

# Summary of Research on the Relationship between Economic Development and Higher Vocational Education

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## Abstract

This study uses CiteSpace to analyze the research status of the relationship between higher vocational education and economic growth over the past 20 years (1999-2022). After analysis, it can be seen that, after 2008 higher vocational education's contribution to the economic research attention from many scholars, the research hot spot topics include: economic growth contribution rate research of higher vocational education; Higher vocational education and economic growth mutual fusion inquiry; Research on the relationship between higher vocational education and regional economy; Research on the economic contribution rate of higher vocational education from the perspective of human capital; The empirical study of higher vocational education contribution to economic growth. Through the analysis of the previous studies, the changing trend of research hotspots can be detected, so as to enlighten future researchers.

## Keywords

Higher Vocational Education; Economic Growth; Contribution Rate.

## 1. Introduction

After entering the 21st century, China's economy has achieved leapfrog development. At the same time, higher vocational education has gradually received the attention of the government, and its role in economic growth has become increasingly prominent. The "Vocational Education Law of the people's Republic of China (1996version)" confirmed the legal status of higher vocational education. Subsequently, higher vocational education was gradually regarded as an important part of higher education. It can be seen that the unique position of higher vocational education has gradually emerged in the higher education system, and has become one of the main sources of high-tech talents required by China's industrial structure adjustment in the new historical period, making a unique contribution to China's social and economic development.

It can be seen that the role of Higher Vocational Education in national economic growth has been highly valued at the national level. With the promulgation of a series of national policies, a large number of relevant studies on the role of Higher Vocational Education in economic growth and the regional economic contribution rate of higher vocational education have emerged. In order to sort out the research context of the relationship between higher vocational education and economic growth, present the research status and prospect the research trend, this paper uses CiteSpace software to visually analyze the literature related to higher vocational education and economic growth published on the CNKI platform, so as to find the change process of research frontiers and hot spots.

## 2. Research Tools and Data Sources

### 2.1. Research Tools

The tool used in this research is mainly CiteSpace software, which is mainly developed by Professor Chen Chaomei's team. The software can visually analyze the research hotspots and frontiers in a certain field[1]. CiteSpace software is widely used in research reviews because it can quantitatively analyze the literature collection in specific fields, clearly show the research trend and grasp the research frontier of the field through the presentation of knowledge map. [1]

### 2.2. Data Source

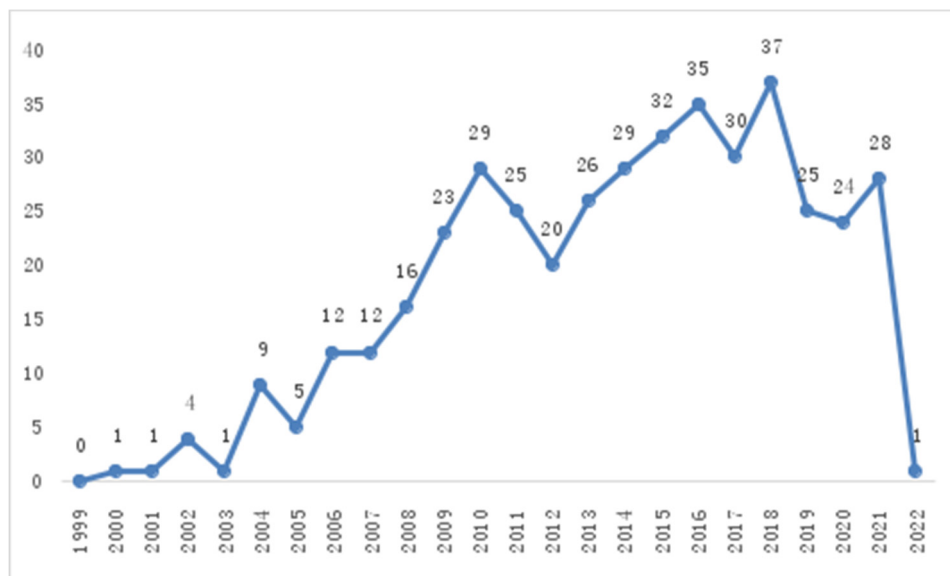
The data of this study comes from CNKI Chinese database. In order to prevent the literature from losing its comprehensiveness and objectivity, the author uses advanced retrieval to search the literature. For example, set the theme as the contribution rate of higher vocational education or set the theme as the economic growth of higher vocational education, the time span is 1999 - 2022, and the selection of search conditions is accuracy. A total of 427 Chinese literatures were retrieved (the retrieval time was April 1, 2022). By manually eliminating duplicate documents, meeting notices, speech reports, news publicity and other non research documents, a total of 425 valid documents were obtained.

### 2.3. The Tendency of Article Quantity

#### 2.3.1. Basic Information of the Number of Documents Issued

Figure 1 shows the basic situation of the number of documents on the relationship between higher vocational education and China's economic growth on CNKI since 1999. According to the figure, we can find that the number of documents issued is fluctuating and rising every year, indicating that the research on the relationship between higher vocational education and economic growth has gradually attracted the attention of academia. Through the analysis of literature samples, it can be found that the change trend can be divided into exploration and rapid development stages. From 1999 to 2008, scholars made preliminary exploration. The total number of research documents in this period is 45. It was proposed that higher vocational education should actively adapt to the adjustment of regional economic structure, and school enterprise cooperation should not be ignored; Rapid development stage (2008). In 2008, the Ministry of Education issued the "talent training evaluation plan for higher vocational colleges" which pointed out that "promoting higher vocational colleges to strengthen the connotation construction, deepening the talent training mode of school enterprise cooperation and the combination of work and study plays a guiding role in promoting the relevant research on the economic contribution rate of Higher Vocational Education". It can also be seen in Figure 1 that there were 68 journals in only three years from 2008 to 2010, indicating that the relationship between higher vocational education and economic growth has become a new issue that must be paid attention to in the development of Higher Vocational Education after 2008.

As "price literature index growth law" points out, the development of literature in each discipline has its own development law. When it is in the initial stage of development, the number of documents studying this field will fluctuate and slowly rise. When the discipline enters the development stage, the number of documents will increase exponentially, and there will be a "information explosion" trend [2]. In the statistics of literature samples in this field, the characteristics of "information explosion" in the field of economic contribution rate of higher vocational education since 2008 are very obvious, indicating that this field has entered a period of rapid development of scientific research. [2]



**Figure 1.** Number of documents issued on the research of economic contribution rate of Higher Vocational Education

**2.3.2. Distribution of Authors**

Set the node types parameter in citespace as author, and set the pruning parameter as Pathfinder and pruning sliced networks. The time span parameter is set from January 2000 to December 2021 (because there is no relevant literature in 1999, and the literature reporting period is at the beginning of 2022). Taking one year as the division unit, running CiteSpace 5.8r3, we can obtain the co-occurrence knowledge map of research authors in this field.

We can see that the network of the contribution map is discrete, and the connections of the author nodes are sparse, which reflects that the connections between the authors are not close.

**2.3.3. Analysis of Literature Citation Network**

Taking the document "empirical research on the impact of higher vocational education on economic growth -- Taking the panel data of cities and cities in Jiangxi Province as an example", 33 references are related to this field, 37 are related to the original literature, and the citation frequency is 10 times. It can be seen that the literatures in this research field are frequently cited and innovated on the basis of reference.

**2.3.4. Distribution of Research Institutions**

Modify node types parameter in citespace to institutions, pruning parameter to Pathfinder, and run CiteSpace software to get the following map, in which the density is 0. The network of the whole map is relatively discrete, and it is difficult to find connections between various research institutions, indicating the lack of mutual cooperation among research institutions in the research field of the relationship between higher vocational education and economic growth.

In terms of the number of documents issued by institutions (as shown in Table 1), from 1999 to 2022, Wuxi Vocational and Technical College of Commerce issued the most documents, with 4 articles, followed by Henan Communications vocational and technical college, Hebei Engineering and Technology College and Shihezi University normal college, which published 3 articles respectively. According to the data in Table 1, we can see that the research field of the relationship between higher vocational education and economic growth has not formed a systematic and perfect research author group and research institution system, and is very deficient in the depth, breadth and lasting stability of the research content.

**Table 1.** Information of main issuing agencies

| Issuing agency  | Number of documents issued | Year of first release | Centrality |
|---|----------------------------|-----------------------|------------|
| Wuxi Institute of Commerce                                  | 4                          | 2016                  | 0          |
| Henan Communication Vocational Technology College           | 3                          | 2012                  | 0          |
| Hebei Engineering and Technical College                     | 3                          | 2014                  | 0          |
| Shihezi University Normal College                           | 3                          | 2015                  | 0          |
| School of management, China University of Geosciences       | 2                          | 2007                  | 0          |
| College of educational science, Northwest Normal University | 2                          | 2002                  | 0          |
| College of continuing education, Shanxi University          | 2                          | 2016                  | 0          |
| School of economics and management, Xinjiang University     | 2                          | 2014                  | 0          |

### 3. Quantitative Visual Analysis

#### 3.1. Keyword Cluster Analysis

Keywords are the most representative of the author's central point of view and the highly concise theme of a document. Therefore, in a specific period, the research content of interrelated keywords with high centrality and high frequency represents the research hotspot in a specific field [1]. [1]

Set node types parameter in citespace as keyword, and the pruning parameter as Pathfinder and pruning sliced networks, and open CiteSpace. In order to find out the hot spot research, get the corresponding keyword network through the keyword analysis function of CiteSpace, so as to understand the hot spot direction in the research field, and adopt the clustering analysis method to get the knowledge map of keywords, The Q value in the figure is equal to 0.6856 and greater than 0.3, indicating that the divided community structure is significant; The average contour value is 0.8908 and greater than 0.7, indicating that clustering is effective and convincing. These clusters reflect the hot issues in the research field of economic contribution rate of Higher Vocational Education in China in the past 20 years. Including human capital, innovation and entrepreneurship, economic development, regional economy, industrial structure, higher vocational colleges and other 14 cluster labels.

#### 3.2. Time Zone Map Analysis

The co-occurrence time zone map of keywords mainly shows the change and development trend of research topics by showing the emergence and change trend of keywords with the time axis and the co-occurrence relationship of different keywords, so as to reflect the change process of research hotspots. Based on the sample literature of CNKI, this study draws the time zone map of keyword co-occurrence in the field of higher vocational education and economic growth, and then clearly finds the change and evolution trend of the research on the relationship between domestic higher vocational education and economic growth.

By combing the time zone map of keyword co-occurrence, we can get the general context of the research on the relationship between higher vocational education and economic growth. Scholars first analyze it from the perspective of human capital accumulation, and in this process,

lay the foundation for subsequent research; Then scholars began to pay attention to the relationship between higher vocational education and regional economy, and regionality became the research hotspot at this stage; The dynamic reflection of specialty setting on the contribution rate of higher vocational education was once concerned by experts and scholars; After 2010, scholars began to study the role of Higher Vocational Education in the industrial structure, and slowly turned to the empirical analysis of the economic contribution rate of higher vocational education, including the comparison of the contribution rate differences among provinces. Below, the author will introduce the literature from the perspective of human capital accumulation, regional economy, industrial structure level and empirical research.

### **3.2.1. Research on Improving Human Capital Accumulation based on Higher Vocational Education**

Through the keyword co-occurrence time zone map obtained by citeaspace software, it can be found that scholars repeatedly pay attention to the relevant knowledge of human capital accumulation in the research process of this field. In economic theory, human capital represents the productive capacity of workers, which includes the accumulation of workers' knowledge and skills. On the one hand, improving productive capacity can improve production efficiency, on the other hand, it can also make workers gain income, so it is a capital with high economic value.

Human capital theory defines human capital as a scarce resource, which needs to strengthen accumulation and investment. In this process, training and education can improve labor efficiency and promote the accumulation of human capital. At the same time, higher vocational education is relatively unique in teaching content, which is indispensable for cultivating high-quality scientific and technological talents and skilled operators (Lang Qunxiu2000) [3]. In China, the main function of the current education system is talent screening rather than improving human capital. Therefore, higher education has received much higher attention and investment than higher vocational education, which also makes the status of higher vocational education relatively backward (Wang Chuan, 2008) [4]. But in fact, in the context of the shortage of skilled talents in China, higher vocational education is indispensable, just as in the process of China's economic transformation and upgrading, higher vocational education should integrate the concepts of modern vocational education and actively adapt to the industrial requirements and enterprise development needs of the new era, Strive to cultivate "applied high intelligent talents and strengthen the accumulation of human capital" (Qian Jin, 2013) [5]. At the same time, the human capital of higher vocational education also plays a special role in economic growth. For example, using the method of spatial panel regression, we can explore that the talent overflow of higher vocational education can improve the economic development of current regions and fields at the same time (Deng Lianqiu, 2018) [6]. [3][4][5][6]

### **3.2.2. Research on Promoting Regional Economic Growth based on Higher Vocational Education**

In the process of studying the relationship between higher vocational education and economic growth, scholars continue to carry out research in this field from the perspective of regional economic development. Higher vocational education can promote the development of regional economy and the urbanization process in the region, but it can not fully meet the needs of both. Therefore, higher vocational education must take the promotion of regional economic development and urbanization as the starting point, so as to better realize value (Cao Liping, 2014)[7]. However, in the process of higher vocational education promoting economic growth, efforts can be made from many aspects. For example, it requires the efforts of local governments, industrial enterprises and higher vocational colleges in many aspects (ren Junli, 2014) [8]; Higher vocational colleges should base on the local social economy, change the higher vocational talent training and education mode, and improve the function of serving the

local, so as to realize the service of sustainable development; Joint enterprises make progress together, study scientific and technological innovation together and transform achievements (Wang Lingling, 2016) [9]; The specialty setting of higher vocational colleges should be adjusted according to the needs of regional economic development. The concept of running schools also needs to be further changed and the mode of talent training in higher vocational colleges should be reformed; We should promote social forces to build education, so as to improve the contribution of higher vocational education to the regional economy (Guan Xin, 2016) [10] and other ways. [7][8][9][10]

### 3.2.3. Research on Promoting Industrial Development based on Higher Vocational Education

From 1999 to 2004, economic growth and economic functions were the main research directions in this field. Scholars believed that one of the important sources of high-quality technical talents required by China's economic development was higher vocational colleges, which played an important role in China's modernization and the upgrading of industrial structure. On the one hand, the promotion of industrial development by higher vocational education can be explored from three aspects: potential, reality and implication. The correlation analysis between the two is also of research significance (Zhou Yangming et al., 2000) [11]. On the other hand, one of the important means to solve China's industrial upgrading is to develop vocational education. During this period, some master's and doctoral dissertations focused on the empirical research between higher vocational education and industrial development to explore the economic significance of Higher Vocational Education in China. [11]

### 3.2.4. Empirical Research based on the Contribution of Higher Vocational Education to Economic Growth

**Table 2.** Comparison of contribution rate of Higher Vocational Education in various studies

| scholar (partial)                   | Liu Xiaoming (2011) | Shi Xinhao (2012) | Li Zhongguo (2015) | Zhang linfeng (2020) | Wang yingmi (2021) |
|-------------------------------------|---------------------|-------------------|--------------------|----------------------|--------------------|
| Start and end time                  | 2001-2009           | 2001-2010         | 2001-2012          | 2001-2010            | 2001-2018          |
| Scope of study                      | Zhejiang            | Shandong          | Western Region     | Hainan               | whole country      |
| Higher vocational contribution rate | 1.21%               | 0.13%             | 0.55%              | 0.74%                | 1.52%              |

As shown in Table 2, Cobb Douglas production function is a function describing production established by Cobb and Douglas after statistical verification from 1927 to 1947, which provides a method for measuring the contribution rate of education to economic growth. For example, the contribution rate of higher vocational education to economic growth in Zhejiang Province from 2001 to 2009 can be calculated by combining human capital theory and education comprehensive index method. After analysis, it is concluded that higher vocational education has a close relationship with the economic development of Zhejiang Province, and the economic function of Higher Vocational Education is obvious, which can actively promote economic growth and other conclusions (Liu Xiaoming, 2011) [15]; It can also be estimated that the contribution of Higher Vocational Education in Shandong Province to the economic growth rate from 2001 to 2009 is 1.21%. According to the research results, it is found that higher vocational education in Shandong Province has developed vigorously in the past ten years, but its contribution to regional economic growth is low. It is suggested to strengthen the construction of the scale and quality of teachers in higher vocational colleges; The government, industry, enterprises and colleges should work together to improve the contribution of higher vocational education to economic growth; Adjust the regional distribution and specialty

division of Higher Vocational Colleges (Shi Xinhao, 2012) [16]; In addition to the eastern region, since the implementation of the western development strategy, the contribution rate of higher vocational education to economic growth in the western region can also be measured. Through empirical analysis, it is found that the role of Higher Vocational Education in promoting economic growth in this region is not obvious, and there are certain differences between different provinces (Li Zhongguo, 2015) [17]. [15][16][17]

Denison factor analysis method was the first to make the contribution of quantitative education to scientific and technological progress, institutional innovation and knowledge progress. Many studies used this method to calculate the economic contribution rate of higher vocational education. For example, through empirical research on Higher Vocational Education and economy in Hebei Province, and quantitative calculation of the contribution rate of higher vocational education to economic growth, it is concluded that the average contribution rate of Higher Vocational Education in Hebei Province to economic growth from 2003 to 2015 is 0.29% (Wang Lulu, 2018) [18]; Calculate and analyze the contribution rate of Higher Vocational Education in Hainan Province to regional economic growth, and combined with the research results, put forward countermeasures on how to improve the contribution rate of Higher Vocational Education in Hainan Province to economic growth, such as strengthening the construction of legal system, strengthening the cooperation between schools and enterprises, optimizing the teaching staff of higher vocational education, optimizing the professional setting (Zhang Linfeng, 2020) [19]; Not only in some regions, the contribution rate of higher vocational education to economic growth in all provinces of the country can be obtained by combining Denison factor analysis method. There are obvious regional differences in the contribution rate of higher vocational education to economic growth in 31 provinces of China from 2001 to 2018 (Wang yingmi, 2021)[20]. [18][19][20]

In terms of research methods in this research field, many scholars have expressed their views on how to calculate the proportion of Higher Vocational Education in the overall education, and now a more extensive method has not been realized. The human capital stock method, Schultz and Dennison factor analysis method have received the attention of most scholars and are widely used.

### 3.3. Visual Analysis of Literature Sources

Set node types parameter in citespace as the keyword source, pruning parameter as Pathfinder and pruning sliced networks, run CiteSpace, and use its document source co-occurrence analysis function to get the journal source co-occurrence network, which can be used to reflect which journals a field comes from.

According to the co-occurrence knowledge map of journal sources, it can be found that in addition to vocational and technical education, modern vocational education, China's Vocational and technical education and other vocational education special issues have published relevant research results on the relationship between higher vocational education and economic growth, including Heilongjiang Higher Education Research, education academic monthly Jiangsu Higher Education and some CSSCI journals also published research results on this topic. This shows that the research field of the relationship between higher vocational education and economic growth has received enough attention, and the research level is also constantly improving.

## 4. Conclusion and Prospect

### 4.1. Conclusion

Through the visual analysis of CiteSpace, it can be found that the research on the relationship between higher vocational education and economic growth during 1999-2022 has the following problems:

1. It is found that there are many research institutions and researchers, but the research strength has not condensed into a research group and has not formed an overall and systematic research content system. And according to the analysis, there is almost no cooperation between research institutions and research authors in this field, which shows that their research strength has not been condensed.

2. From the perspective of research methods, it is found that researchers are more inclined to quantitative research after 2010, and less involved in qualitative research. The clustering of keywords is also relatively discrete, which shows that in the economic field of higher vocational education, scholars' research topics are not concentrated, there is a lack of in-depth analysis of theory, and there is a lack of relatively comprehensive and standardized tools and research methods in research and analysis. At the same time, strict qualitative research is rarely applied in this field. At the same time, the quantitative research in China is not mature. After the theory of educational economics was introduced into China, a complete and systematic calculation method has not been formed. For example, how to separate the contribution of higher vocational education to the economy from the contribution of overall education to the economy is still worth discussing by many scholars.

3. The research level needs to be improved. Researchers in this field mostly come from front-line managers and teachers in higher vocational colleges, and lack theoretical and academic senior researchers. The research content only stays in the shallow analysis or description of image features, and the overall level is not high.

### 4.2. Outlook

The global economy is changing rapidly. With the fourth industrial revolution, the interaction between higher vocational education and economic growth will become increasingly important. On the one hand, the contribution of higher vocational education to economic growth is becoming increasingly prominent. Higher vocational colleges continue to promote the transformation of scientific research achievements in the process of cooperation with scientific research institutions, which will contribute to economic growth. On the other hand, various new technologies, new perspectives and new methods have sprung up. Higher vocational education needs to be based on its own cross-border and professional characteristics, actively adjust in the new era, respond to changes and challenges, and promote the stable growth of social economy. The author believes that the future research on the relationship between higher vocational education and economic growth will focus on the following aspects:

1. With the regional imbalance of the development of Higher Vocational Education in China, there is also a big gap in the contribution of higher vocational education to national economic growth. Therefore, the research on the relationship between regionalized higher vocational education and economic growth will also become a major trend. For example, through the investigation of the contribution of Higher Vocational Colleges in a region to the economy, it is more conducive for science to deal with the relationship between regional economic development and higher vocational development to estimate and analyze the contribution of higher technical vocational schools in some regions to the development of the national economy, So as to promote the overall development of regional economy.

2. At present, researchers are concerned about how to promote economic development from the perspective of higher vocational education, which is a one-way, single research, and failed



to study the integration and promotion of the two from multiple perspectives and methods. In the future research direction, researchers will focus on the integration and promotion of higher vocational education and economic growth from multiple perspectives and methods. Future research will explore the principles, paths, methods, elements, values and other aspects to promote the integration of the two, and use a variety of theories to explore from the fields of pedagogy, economics, management and other disciplines, and establish a systematic research system.

3. There are some common laws and trends in the relationship between higher vocational education and economic growth in the era of globalization. Stones from other mountains can be used to attack jade. Attention should be paid to strengthening international comparative research and selecting appropriate methods for research. From the perspective of the overall reform plan of China's national vocational education reform implementation plan, we will further promote the transformation of Higher Vocational Colleges from a government-based school running mode to a government-based and social diversified school running mode, and actively absorb foreign research results for our own use by learning from existing international experience, To make contributions to improving the role of Higher Vocational Education in promoting economic development, and at the same time, to promote Chinese experience and Chinese programs to the world in a timely manner.

## Acknowledgments

Foundations: Anhui University of Finance and economics graduate research innovation fund project:

"Research on the realization mechanism of school enterprise cooperation regionalization in Higher Vocational Education" (acyc2021068);

Anhui University of Finance and economics graduate research innovation fund project:

"Analysis of supply-demand mismatch and coupling path of College Students' non cognitive ability from the perspective of employment" (acyc2021067).

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