

# Study on the Influencing Factors of Sustainable Development of Higher Vocational and Technical Education in Shanghai Region

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**Abstract.** There are numbers of obstacles and difficulties observed based on the examination of the current situations and development patterns of higher vocational and technical education in Shanghai. This study uses questionnaire method and data analysis, the data is analyzed with the SPSS analysis software, combine information on the development of representative vocational and technical institutions in Shanghai. Based on the information collated in this study and the results of the data analysis, influencing factors which affect the development of higher vocational and technical education have been identified. In this paper, we also propose recommendations for the sustainable development of higher vocational and technical education in Shanghai.

**Keywords:** Vocational and Technical Education; Sustainable Development; Influencing Factors.

## 1. Introduction

In the job market, there are always contradictions between supplies and demands. Take Shanghai region for an example, higher vocational and technical education is hampered and constrained by a variety of factors, higher vocational and technical education also faces qualification discrimination in many aspects [1]. In 2021, Li et al pointed out that identity discrimination in higher vocational and technical education is mainly manifested in four aspects: discrimination in student recruitment, discrimination in degree awarding, discrimination in employment and discrimination in perceptions. These discriminations can be overcome by changing perceptions, upgrading the level of education, optimizing the input structure and improving students' abilities [2]. In 2014, Dang et al indicates that agreement with statements about facilities and equipment, teachers' ability, curriculum, and soft skills are the clearest indicators of enhanced perceptions about the image of vocational and technical education and training [3].

Vocational and technical education has a long way to go in order to meet the needs of the job market. In 2021, Kongkiti, et al pointed out that higher vocational and technical education has a direct impact on the preparation and development of qualified employees. Many significant changes have occurred in vocational and technical education, particularly in the integration of learning and training system [4]. But with its small employment pool and low value, while students graduating from higher vocational colleges usually have low self-confidence. In 2020, Wang et al observed that students in secondary vocational schools have a weak learning base, lack interest in learning, lack confidence in learning new knowledge, some of them may feel confused about the future, so the biggest problem in the teaching process is not whether students have the ability to learn, but to guide them in their subjective learning, which is a huge challenge for teachers in vocational institutions [5]. At the same time, with the transformation and upgrading of urban industries, there is an increasing demand for all types of highly skilled talents. In 2021, Cai et al pointed out that the teaching concept of vocational and technical education should be based on the combination of industry and study. During the early days of China's founding, a large number of engineering and technology talents with modern scientific knowledge were trained for the country by selecting advanced members of workers to receive "half-work, half-study" education. The case of the Shanghai Amateur University of Technology has provided many ideas for the development of higher vocational and technical education in China [6]. In 2020, Li et al through research into the art education in higher vocational colleges showed that the traditional educational model no longer satisfies the needs of today's society. Art teachers in higher

vocational colleges should make appropriate teaching reforms based on computer assistance in order to promote quality education [7]. In such a background, higher vocational and technical education have long time been seriously underrated, the outdated teaching environment and teaching system is also one of the main factors that hinder its development. yet it fails to provide maximum value to the severe job market in China. In 2021, Gao et al Indicated that the most important point to optimizing the overall quality of higher vocational schools is to carry out the reform of "faculty, teaching material and methods"[8]. Also, there is less research on the sustainable development of higher vocational and technical education in the Shanghai region and less attention has been paid to this area, new modes of teaching and learning should be fully explored. In2021, Dinavence et al through research into vocational teacher training, the need for workplace mentors and facilitators to be involved in learning program, as well as joint supervision and collaborative development of supervision guidelines was identified [9].

However, to analyze the current policies, skilled training has great potential for sustainable development of higher vocational and technical Education in the future. In 2021, Wang et al indicated that if take the development of vocational and technical education to a new level, the first thing is to take the development of regional vocational and technical education as an important internal driver of regional economic and social upgrading, create policy and institutional environment for the development of regional vocational and technical education [10]. In 2021, Yan et al thinks that the development of vocational and technical education is mainly reflected in a complete institution training system, establish a sound talent cultivation model and a diversified research force.

Looking to the future, the implementation of Xi Jinping's thought of socialism with Chinese characteristics in the new era will be deepened, the modern higher vocational and technical education system will be more mature, the characteristics of higher vocational and technical education will be more prominent, and the governance of higher vocational and technical education will be sounder [11].

This study visited 12 representative vocational and technical schools in Shanghai to collect data for analysis, to support the sustainable development of higher vocational and technical education, it also provides a theoretical basis for promoting the awareness of vocational and technical education among the general public and students.

## **2. Analysis of the Influencing Factors of Sustainable Development of Higher Vocational and Technical Education in the Shanghai Region**

To achieve sustainable development of higher vocational and technical education in Shanghai is a huge and complex project, closely linked to many local factors such as policies, economy, cultural environment [12].

In terms of influencing factors, the factors affecting the development of higher vocational and technical education in Shanghai region can be set to: Management system, financial support, Theoretical Research Support, uneven development, employment opportunity, own developmental problems, talent cultivation mechanism, faculty force, national policy support, local policy support, traditional concept, a total of 12 indicators. Assigning a score of 5 - 1 to the findings, factor analysis of the survey results was carried out using statistical software (SPSS 23.0) to reflect the problems that emerged in the sustainable development of vocational and technical education in Shanghai.

Through exploratory factor analysis to provide a data base for the further policy setting, marketing strategies etc. to improve the sustainable development of vocational and technical education in the Shanghai region.

## 2.1 Influencing Factors Which Affecting the Sustainable Development of Higher Vocational and Technical Education

### 2.1.1 Kaiser-Meyer-Olkin and Bartlett's Test of Sphericity

Before doing the statistical analysis, each influence factor was set to a degree scale of 1, 2, 3, 4, 5, depending on what the questionnaire information required, the 12 original variables were subjected to exploratory factor analysis to obtain eigenvalues, contribution rates, cumulative contribution rates, etc. To ensure that each indicator in this category is suitable for factor analysis, first, KMO tests and Bartlett's tests were performed. Exploratory factor analysis was conducted on 12 indicators using SPSS 23.0, KMO tests and Bartlett's tests were performed on the scales, the results are shown in the table below.

**Table 1.** KMO Kaiser-Meyer-Olkin and Bartlett's test of Sphericity

Kaiser-Meyer-Olkin Measure of Sampling Adequacy		0.740
Bartlett's test	Approx. Chi-Square	517.375
	df	66
	Sig.	.000

As showed in Table 1, the KMO test value of 0.74 is greater than 0.7, indicating that the sample data is amenable to factor analysis. The Barlett test has a high significance probability of 0.000, indicating the existence of common factors between the matrices of the sample data.

### 2.1.2 Determining the Number of Factors Affecting the Sustainability of Higher Vocational and Technical Education

The results of the survey were evaluated by scoring the impact factors according to statistical principles, and the data of the 12 original variables were analyzed using an R-factor analysis. Sampling 5 principal factors with eigenvalues greater than 1 according to the "Kaiser method, the cumulative contribution reached 81.128%, although it did not reach the requirement of 85%. However, as the eigenvalues of the latter factors were low, the effect of taking a few more factors were not significant, so five factors were taken for the data analysis. The overall informativeness of the sample data can be seen in the cumulative contribution of 81.128% of the sample data factors in this study.

## 2.2 Identifying the Common Influencing Factors Affecting Higher Vocational and Technical Education

**Table 2.** Common Factor Analysis (Communality Variance)

	Initia	Extraction
Security Factor1	1	0.771
Security Factor2	1	0.818
Security Factor3	1	0.808
Development Factor1	1	0.772
Development Factor2	1	0.747
Development Factor3	1	0.798
Political Factor1	1	0.838
Political Factor2	1	0.811
Talent Cultivation Factor1	1	0.824
Talent Cultivation Factor2	1	0.835
Popularization Factor1	1	0.841
Popularization Factor2	1	0.872

The 12 original variables of the research study were categorized on the basis of determining the number of factors affecting higher vocational and technical education. Using "Varimax orthogonal rotation" The factor loading was transformed and the original variables with larger absolute values of loading were categorized (Table 2). In this study, five primitive factors were extracted using principal component analysis, with the characteristic root greater than 1. The main factors affecting vocational and technical education are security factors, development factors, political factors, talent cultivation factors, and popularization factors.

**Table 3. Total Variance Explained**

	Initial Eigenvalues			Extraction Sums of Squared Loading			Rotating Load of Squared Loading		
	Total	Variance Percent	Accumulative %	Total	Variance Percent	Accumulative %	Total	Variance Percent	Accumulative %
1	4.326	36.05	36.05	4.326	36.05	36.05	2.331	19.428	19.428
2	1.578	13.146	49.196	1.578	13.146	49.196	2.304	19.2	38.628
3	1.443	12.027	61.223	1.443	12.027	61.223	1.712	14.265	52.893
4	1.256	10.465	71.688	1.256	10.465	71.688	1.701	14.171	67.064
5	1.133	9.44	81.128	1.133	9.44	81.128	1.688	14.064	81.128
6	0.444	3.704	84.832						
7	0.4	3.33	88.162						
8	0.371	3.089	91.251						
9	0.318	2.649	93.9						
10	0.294	2.448	96.348						
11	0.236	1.969	98.317						
12	0.202	1.683	100						

After setting the principal factor, the 12 original variables were categorized and analyzed, and to be able to clearly see for each latent factor, which indicator had the greatest impact, the initial latent factor was converted into a new latent factor (varimax orthogonal rotation), as shown in the table below.

**Table 4. Rotated Component Matrix (component)**

	Component				
	1	2	3	4	5
Financial Support	0.843				
Management Systems	0.91				
Theoretical Research Support	0.862				
Employment Opportunity		0.866			
Own Developmental Problems of Vocational and technical education		0.863			
Uneven Development		0.887			
National Policy Support			0.765		
Local Policy Support			0.894		
Talent Cultivation Mechanism				0.814	
Faculty Force				0.833	
Publicity					0.888
Traditional Concept					0.89

According to the above table, after the transformation of potential factors, each factor represents a major category, loading value <0.5 for categorization, grouping the 12 original variables into 5 main factors, each variable is named and categorized. After naming the security factors, development factors, political factors, talent cultivation factors and popularization factors, according to the 12 indicators corresponding to each of the 5 main factors analyzed, the study mainly deals with the

subjective and objective influencing factors for the sustainable development of higher vocational and technical education in Shanghai region, The study gave each indicator 5 degrees, set as "1 (not influential)", "2 (not very influential)", "3 (medium)", "4 (influential)" and "5 (very influential)", as follows:

**Table 5. Descriptive Statistics of Influencing Factors**

Factors	Index	1	2	3	4	5
Security Factors	Management Systems	3.3	32.9	32.4	16.5	14.9
	Financial Support	3.6	21.5	23.8	26.5	24.6
	Theoretical Research Support	8.2	38.6	24.8	14.5	13.9
Development Factors	Uneven Development	8.1	26.3	35.8	14.8	15
	Employment Opportunity	6.7	33.2	25.6	16	18.5
	Own Developmental Problems	3.8	49.2	16.1	15.2	15.7
Talent Cultivation Factors	Talent Cultivation Mechanism	2.9	44.1	30.4	12.2	10.4
	Faculty Force	3.9	31.1	13.8	23.9	27.3
Political Factors	National Policy Support	12	23.2	13.2	42.6	9
	Local Policy Support	8.9	33.8	30.6	16.8	9.9
Popularization Factor	Publicity	6.9	34.4	28.7	11.8	18.2
	Traditional Concept	4.2	13.6	26.3	32.8	23.1

The above table shows, the factor analysis reveals that there is some variation in the indicators affecting the sustainable development of higher vocational and technical education, this study tends to favor the influential values, with the values of "influential" and "very influential" indicators <50% are the main factors that have the greatest influence on the sustainable development of higher vocational and technical education.

By observing the statistical index, it can be seen that there are 4 factors (over 50%) that have the most influence on the sustainable development of higher vocational and technical education, which are presented in the following order: 1. traditional concept; 2. national policy support; 3. faculty force; 4. financial support. One of these four indicators one attributed to the "political factors", one to the "talent cultivation factors", one to the "popularization factors" and one to the "security factors".

### **3. Analysis of the Influencing Factors Which Affect the Sustainable Development of Higher Vocational and Technical Education in Shanghai**

#### **3.1 Traditional Concept**

Vocational and technical education is often seen as "someone else's education" and "the education of losers", and only those who fail to get into university will go into higher vocational institutions. Young generation usually wish to have white-collar jobs, or become civil servants, the last thing they want for a job is to become blue-collar workers, which is a typical ideological constraint of the traditional concept [13]. Enhancing the attractiveness of vocational and technical education, breaking the shackles of traditional attitudes, and effectively improving the overall environment and quality of vocational and technical education are essential to making it more visible to society. When the educational quality improved and students can really benefit from their higher vocational and technical education, more large enterprises are involved in the course design and select their employee from vocational and technical institutions, it will certainly help to eliminate the traditional prejudice and discrimination of society towards vocational and technical education [14].

### 3.2 National Policy Support

Another reason for the low priority given to higher vocational and technical education is the policies. It is not wrong to promote higher education as the main target of state policy with massive funding and financial subsidies, but it cannot be avoided that devoting efforts to higher education while the compulsory and basic education are still inadequate [15]. Such particular realities required that higher vocational and technical education must be repositioned and protected. All along, the reforms have been put forward with higher education reform.

- In terms of tuition fees, vocational and technical education does not have an advantage, and in some cases, it is even more expensive than going to university.
- In terms of admission, vocational colleges are placed in the fourth or fifth batch, which is inferior to others.
- In terms of employment, students are simply pushed into the fierce job market without being able to obtain the corresponding academic certificates.
- In the eyes of teachers and parents, there is no such degree as higher vocational and technical education
- In the eyes of employers, there is no value of higher vocational and technical education graduates.

As a result, students feel like receiving "second-rate education" which totally destroy their confidence [16].

### 3.3 Faculty Force

The development of higher vocational and technical education has been slow, the quality of faculty team is relatively weak. Most of the teachers have turned to adapt to the needs of vocational and technical education with actually the teachers of basic cultural subjects. Some outstanding teachers choose to teach in second or third-level universities, thus creating the problem of weak faculty in higher vocational institutions.

To improve the quality of faculty team, on the one hand, organize and support teachers training and practice in enterprises, on the other hand, regularly invite experts to carry out technical guidance. At the same time, establish faculty training assessment and evaluating system, the relevant information on teachers' participation in further training is recorded as an important basis for evaluation [17].

Teachers should reinforce the teaching of basic theories and knowledge about technical project, optimize the teaching staff in all respects [18].

### 3.4 Financial Support

Higher vocational and technical education is a type of education that is directly linked to the job market. A region's input somehow determines the success of policy. For a long time, the financial input to higher education have been much higher than those allocated to vocational and technical education, the total level of financial investment has been lower, the local government have no sufficient resources to implement vocational and technical education policies or to support them [19]. Considering that higher vocational and technical education is a high-cost education and that the infrastructure generally poor, improve the mechanism for ensuring adequate funding, active financial support measures should be carried out, priority should be given to the protection of vocational and technical education in order to promote its good and rapid development. Open up investment channels in many ways, actively raise funds for construction, adhere to the main channels of government investment, attract foreign investment for infrastructure construction, so that the comprehensive strength and service capacity of vocational schools can be substantially improved. Only by increasing financial investment will it be possible to increase support for the development of regional vocational and technical education [20].

## 4. Conclusion

The development of higher vocational and technical education is still in its infancy and has not yet formed a virtuous cycle of development in China. Although the government has invested more in recent years, but long-standing prejudice and lack of attention has led to a stalemate in the development of higher vocational and technical education. This study has investigated a number of influencing factors which affect the higher vocational and technical education institutions in Shanghai and these factors are being analyzed and counter measures are proposed. Policy, economy, traditional concept, talents and teachers are all factors that must be overcome for a healthy and sustainable environment in the future market. The reason behind this is also a lack of attention to the manufacturing industry, which has led to a neglect of vocational and technical talents training.

At the macro level, it is vital to address the issue of policy, national and regional policies on higher vocational and technical education will ensure the sustainable development of higher vocational and technical education. Financial investment should also be strengthened, financial policies should be optimized and the mechanisms for management and operation of funds should be enhanced to attract more investment resources, make the financial allocation relatively equal. At the micro level, it should reinforce the construction of teachers' teams, improve the management system, establish an introduction mechanism and introduce talents through multiple channels. Establish internship and training mechanism for teachers, cultivate support team of teachers. This will fundamentally change the long-standing discrimination and prejudice in people's minds and make it to play its essential role in the field of sustainable development of higher vocational and technical education.

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