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The Balanced Development of Vocational Education: Case Study on Four Municipalities in China

ZHU Chengchen[a],*; ZHU Dequan[b]

[a]University of Michigan, Ann Arbor, Michigan, U.S.
[b]Faculty of Education, Southwest University, Chongqing, China.
*Corresponding author

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Abstract

This paper aims to design an indication system, involving statistics originated from samples of the four Chinese municipalities (Beijing, Tianjin, Shanghai and Chongqing). It illustrates current situations and predicament in the development of vocational education in China, and evaluates the balanced development of vocational education scientifically and objectively. The "vocational education balanced development index system" is used as an analysis tool and this paper adopts analytic hierarchy process (AHP), descriptions and inference statistics and questionnaires as research methods. The results show that in recent years, the general development of vocational education in four municipalities tends towards equilibrium. However, there is obvious degree difference in balance in different regions.

Key words: Vocational education; Regional balanced development; China

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INTRODUCTION

China's economy, and society, has experienced great changes in the 30 years since the period of reform and opening up. Vocational education in China has also developed steadily under the macro-background of China's reform and development. As mentioned by Jiang (2011), drawing on the experience of other countries, exemplified by "dual system" vocational education in Germany, 'continued and technology education' in Australia, 'community college education' in Canada and the United States etc., China has formed its own system of vocational education with Chinese characteristics under the tendency of stable and diverse development of international vocational education.

Although great success is achieved in both economic society and vocational education in China, the development of vocational education itself is unbalanced. The imbalance is mainly embodied in two aspects: on one side, the development of vocational education does not keep up with the development of regional economic society; on the other side, there are regional differences of developments of vocational education in China, not only in different provinces of eastern, central and western China (Jiang & Lu, 2008; Wang, 2010; Ma, Wang & Tang, 2011; Ma, Zhang & Chen, 2011), but also between urban and rural areas within the region (Liu, 2011; Zhu & Yang, 2012).

There are two aspects that lead to the imbalance of vocational education development in China. First, there are enormous disparities in the level of economic and social development among different regions in China. The GDP in eastern areas is, in general, higher than that in western regions. Ma (2012) indicates that, in the year of 2010, China's major eastern provinces (Beijing, Tianjin, Hebei, Liaoning, Shanghai, Jiangsu, Zhejiang, Fujian, Shandong) had a GDP of 2.1671 trillion Yuan, while the GDP in western provinces (Chongqing, Sichuan, Guizhou, Yunnan, Tibet, and Shaanxi, Gansu, Qinghai, Ningxia and Xinjiang) was only 601.6 billion Yuan. Therefore, the difference of economic and social development, to a large extent, results in the imbalance of vocational education development in different regions. In addition, there is less integration between vocational education development and regional economic and social development in China.

Moreover, many in the government do not consider the lack of school-enterprise cooperation as an important issue that negatively affects development of Chinese vocational education, influencing the equilibrium of vocational education objectively.

Both the practical development and existing research reveals the imbalanced development of vocational education in China. In which way did these imbalances exist? What was the degree of the disequilibrium? How should we measure the disequilibrium? Effective and convincing answers to these questions are still missing in China. This study attempts to answer these questions. The purposes of our study are:

Design a reliable index system to measure vocational education balanced development;

Measure vocational education balanced development level of sample cities with the adoption of our index system;

Compare the development index differences between sample cities in vocational education;

Analyze the index differences of vocational education between cities of east and west.

1. RESEARCH DESIGN

1.1 Design a Balanced Development Index System of Vocational Education

In recent years, great attention has been paid to the balanced development of education in China. An increasing number of Chinese scholars have focused on designing an index system, which can measure education balanced development effectively. Some researchers made fruitful contributions. Zhai (2006, 2007), Yao (2008), Li & Wu (2009), Chu & Gao (2010), Dong& Fan (2011), Yu, Zhao & Zhao (2011) have designed various education balanced development index systems from different perspectives. However, the measurement index system mainly focuses on balanced development of compulsory education other than vocational education. In the matter of designing measurement index system of vocational education balanced development, Ma (2011) and his colleagues have made great contributions to the establishment of a theoretical model of vocational education balanced development. They claim that at the core of occupational education balanced development is balance of supplement and demand, which represents in four aspects: opportunity equilibrium, structural equilibrium, resource equilibrium and quality equilibrium. In addition, Zhang & Zhu (2011, 2012), Zhao & Yang (2011) etc. made contributions to the design of balanced development measurement index system of vocational education.

This paper is based on the basic connotation of vocational education balanced development and existing research results, using an analytic hierarchy process to build a vocational education balanced development index system. First, we establish a hierarchy structure by analyzing the influence factors that involve 5 level-one variables (entrance quality, basic conditions, the core development, support and quality benefit) and 16 secondary variables. Secondly, we set up a judgment matrix on the basis of weighting factors. The weighting factors are determined through a meeting of experts, and then a judgment matrix was established, creating weights of different factors. Finally, the foundation of balanced development evaluation was established through weight consistency test and variable standardized process. We inspected the consistency of weight factors continuously when we analyzed the weights of each index. We use the standardization variables as the criterion of evaluation for balanced development (Table 1).

Table1
Vocational Education Balanced Development Measurement Index System of Beijing, Tianjin, Shanghai and Chongqing

Target variable	Level-one variable		Secondary variable	
	Content	Weight	Content	Weight
Vocational education balanced development	A Entrance quity index	0.106	A_1: The number of students in senior and secondary vocational school per 10,000 people	2/3
			A_2: Growth rate of enrolled students in the last five years	1/3
	B Basic condition index	0.142	B_1. Floor area for each student	1/3
			B_2. number of equipment that can be operated per student	1/3
			B_3. number of books per student	1/3
	C Core development index	0.234	C_1. Student-teacher ratio	1/4
			C_2: ratio of double-quality teachers and full-time teachers	1/4
			C_3: ratio of teachers with senior professional title	1/4
			C_4: ratio of highly educated teachers	1/4
	D Security & Support index	0.251	D_1: educational investment per student	1/3
			D_2. educational expenditure per student	1/3
			D_3. educational intro-budgetary expenditure per student	1/3
	E Quality & efficiency index	0.267	E_1: Students satisfaction	1/3
			E_2: Number of graduates per ten thousand students in five years	1/6
			E_3: ratio of graduates gaining double certificates	1/6
			E_4: direct employment rate	1/3

1.2 Sample Selection

The data come from four municipalities in China (Beijing, Tianjin, Shanghai and Chongqing) as analytical samples. These locations were chosen for multiple reasons. First, all of these municipalities stand in significant positions in the economic and social development in China. Secondly, these four municipalities share similarities in economic position and strategic direction of development, while they have different geographical location and foundation. Beijing, Shanghai, and Tianjin are traditional Chinese municipalities directly under the central government, locating in the east area, where resources and development are a priority. They show better economic foundation, while Chongqing is an emerging municipality (founded in 1997), which locates in west areas where economic foundation is relatively weak.

1.3 Data Collection and Analysis

Data of each index was collected during the period of index system design. The data of entrance equity index, basic condition index, core development index comes from the book of the 'Brief Statistical Analysis of National Education and Career Development' (from 2007 to 2011) , 'China Statistical Yearbook', 'Statistical Yearbook of Beijing', 'Statistical Yearbook of Tianjin', 'Statistical Yearbook of Shanghai', 'Statistical Yearbook of Chongqing', 'Education Yearbook of Beijing', 'Education Yearbook of Tianjin', 'Education Yearbook of Shanghai', 'Chongqing Education Yearbook'. Security and support index data comes from 'Yearbook of Statistics of Educational Funds in China (from 2008 to 2011)'. The quality and efficiency index data are mainly from data of the yearbooks and the questionnaires. The satisfaction questionnaire was arranged in accordance with the service quality gap analysis model (SERVQUAL scale) of Parasuraman, etc... 660 questionnaires were sent to senior and secondary vocational schools in Beijing, Tianjin, Shanghai, and Chongqing. 509 valid questionnaires were completed and returned (124 copies from Beijing, 109 copies from Tianjin, 114 copies from Shanghai and 162 copies from Chongqing).

2. RESULTS

2.1 Measurement and Comparison of Entrance Equity Index

Rawls (? source) defines fairness as consisting of a fair starting point, a fair process and fair results. In the situation of vocational education development, we studied entrance equity index in terms of capacity of whether vocational education in a region met the requirement of regional school-age population and labor demand. The secondary index of entrance equity contains the number of students in senior and secondary vocational school in 10 thousand people, and the growth rate of enrolled students in the past five years.

Based on the "vocational education balanced development measurement index system of Beijing, Tianjin, Shanghai and Chongqing", the formula of entrance equity index is: $A=\frac{2}{3}A_{1i}+\frac{1}{3}A_{2i}$ (i represents different year, the same hereinafter). We collected the data from 2007 to 2011, and calculated with formula $\overline{A}=\frac{\sum\frac{2}{3}A_{1i}+\frac{1}{3}A_{2i}}{N}$ (N represents different year, the same hereinafter). We calculated the entrance equity index of secondary vocational education and senior vocational education in four municipalities in recent five years (Figure 1).

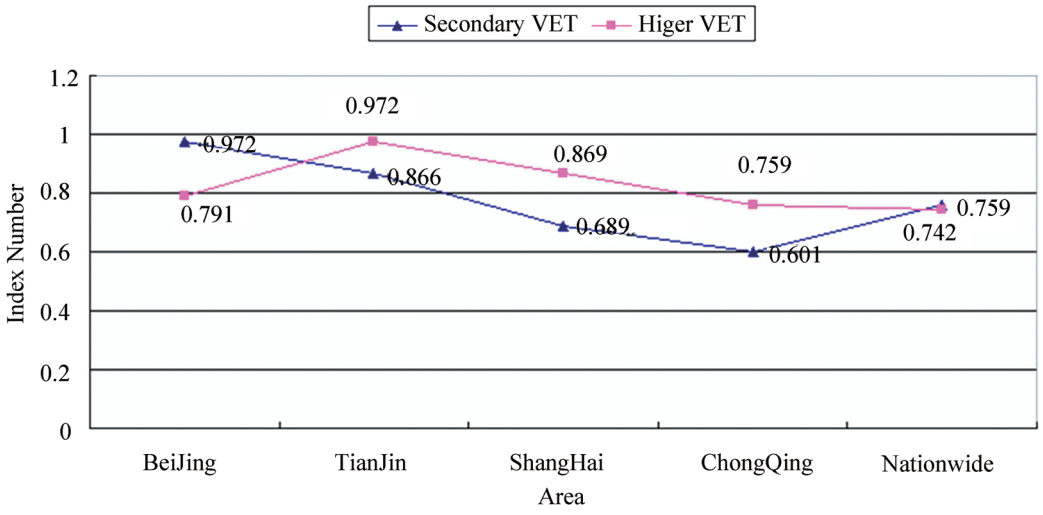

Figure 1
Comparison of Entrance Equity Evaluation Index

As shown in figure 1, we find that the entrance equity index of either secondary or senior vocational education in Beijing, Tianjin, and Shanghai is apparently higher than that in Chongqing. Additionally, the entrance equity index in Chongqing is lower than the national average index. Second, the entrance equity index of secondary vocational education in Beijing and Chongqing is higher than the index of senior vocational education, especially in Beijing, where the entrance equity index of secondary vocational education is obviously higher than other cities. Thirdly, in the light of national average data, the entrance equity index of secondary vocational education (0.759) is slightly higher than that of senior vocational education (0.742). As shown in figure 1, the overall level of vocational education development in China improves gradually, and the level of vocational education entrance equity in various regions has also improved. Finally, it is worth mentioning that the gap of vocational education entrance equity among different regions in China has narrowed.

2.2 Measurement and Comparison of Basic Condition Index

In recent years, the expansion of enrollment in vocational schools in China has made the lack of infrastructure investment one of the vital factors that influence the development of vocational education. In order to gain full understanding of basic condition index of the equilibrium, we use three variables: floor area for each student, number of equipment that can be operated per student and number of books per student. Based on the index system, the formula of basic condition index is defined as $B=\frac{1}{3}B_{1i}+\frac{1}{3}B_{2i}+\frac{1}{3}B_{3i}$. We collect data from 2007 to 2011 and adopt the calculation formula: $\overline{B}=\frac{\sum\frac{1}{3}B_{1i}+\frac{1}{3}B_{2i}+\frac{1}{3}B_{3i}}{N}$. Then we obtain the basic condition evaluation index of secondary and senior vocational education in the last five years in Beijing, Tianjin, Shanghai and Chongqing (Figure 2).

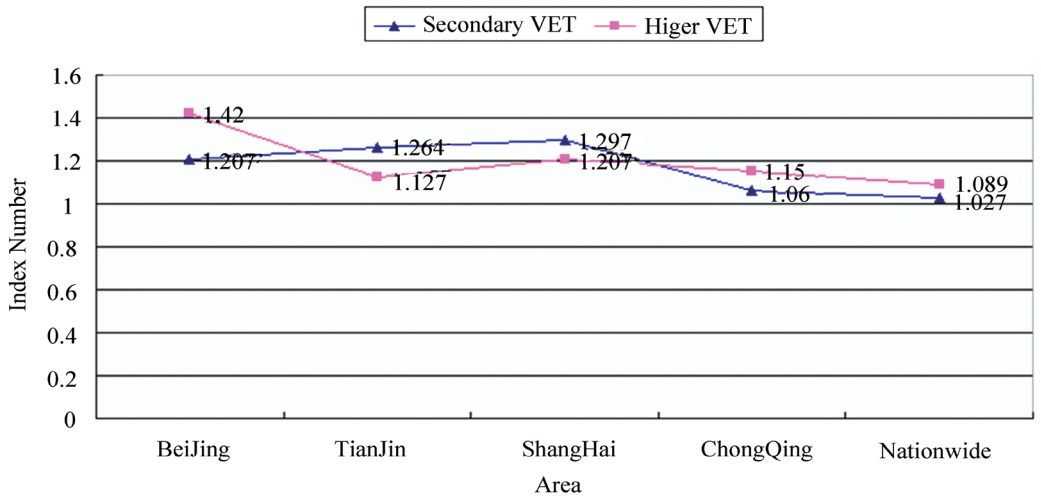

Figure 2
Comparison of Basic Conditions Evaluation Index

From figure 2 we conclude that in the basic condition evaluation index of secondary vocational education, Shanghai has the highest level of equilibrium, followed by Tianjin. Equilibrium level of Beijing and Chongqing ranks third and fourth respectively. In the higher vocational education basic condition evaluation index, the equilibrium level in Beijing, Shanghai, Chongqing and Tianjin spans from high to low. The index of all these four cities is above the national average. Secondly, the basic condition index of secondary vocational education is slightly higher than that of senior vocational education in both Tianjin and Shanghai city. Thirdly, in general, the basic conditions of vocational education in east cities are more developed than that in the west. Further study shows that there exists a significant difference (0.001) in all of the three secondary variables (floor area for each student, number of equipment that can be operated per student and number of books per student) in four target cities. In addition, statistical analysis indicates that, even in recent years, the investment in hardware resources of secondary and senior vocational education in Beijing, Tianjin, Shanghai and Chongqing increases year by year. Finally, the managerial condition has been obviously improved, and the disparity of resource allocation in different regions still exists and will be gradually expanded.

2.3 Measurement and Comparison of Core Development Index

The role of teachers serving in the vocational education system has gained momentum over the years. We consider

teachers' level as the core development index to highlight the importance of the teachers' ability. The index includes four variables: student-teacher ratio, ratio of double-quality teachers and full-time teachers, ratio of teachers with senior professional title and ratio of highly educated teachers. The formula of core development index is $C=\frac{1}{4}C_{1i}+\frac{1}{4}C_{2i}+\frac{1}{4}C_{3i}+\frac{1}{4}C_{4i}$.

Embedding data from 2007 to 2011 in the formula above and then we gain the mean value of core development index in four municipalities using the formula of $\bar{C}=\frac{\sum\frac{1}{4}C_{1i}+\frac{1}{4}C_{2i}+\frac{1}{4}C_{3i}+\frac{1}{4}C_{4i}}{N}$.

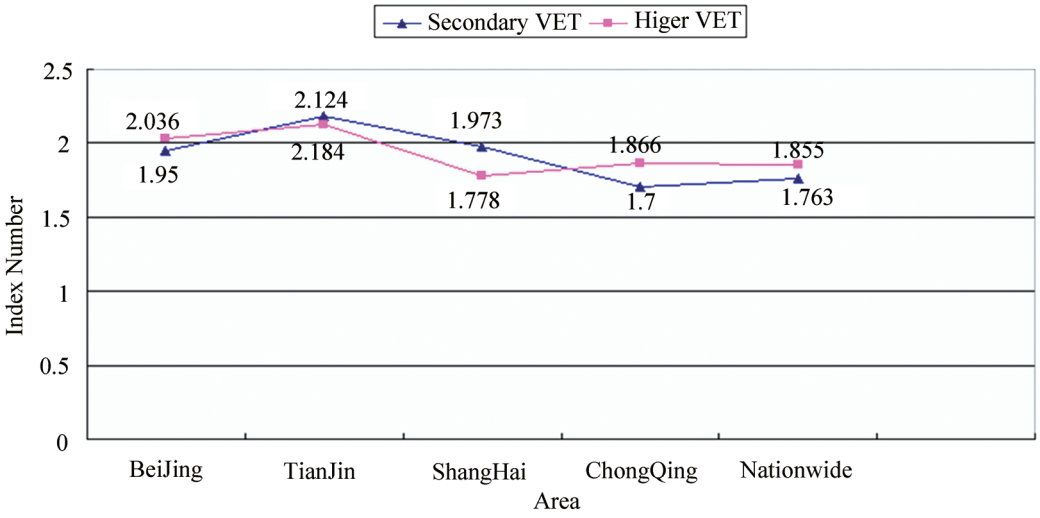

Figure 3
Comparison of Core Development Index

From the accurate data and figure 3, we conclude that in core development evaluation index of secondary vocational education, the equilibrium level from high to low is Tianjin, Shanghai, Beijing and Chongqing. Chongqing is slightly lower than the national average. Second, in the core development evaluation index of higher vocational education, the equilibrium level from high to low is Tianjin, Beijing, Chongqing and Shanghai. From figure 3, Tianjin has a distinct advantage, while Shanghai is below the national average level. The main reason is that in recent years, the student/teacher ratio (17.382) of higher vocational education in Shanghai is higher than Tianjin, Beijing and Chongqing, and slightly higher than the national average (17.262). In addition, Shanghai's high title teacher ratio is also slightly lower than those of Tianjin, Beijing and Chongqing and even below the national average. Third, in eastern China, teachers' level of vocational education is much higher than that in the west, which related to the attraction of social, economic and cultural advantages in these areas.

2.4 Measurement and Comparison of Support Index

Funding is the guarantee and support of development in vocational education. Security support index consists of three observation points, namely the average educational input of students, the average educational expenditure of students and the average budgetary of educational expenditure. The security support index is calculated using the formula $D=\frac{1}{3}D_{1i}+\frac{1}{3}D_{2i}+\frac{1}{3}D_{3i}$. The average data for five years is calculated using the formula $\bar{D}=\frac{\sum\frac{1}{3}D_{1i}+\frac{1}{3}D_{2i}+\frac{1}{3}D_{3i}}{N}$.

When we synthesize all the data we collected from figure 3, we can analyze the secondary vocational education security support index. Ranging from high to low by the equilibrium index, while Chongqing is below the national average, Second, the higher vocational education security support index presents parallels with secondary vocational education. In analyzing the data, we find that the advantage of education funds in Beijing secondary and higher vocational education is particularly prominent; it is much higher than other municipalities on the average educational input of students, the average educational expenditure of students and the average budgetary of educational expenditure, which directly indicates that the support of Beijing on vocational education is substantial. However, in contrast, due to the weak educational appropriations, Chongqing is facing the seriously problems of insufficient funding, which leads to the consequence that the average budgetary of educational expenditure is lower than Beijing, Shanghai and Tianjin. Then it can be verified that the level of vocational education input and the level of regional economic development are related closely.

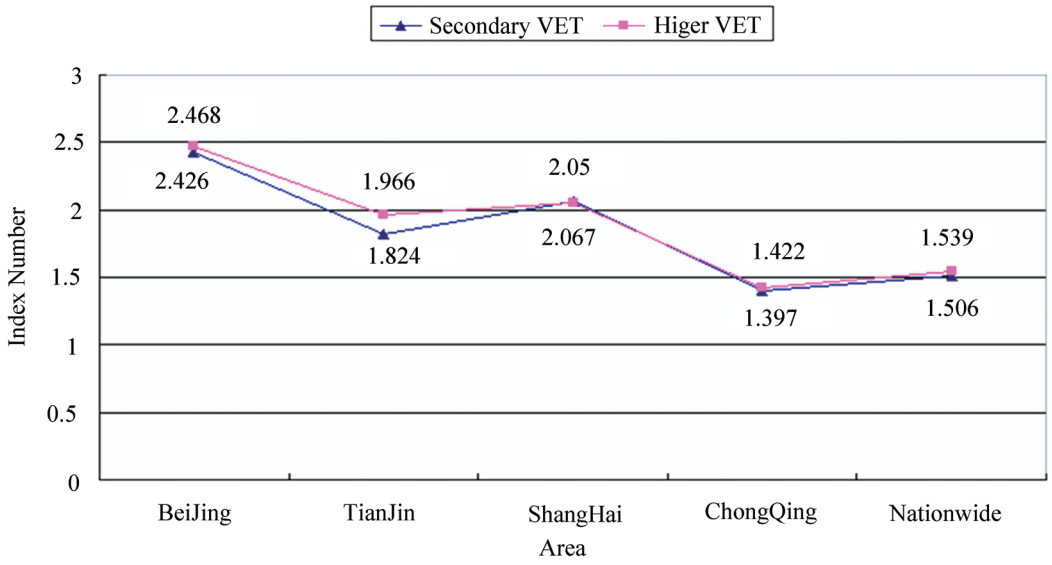

Figure 4
Comparison of Support Index

2.5 Measurement and Comparison of Quality Benefit

The quality of vocational education is relative to the international competitiveness of a country, the survival and development of vocational colleges, as well as the future development and destiny of the students. Therefore, the quality benefit is one of the significant indexes of balanced development of vocational education. The index is measured using four aspects: student satisfaction degree, graduation rate in recent five years, proportion of the double certificates, and first employment rate. The calculation formula of quality benefit index is:

$$E = \frac{1}{3}E_1 + \frac{1}{6}E_{2i} + \frac{1}{6}E_{3i} + \frac{1}{3}E_{4i} \ .$$

Different from the previous indexes, the parameter of student satisfaction degree is obtained mainly through the survey data, as well as the various statistical yearbooks. Then, the satisfaction of vocational college students is in Beijing, Tianjin, Shanghai and Chongqing investigated using standardized questionnaire and transformed to satisfaction value. The mean value formula of quality benefit index of recent five years is

$$\overline{E} = \frac{\sum \frac{1}{3}E_1 + \frac{1}{6}E_{2i} + \frac{1}{6}E_{3i} + \frac{1}{3}E_{4i}}{N} \ .$$

Calculation result is shown in figure 5

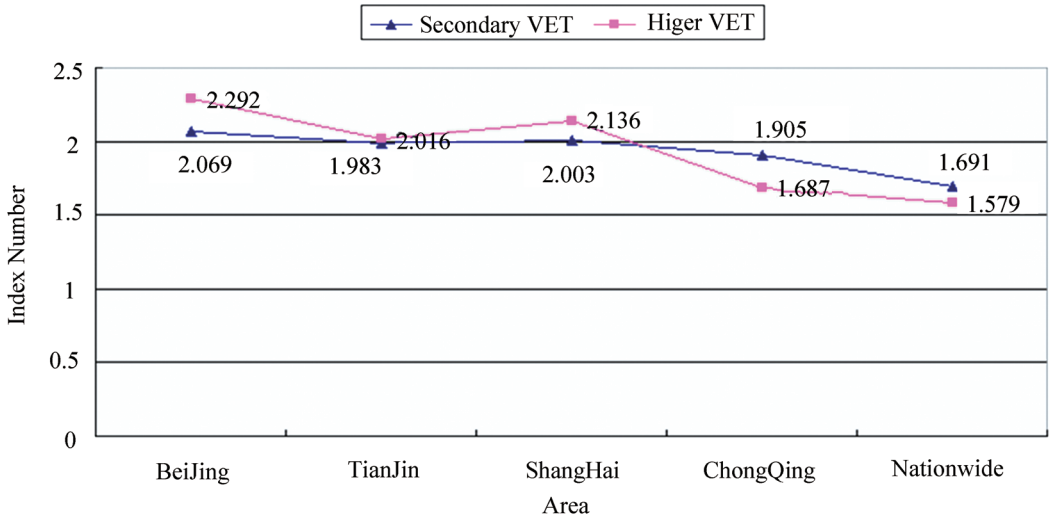

Figure 5
Comparison of Quality and Effectiveness

With the data and figure 5, we conclude that both secondary vocational education and higher vocational education, the order of educational balanced degree from high to low is Beijing, Shanghai, Tianjin and Chongqing. However, they are all above the national average level. Secondly, from the questionnaire we can conclude that the vocational education satisfaction is not higher than the students expected. We can still see the distance between the service quality experienced and expected by the students. Comparatively, satisfaction is higher in Beijing, while is it not as high in Chongqing. On the other hand, the satisfaction of higher vocational schools is generally better than that of secondary vocational schools. Finally, there is an obvious gap of index number 0.05 in Beijing, Tianjin, Shanghai and Chongqing, either in the rate of graduation, vocational certificate or first employment.

2.6 The Overall Comparison of Development Index in Vocational Education

According to the balanced development index system of vocational education in Beijing, Tianjin, Shanghai and Chongqing, the formula of balanced development index of vocational education in Beijing, Tianjin, Shanghai and Chongqing is:

$$\bar{I}=0.106\bar{A}+0.142\bar{B}+0.234\bar{C}+0.2514\bar{D}+0.267\bar{E}.$$

The comparison results of balanced development index of vocational education in Beijing, Tianjin, Shanghai and Chongqing are shown in diagram 6:

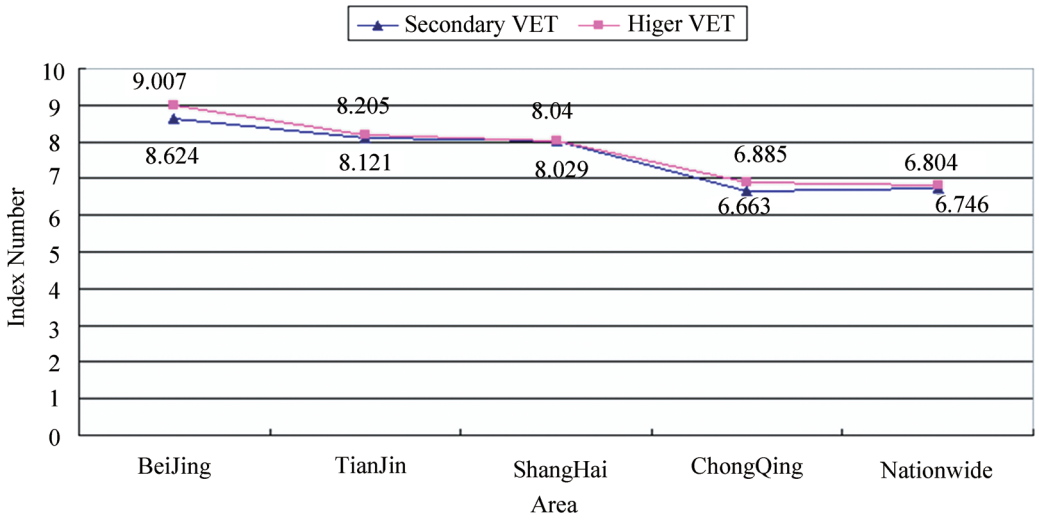

Figure 6
Comparison of Balanced Development Index

From figure 6, the order of equilibrium level is Beijing, Tianjin, Shanghai and Chongqing both in higher vocational education or secondary vocational education. Additionally, the higher vocational education balanced development is generally better than the secondary vocational education.

CONCLUSIONS

To summarize, this paper mainly made following conclusions:

Because of the imbalanced developing policy since 1970s, known as the reform and open policy, China is currently in an imbalanced regional development mode. There is a huge gap between eastern China and western China in GDP per person and the urbanizing and industrializing processes, which directly caused the gap in vocational education development. Since the huge gap in economic development between different regions in China cannot be changed in a short time, the imbalanced development in vocational education is also difficult to change quickly. However, Chinese government must face the gap directly and take steps positively in regional vocational education in order to help the fast development of vocational education in western China. On the other hand, the western region also has to contribute to the coordination of development between vocational education and regional economy. It is urgent to raise the quality of training skilled people, aimed to progress economic development and employment, reduce the number of the poor, and finally construct a harmless society.

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