structure

The prominent industrial structure contradiction is one of important factors affecting Xinjiang economic operation and the operational quality. Therefore, we must take the strategic adjustment of economic structure as Xinjiang economic development mainline, running through the whole process of reform and development. Focus on the strategic points of

Xinjiang economy, take the market as the guidance, the improvement of economic benefit as the center, the optimization and upgrade as the goal, adjust the economic structure comprehensively, construct a Xinjiang characterized new economic pattern, and drive the fast and healthy development of Xinjiang economy. The fundamental solution for all these issues is to improve the investments in education in Xinjiang.

To promote the industrial structure optimization and upgrade, we must take the improvement of laborers' quality and income as the goal and make strategic adjustment to Xinjiang industrial economic structure. Therefore, we should emphasize on human investment. Only when people's techniques are improved, can we realize the adjustment of economic structure in Xinjiang. It is a gradual logic process. If people's quality is improved, they can master new technologies and adapt themselves to new equipments soon, which will reduce the barriers of industrial structure adjustment to a great degree. The unreasonable talents structure, the low quality and efficiency of industry, especially the slow increase of laborers' income are the key for Xinjiang economic development. The important way for Xinjiang economic structure adjustment includes: promote the industrial structure optimization and upgrade, take the market as the guidance, the enterprises as the subjects, the benefits as the center, the technology and innovation as the support, enhance the education investment, improve the industrial quality and market competence comprehensively.

Increase the education investment and make the economic development turn into the improvement of laborers' quality from the transfer of laborer quantity. Laborers, once the quality and the technology are improved, will improve their productivity, save resources and work time to a great degree. The whole industry of Xinjiang will be transferred from the labor-intensive to the technology-intensive, realizing the optimization and upgrade of industrial structure.

2.3 Education investment is the engine for Xinjiang economic development

As for development, what people concerns firstly is economic development. Undoubtedly, that is true. Economic development is the base for national or regional development, which is also the key for all issues. Xinjiang is not an exception. Economic development must center on economic construction. Then, what is the inner source of economic development? It is human being. Human has initiative. Laborer is the most active initiative factor among all production factors. Education determines laborers' quality and competence, which finally determines the level and benefit of economic development. Economic competition is to compete for talents in essence. It results in education competition. The real source for Xinjiang economic development relies in the advantage of turning amounts of laborers into human resources, comprehensively improving Xinjiang people's scientific and cultural quality. To explore the natural resources, the first is to develop human resource. "Strengthening the country with education" should serve as the ultimate motive for Xinjiang economic development. In specific, the effects of education investment on laborers include four aspects as follow:

- (1) Education investment can improve laborers' quality. By means of education, laborers can acquire new knowledge and enlarge the insight. By this way, the quality of laborers will be improved.
- (2) Education investment can endow future laborers with techniques, and present laborers with new techniques. Techniques are in a positive proportion with values created by labor. Therefore, all provinces lay stresses on professional technique education, offering sorts of professional trainings, aiming at improving laborers' techniques.
- (3) Education investment is the base for scientific and technological innovation. It is the motive power of the first productivity. The development of science and technology is determined by the education. If science and technology are the first productivity, education will be the motive power of the first productivity. Today, the development of economy and the improvement of comprehensive national power depend on the development of science and technology. Therefore, emphasizing on the education cause and cultivating more innovative talents is the key for the sustainable development of economy.
- (4) Education investment can help to cultivate management talents for economic development. The economic development follows certain law that is controlled and used by people. Besides practical exploration, education and trainings can cultivate management talents who master economic laws.

In general, education is an indirect, potential, and long-term productivity. Its function is to cultivate knowledgeable, competitive, and high-quality talents. At present, the most developed country in the world has the most developed education level.

3. The quantitative analysis of the relationship between Xinjiang education investment and Xinjiang economic growth

Indexes for National economic growth mainly include gross domestic product (GDP), general national product (GNP), total product of society, total product of industry and agriculture, and household consumption level. We use the number of graduates in Xinjiang every year as the index for education development. Here, y refers to Xinjiang total product, x the number of graduates from colleges and universities in Xinjiang. Based on data from 1979 to 2004 in Xinjiang Statistical Yearbook, we set up the correlation model and the regression model as follow.

3.1 Correlation coefficient matrix

Suppose x_1, x_2, \dots, x_m are the relevant factor indexes. After observing these factors for n times, we get relevant sample data $x_i(k) (k = 1, 2, \dots, n)$. Then, the system's correlation coefficient matrix is:

$$R = \begin{bmatrix} r_{11} & r_{12} & \cdots & r_{1m} \\ r_{21} & r_{22} & \cdots & r_{2m} \\ \cdots & \cdots & \cdots & \cdots \\ r_{m1} & r_{m2} & \cdots & r_{mm} \end{bmatrix}$$

$$\text{Here, } r_{ij} = \frac{\sum_{k=1}^n (x_i(k) - \bar{x}_i)(x_j(k) - \bar{x}_j)}{\sqrt{\sum_{k=1}^n (x_i(k) - \bar{x}_i)^2 \sum_{k=1}^n (x_j(k) - \bar{x}_j)^2}}, \bar{x}_i = \frac{1}{n} \sum_{k=1}^n x_i(k)$$

$0 \leq r_{ij} \leq 1$ represents the correlation degree of x_i and x_j . The closer r_{ij} is to 1, the significant the correlation between x_i and x_j . As r_{ij} is close to 0, it means there is no correlation between x_i and x_j . Based on data from 1979 to 2004 in Xinjiang, we get:

$$R = \begin{bmatrix} 1 & 0.924708 \\ 0.924708 & 1 \end{bmatrix}$$

From relevant coefficient matrix, we get the correlation coefficient for y and x , 0.924708, which means a significant correlation. It indicates that Xinjiaing education investment has an important driving effect on Xinjiang economic development.

3.2 Regression analysis

The regression analysis is to study the dependence of one variable on the other variable. It can evaluate or predict one variable's average by the other variable's value or supposed value. One variable is dependent variable. The other is independent variable. We set a simple linear regression model, in which there is only one independent variable:

$$y_i = \beta_0 + \beta_1 x_i + \mu_i \text{ here, } i = 1, 2, \dots, n$$

y_i is dependent variable. x_i is independent variable. β_0 and β_1 are parameters by estimation. μ_i is a random disturbing item. In order to avoid the heteroscedasticity, we make logarithm of the independent variable and the dependent variable. Based on data from 1979 to 2004, we set the regression equation.

$$y = 1.26x - 5.2283$$

$$(9.22) \quad (-4.33)$$

$$R^2 = 0.78 \quad F = 85.31 \quad DW = 0.76$$

The result of regression indicates a satisfied model fitting. $R^2 = 0.78$ means the model fitting is satisfying in general. The test values of intercept and slope are larger than 5%, and the critical value of the free degree of significance level

$n-2=24$ $t_{0.025}(24) = 2.06$. Besides, from the intercept value, 1.26 is larger than 0, which indicates a positive correlation between them. In other words, the marginal contribution ratio of graduates from colleges and universities in Xinjiang to Xinjiang total product is 1.26. Once the graduates are rising by 1, the total product will rise by 1.26.

From the correlation model and regression model, we know that the driving effect of education investment on economy is considerable. The theoretical analysis has been verified by practices. Education investment is the direct driving power for economy.

4. Present conditions of Xinjiang education investment

4.1 The quality of human capital is poor and the proportion of education investment is irrational.

Here the quality refers to laborers' knowledge level, knowledge application ability, and the knowledge progress of human capital. In Xinjiang, the human capital has a large quantity but poor quality. The education structure of talents is unreasonable and can not meet the economic requirements. Concerning economic growth, the first is human capital. Therefore, when Xinjiang economy develops toward modernization, the largest barrier is not the resource or the capital or even the technological reform, but the population quality. Capitals can be accumulated. Technologies can be introduced. But population quality can not. It must depend on education investment.

4.2 The government's education investment for human capital is insufficient.

Data show that although Xinjiang education has achieved great progresses based on the government investment, it still far lagged behind the eastern provinces and cities, especially the talents structure. Xinjiang has rich natural resources. However, modern economic development lays more and more stresses on human capital. The key for human capital is education investment. In this aspect, Xinjiang local government does not offer sufficient investment, especially the education investment, for human capital. The local government should adopt an effective talents-introducing and maintaining mechanism, motivating the most potential talents to contribute themselves to Xinjiang economic development.

5. Policy suggestions for the development of Xinjiang education investment

5.1 Invest more in education expenses

To solve the lower investment issue, the urgent is to invest more in education. Education is an industry. But it should not be industrialized. Xinjiang local government should change the traditional thought and make it clear that education investment is a production investment, taking the education investment into the government's strategic vision and investment plan. In a sense, the local government can turn the education charges into "education tax", reducing the educational funds' external circular, regulating the government behavior, improving the investment environment, and making the education investment meet the requirements for Xinjiang economic growth. Meanwhile, transfer the vertical human capital investment into the horizontal and separate investment as soon as possible, motivate all social powers, enlarge the financing channels, invite more investments from enterprises, folks, and foreign subjects, forming a multiple invested education mechanism, and solving the shortage issue of education investment thoroughly.

5.2 Adjust the structure of education investment

Compared with other provinces, Xinjiang economy is still at a lower level. Education investment should more focus on the primary education that has higher social returns. The State Council regulates that from the spring of 2006, China will apply the new guaranteed mechanism for rural compulsory education funds. It marks that China has already realized the effect of primary education on the whole education system. Based on the increasing investments from the central government and the local government, the education quality will be improved gradually. It is an opportunity for Xinjiang developing the education. Therefore, we should grasp the opportunity to develop Xinjiang's primary education.

5.3 Actualize the balanced growth of regional education investment

At present, the education investment in areas of Xinjiang is not in a balance. The education investment in northern Xinjiang is larger than that in southern Xinjiang. In order to actualize a balance and drive the education development in undeveloped areas, the Xinjiang government should supply relevant financial supports and even more practical supports. China adopts the "local responsibility and leveled management" education mechanism. However, as a matter of fact, some local governments in Xinjiang fail to supply necessary guaranty for the implementation of policies and plans after they assume relevant education responsibilities. Therefore, to strengthen the Xinjiang government's financial transfer payment and local financial transfer payment is an important way for increasing education investment, guaranteeing the balanced development of primary education, and realizing the education fairness. In order to actualize the fair competition, Xinjiang should improve the local government's ability of transfer payment, achieving the education fairness.

6. Conclusion

To sum up, to speed up the development of Xinjiang economy, we must improve the education investment in Xinjiang. Only by this way, we can cultivate more high-quality talents for Xinjiang, driving the adjustment of industrial structure in Xinjiang area, and optimizing the talents structure there. We should understand the gap between Xinjiang and the east concerns not only economy. The key is the talents competition mode. We should learn to attract talents, retain talents, motivate talents, and use talents, what will benefit the sustainable development of whole Xinjiang economy.

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