



**PERFORMANCE EVALUATION STUDY ON THE
INTEGRATION OF INDUSTRY-EDUCATION
—TAKING SHANDONG ENGINEERING VOCATIONAL
UNIVERSITY AS AN EXAMPLE**

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**AN INDEPENDENT STUDY SUBMITTED IN PARTIAL FULFILLMENT OF
THE REQUIREMENTS FOR THE MASTER'S DEGREE OF BUSINESS
ADMINISTRATION GRADUATE SCHOOL OF BUSINESS**

SIAM UNIVERSITY

2023



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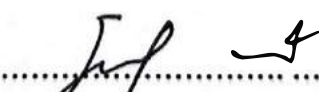
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This Independent Study has been Approved as a Partial Fulfillment of the Requirement
of International Master of Business Administration in International
Business Management

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Title: Performance Evaluation Study on the Integration of Industry-Education—Taking Shandong Engineering Vocational University as an Example

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Degree: Master of Business Administration

Major: Education Management

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..... 11 / 9 / 2023

ABSTRACT

The purpose of this study is to analyze the performance evaluation and effect of the integration of production and education in higher vocational colleges under the background of China's vigorous development of vocational education, promoting the integration of production and education, and promoting the high-quality development of vocational education. The two objectives of this study are: 1) To construct a more scientific and reasonable performance evaluation index system based on the theory of IPO evaluation model; 2) To compare the work of the integration of industry and education of the three sample colleges with the constructed index system, to analyze the key factors affecting the effect of the integration of industry and education and to give solutions.

This paper adopts the documentary method to analyze the problems, taking Shandong Engineering Vocational and Technical University as an example, and IPO theoretical model, performance evaluation theory and stakeholder theory to construct an index system of industry-education integration, which sets three primary indicators, nine secondary indicators and 32 tertiary indicators in the performance evaluation system. Subsequently, three typical three secondary colleges with typical representatives in the integration of industry and education are selected as the study objects, and the constructed indicators are used for verification. The result shows that: Firstly, the constructed performance evaluation system is relatively scientific and reasonable; Secondly, it can be widely used in the performance evaluation of the integration of production and education. This study hopes to provide more experience and reference for similar institutions in Shandong Province in the work of integration of industry and education, so that the value of the implementation and application of the index system can be highlighted.

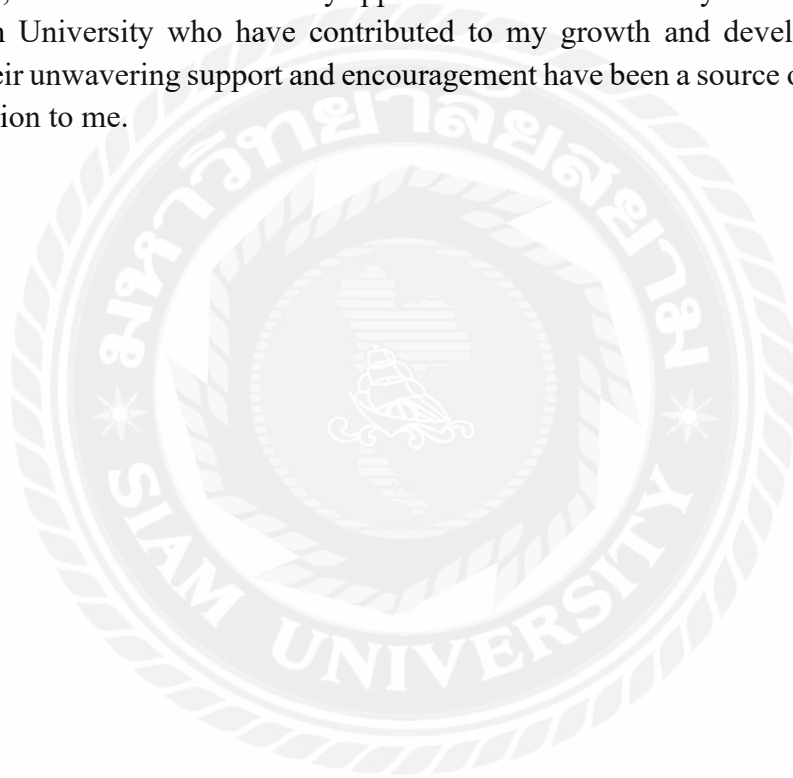
Keywords: higher vocational college, integration of production and education, Performance evaluation, IPO theoretical model, stakeholder theory

ACKNOWLEDGEMENT

I would like to express my deepest gratitude to my advisor, for his invaluable guidance, support, and encouragement throughout my independent study. His insightful comments and constructive criticism have significantly improved the quality of my work.

Additionally, I am grateful to Associate Professor Jomphong Mongkhonvanit, Dean, Graduate School of Business, for his support and encouragement throughout my studies. His dedication to the graduate program and commitment to excellence have inspired me to strive for academic excellence.

Finally, I would like to extend my appreciation to all the faculty members and staff of the Siam University who have contributed to my growth and development as a student. Their unwavering support and encouragement have been a source of inspiration and motivation to me.



Declaration

I, Li Rongrong, hereby certify that the work embodied in this independent study entitled “Performance evaluation study on the integration of industry-education by taking Shandong Engineering Vocational University as an example” is result of original research and has not been submitted for a higher degree to any other university or institution.



(LI RONGRONG)

May 28, 2023



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1. Introduction

1.1 Background of the Study

In 2019 China proposed that deepening the integration of industry and education is a crucial model for cultivating higher vocational talents and a strategic initiative for the steady development of institutions, the healthy growth of skills, the sustainable development of industries, and the high-quality economic development to synergize, integrate and promote each other.

The "integration of industry and education" is essentially a critical element in the construction of the national vocational education systems and an essential strategy for the reform and development of vocational education in China (HSS letter, 2022). Zhang Ling proposed to carry out multiple third-party comprehensive evaluations according to different evaluation subjects and objects to achieve relatively accurate and objective evaluation results around the realization of the performance goal of production-education integration (Wan & Hou, 2014).

Li Mengqing talks about the integration of industry-education and school-enterprise cooperation as an irreplaceable and more desirable mode of schooling for higher education institutions; vocational institutions need to build an evaluation index system to adapt to the performance evaluation of the integration of industry-education in higher education institutions in the new era through the process of school-enterprise cooperation and to monitor and evaluate the development of the integration of industry-education in higher education institutions in a scientific manner (Wan & Hou, 2014). Analyzing the performance of the integration of higher education institutions not only helps to clarify the constituent factors of the performance indicator system of the integration and formulate a scientific evaluation mechanism but also facilitates the supervision and regulation of the work of the integration and timely diagnosis and improvement (He, 2021).

1.2 Problems of the Study

Other scholars have studied existing research on the evaluation of the performance of industry-education integration in vocational education that has not received sufficient attention from the academic community (Li & Gao, 2022). And the following two problems still exist at Shandong Engineering Vocational University, which actively promotes the work of industry-education integration:

1. The school has not established a school-level self-diagnostic evaluation index system for the work of the integration of industry and education. The evaluation method and implementation details are missing (Xiang, 2018), which cannot scientifically and reasonably evaluate the level of the work of the integration of industry and education within the school and affects the school's assessment of this work.

2. Using the constructed index system to compare the work of the three sample colleges on the integration of industry education, we analyze the input, process, and results of the integration of industry education, diagnose the problems of various models, and give strategies to solve them.

1.3 Objectives of the Study

1. Based on the IPO evaluation model theory, I will construct a more scientific and reasonable performance evaluation index system for integrating industry and education at Shandong Engineering Vocational University.

2. Using the constructed index system to compare the work of the three sample colleges on the integration of industry education, we analyze the input, process, and results of the integration of industry education respectively, diagnose the problems of various models, and give strategies to solve them.

1.4 Scope of the Study

This study mainly takes the integration of industry and education, higher education institutions, and performance evaluation as the entry point, conducts research and reflection on the integration of industry and education and its evaluation system at home and abroad, conducts systematic analysis and research on the IPO theoretical model theory and performance evaluation theory that support this study, and constructs a performance evaluation index system for the integration of industry and education.

1.5 Significant of the Study

1. Deepening the integration of industry and education and strengthening the cooperation between schools and enterprises are the main themes of current higher education. Through the construction of the performance evaluation index system of the university to carry out the integration of industry and education projects, the timely tracking of the development of the integration of industry and education projects, and the supervision of secondary colleges and cooperative enterprises to carry out substantial cooperation according to the project contract (Li & Wang, 2020). This paper takes Shandong Engineering Vocational and Technical University as an example to construct a monitoring and evaluation system for the integration of industry education in higher education institutions, which is of great significance to the self-evaluation and teaching reform of schools. It can make up for the lack of school-level self-monitoring and evaluation theories at the theoretical level, provide a theoretical analysis framework for the research on the monitoring and evaluation system of integrating industry and education (He, 2021), enrich the research results of the monitoring and evaluation system of the integration of industry and teaching in higher vocational institutions in Shandong Province, and continuously improve the strength of the integration of industry and education and the development quality of higher vocational education (Liu & Zhao, 2020).

2. The construction of an evaluation index system for the performance evaluation of the integration of industry and education in vocational education is applied to evaluate the development of the integration of industry and teaching at Shandong Engineering Vocational and Technical University. Firstly, it provides a scientific and effective evaluation method for objectively evaluating the performance level of the integration of industry and education in higher vocational institutions to build a suitable

evaluation model, formulate more operative evaluation criteria, borrow reasonable evaluation methods, and improve the standardization and scientific nature of the research on the performance evaluation of the integration of industry and education (He, 2021); secondly, it applies the index system of the monitoring and evaluation of the integration of industry and education to the integration of industry and education in sample higher vocational institutions, finds out through empirical analysis. The second is to apply the three-level index system for monitoring and evaluating the integration of industry-education to the integration of industry-education in the sample higher education institutions. Higher vocational institutions can choose appropriate models of school-enterprise cooperation for talent training according to the actual situation, which is conducive to practical research on the development of vocational education in Shandong Province (Wang, 2021). We provide ideas for evaluating industry-education integration in similar vocational institutions by continuously improving the evaluation mechanism of industry-education integration in vocational education in the hope of better promoting the internal development of vocational education.

2. Literatures Review

In this chapter, mainly through literature search and analysis, we studied the current situation regarding the integration of industry and education and the evaluation system of the integration of industry and education, studied in depth the IPO theoretical model and performance management theory that support this study, strengthened the understanding of performance evaluation and other related academic terms, and gained a deeper understanding of the evaluation work of the integration of industry and education.

2.1 Higher vocational school

The central institutions implementing higher vocational education are higher vocational colleges and universities. Higher vocational colleges and universities generally include two levels of education: specialist and undergraduate, and the higher vocational colleges and universities mentioned in this study mainly refer to specialist-level education. Compared with traditional academic talent cultivation, they are fundamentally different from each other. Higher vocational colleges and universities focus on cultivating high-quality talents with specific professional theoretical knowledge and solid operational ability, so the skills have strong adaptability, practicability, and technicality when they go to their positions. In this study, higher vocational colleges and universities mainly refer to private general higher vocational colleges and universities. The Higher Education Law (1998) stipulates: "Higher education referred to in this law refers to higher specialized schools, independent colleges, and universities, and also includes higher vocational education and adult vocational education and other schools with vocational nature and mainly training workers."

2.2 Industry-education integration

At present, there is no uniform definition of industry-education integration at the national level, education sector, industry, etc. (Yu, 2020). It includes two parts: industry-education, and integration. In contrast, integration refers to the fusion of several physical objects into one and the interconnection and interaction between them, specifically between industry and education. The connotation of industry-education integration is continuously enriched. At first, it was only used as a talent training model. For example, the American Vocational Association defined cooperative education as combining theoretical study and real work experience. The World Association for Cooperative Education has made further improvements to highlight the compatibility of the two. Later, the integration of industry and education gradually emphasized the cooperative relationship between schools and enterprises. It's believed that this integration is a collaborative activity between higher education and industry to enrich the education process and support the sector (Gao & Zhang, 2020).

According to Chen Zhijian, the integration of industry and education refers to the integration of industry and education, enterprises and schools, and production and teaching. The integration of industry and education contains three levels of points and lines (Chen, 2013). From the perspective of national policy texts, although the term 'integration of industry and education' only formally appeared in federal documents in 2013, it has been expressed in different forms in policy texts such as half-work and half-read, industry-education integration, industry-learning integration, engineering integration, and school-enterprise cooperation (Lin & Zhong, 2021). It was not until 2013 that China proposed a system of industry-education integration to promote school-enterprise cooperation. In 2017, the General Office of the State Council pointed out in the Opinions on Deepening the Integration of Industry and Education that the goal of deepening the integration of industry and education is to improve the coordination of school-enterprise education and promote diversified schooling to build a general trend of benign integration and interactive development between education and industry. Professor Wang talked about how the integration of industry and teaching in higher vocational education is reflected the combination of the vocational education system and national industrial system at the macro level. At the group of higher vocational colleges and universities, it is glanced in the mode of school operation and talent training through cooperation between industry, university, and research (Wan & Hou, 2014). The performance evaluation of industry-education integration in higher vocational institutions refers to constructing a set of index systems through specific methods and adopting reasonable educational evaluation methods to monitor and evaluate the performance and work effectiveness of industry-education integration in one or higher vocational institutions within a particular time frame, to obtain objective and reasonable evaluation results, find out problems and summarize experiences from them, to continuously deepen the integration of industry-education and school-enterprise cooperation (Tu, 2020).

Regarding the development status of industry-education integration and vocational education evaluation, the results of the research literature are four points: Firstly, they focus on the rule of education according to law, and all promulgate corresponding laws and regulations to regulate the development of industry-education integration and monitoring and evaluation of vocational education. Second is the plurality of evaluation subjects, realizing the evaluation mechanism with the participation of multiple stakeholders such as industry, enterprises, and society (Wan, 2021), and improving the match between vocational education and social needs. Thirdly, monitoring and evaluation indicators are designed from multiple levels and perspectives. Fourthly, universities in all countries pay attention to the combination of internal and external evaluation, the establishment and improvement of objective, fair, and equitable evaluation systems and evaluation methods, etc., and all advocate the introduction of third-party vocational education evaluation mechanisms.

2.3 Performance Evaluation

There is an essential part of performance management in modern human resource management, which reflects performance-related problems systematically. Performance management is a cyclical process of performance planning, performance monitoring, performance evaluation, and performance feedback by managers to achieve the organization's vision and strategic goals, guided by the organization's mission and management values. Collecting and sharing performance data Resources Preparing for performance reviews Reinforcement provides the information. This also includes an evaluation of the extent to which the goals stated in the development plan have been achieved (Herman, 2013). The purpose is to ensure that the performance and results of the organization's members are consistent with the organization's desired goals and to achieve the organization's ambitious goals through continuous improvement of individual, departmental, and organizational performance (Fan & Ran, 2016).

Wang Chunyan built a quality evaluation system from four dimensions: professional and curriculum construction, resource conditions, operation and management, and quality performance in a decision-oriented manner (Wang, 2015). Tan Shaohua et al. designed the provincial vocational education modernization index system from six core indicators: enrollment scale, secondary and higher vocational articulation, graduate employment rate, average public funding standard, "dual-teacher" teacher ratio, and service industry development capacity (Tan, 2016). Gao Haiyan attempted to construct a vocational education monitoring index system from six dimensions to get a good monitoring effect of VET, which are systematization, marketization, quality, internationalization, informatization, and securitization (Gao, 2017). Jin Rongxue et al. designed the performance evaluation index system of higher vocational education based on the AHP complete weight method from four dimensions: infrastructure, education funding, faculty strength, and student quality (Jin, 2017). Xie Min et al. designed a "five-dimensional" hierarchical model and a three-level evaluation index system based on hierarchical analysis and the Delphi method to evaluate the

integration of higher education institutions. They selected three types of sample institutions for empirical research (Xie & Gu, 2018). Wang Bingqing et al. tried to design a set of performance evaluation systems suitable for vocational education group schooling in Guizhou province, including three first-level indicators: funding performance, operation performance, and output performance (Wang, 2018). Xiang Luosheng designed the index system from five dimensions, including the strength, breadth, depth, effectiveness, and density of school-enterprise cooperation, to comprehensively assess the reality of school-enterprise cooperation (Xiang, 2018). Li Yu established a teaching assessment system for vocational colleges and universities, which contains four first-level indicators, including teaching operation and supervision, professional setting and characteristics, educational achievements and quality, and social evaluation and reputation (Li, 2018).

The concept of performance management is also often borrowed in the management of higher education institutions. Through quantitative and qualitative analysis of higher education resources, we can perform a comprehensive evaluation of the resource inputs and outputs at each stage. The evaluation results can guide the scientific allocation and use of educational resources to meet the actual needs of higher vocational education development to promote the development of higher vocational education and meet the needs of economic and social development. Performance management theory includes four processes: performance planning and organization, performance supervision and management, performance monitoring and evaluation, and performance feedback and summary (Tang, 2005), which are not independent, but a continuous cyclic process. In line with the development characteristics of industry-education integration, which involves multiple subjects, practical cooperation and resource integration among various innovative issues can realize complementary advantages and resource sharing, ensuring orderly and smooth activities and the cyclic process of performance management theory can effectively monitor the development of various aspects of industry-education integration.

2.4 IPO Theoretical Model

Based on the I-E-O model, domestic scholars have expanded E (environment) to P (educational process). The IPO theoretical model is a deepening and expansion of the existing results, and the evaluation of doctoral education quality is often applied to the "input-process-outcome" IPO framework (Luo & Cheng, 2014). Using student development theory, Lyu Hongyan established the IPO research framework of "input-process-output" for master's degree students and found the teaching evaluation system (Lyu, 2019). Yan Xiaoyong established the performance evaluation index system of college teachers based on the IPO model, which examines the whole process of college teachers' work from three aspects: input, process, and output, and reflects teachers' work performance more comprehensively (Yan, 2020). Cheng, Jun, et al. established the IPO theoretical model and index system for undergraduate education in three aspects: input quality evaluation, process quality evaluation, and result in quality evaluation (Cheng

& Li, 2020).

The theoretical model focuses on process evaluation and process improvement, which is more in line with the objective requirements of assessing the integration of industry and education in vocational education, highlighting the role of diagnosis and feedback, so I choose the IPO evaluation model as the theoretical basis.

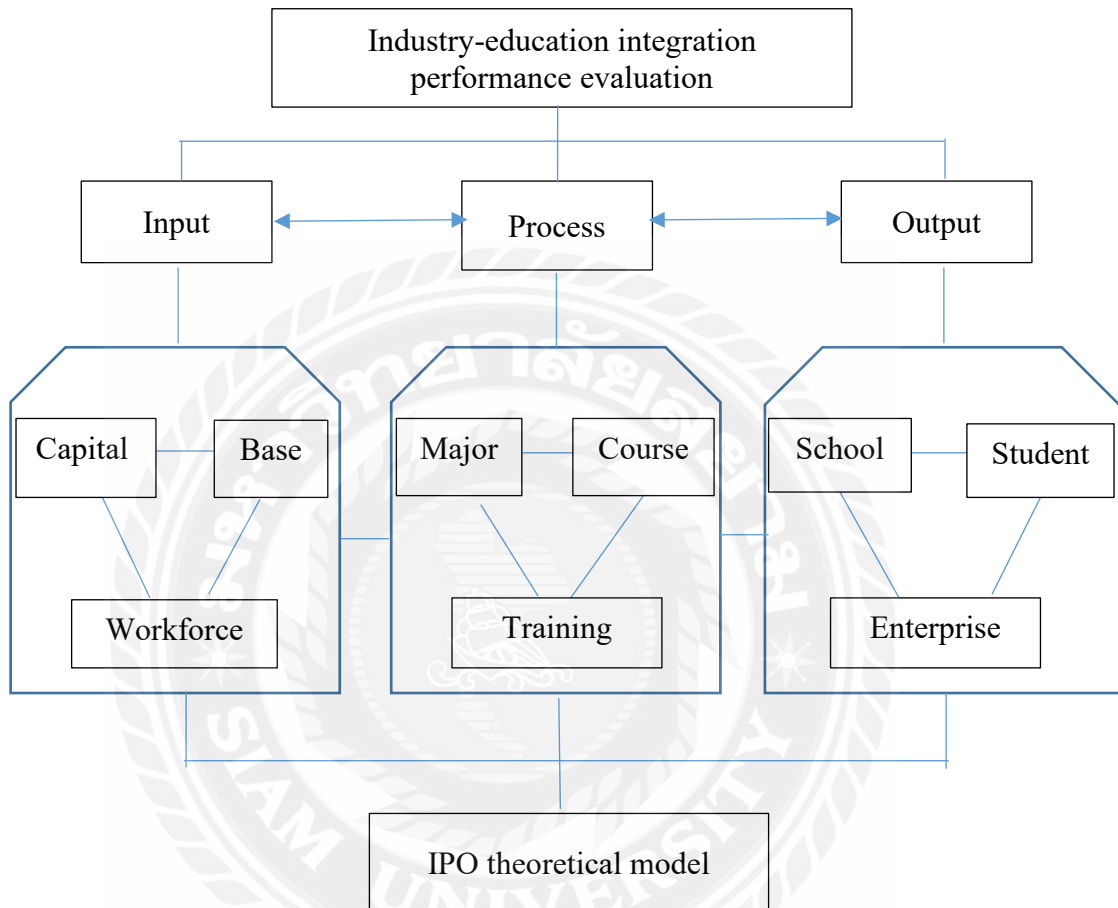


Figure2.1 IPO theoretical model diagram

2.5 Stakeholder Theory

The concept of "stakeholders" originates from economics and is used in business management. On the definition of stakeholder, different scholars discussion is also other; Freeman believes that stakeholders participate in creating enterprise value (Freeman, 1984). American scholars such as Mitchell proposed a scoring method to define stakeholders called Mitchell's scoring method, which contains three attributes, namely legitimacy, power, and urgency. Mitchell et al. classified stakeholders into three categories based on these three attributes which are deterministic stakeholders, a group of people who have all three characteristics at the same time and have some legitimacy, power, and urgency in issues such as company operation, management, and decision making; prospective stakeholders, a group that has two of these attributes; and potential stakeholders, a group that has only one of the three attributes (Mitchell, 1997).

Xiao Xia believed that enterprises, schools, and students are the core subjects of

the top-up internship, and these three are the critical stakeholders in the forming of the top-up internship motivation mechanism (Xiao, 2016). Cui Binghui mentioned that if the shared governance of education by different stakeholders, we can do so through industry-education integration and market mechanisms (Cui, 2019). Li Hewei et al. mentioned that stakeholders have their roles and responsibilities. The performance of stakeholder roles can be limited by institutional constraints, thus creating conflicts of interest, and VET groups should find a solution path to balance conflicts (Li, 2019). Stakeholder theory provides a research framework and ideas for building a monitoring and evaluation index system for integrating industry and education. Integrating industry and teaching in higher vocational education is a typical model of school operation with multiple stakeholders, among which schools, enterprises, and students are definite stakeholders. Teachers, parents, government and industry associations expected stakeholders, media, organizations, and the public are potential stakeholders (Lu, 2019).

3. Research Methodology

The research method used in this paper is the documentary method. The documentary method, also known as the historical documentary method, is a method of collecting and analyzing various existing relevant documents, researching them, and selecting information from them to achieve specific research purposes. I ordered a large amount of literature material as a reference by searching master's theses, various journal papers, and relevant educational official websites from the website of Zhiwang.com, are selected 34 articles that are closely related to this study as references. I have reviewed the literature on higher education, integration of industry and education, IPO theory, performance evaluation, stakeholder-related theory, and the results of the theoretical review to provide a theoretical basis for the full text. At the end of the literature collection, we conducted an in-depth and detailed study of the collected literature and comprehensively organized it. Through the analysis of the literature study, I have identified the core problem of this paper and analyzed and summarized the issues to be solved. I used the IPO theory, drew on relevant documents to extract relevant indicators about the work of industry-education integration, and used the existing evaluation index framework of industry-education integration as a reference to initially construct the performance evaluation index system of industry-education integration within Shandong Engineering Vocational and Technical University.

Finally, I extracted the data from performance evaluation-related indexes by reading and checking the official documents from the official website of the Chinese Ministry of Education, Department of Education, and sample colleges, such as the Annual Report on the Quality of Higher Vocational Education Talent Cultivation, Self-Assessment Report on the Ability to Adapt to Social Needs, Annual Report on the Quality of Graduate Employment, Tracking Survey on the Quality of Talent Cultivation in Higher Vocational Colleges, and other related materials,

and compared the three sample colleges of the study. I reached the data of the indicators of the three sample colleges of the research and drew relevant conclusions based on comparing of the final values. And the items with insufficient data in the indicators are analyzed to propose actionable strategies and suggestions.

4. Finding

1. In this paper, through literature research. First, basing on the IPO model, I construct the performance evaluation index system of production-education integration in higher vocational colleges, which mainly includes three aspects: input, process, and effect. Finally, 3 primary indicators, 9 secondary indicators and 32 tertiary indicators were determined. Specific indicators are as follows:

Table 4.1 Performance evaluation index system for the integration of industry and education in higher education institutions

First-level indicators	Second-level indicators	Third-level indicators
Industry-education integration input indicators	Funding input	Ratio of government economic investment to teaching revenue
		The value of equipment donated by enterprises to the total amount of practical training equipment
		Annual payment to part-time teachers of enterprises (RMB)
		Annual per-student financial allocation level (yuan)
	Faculty	Ratio of dual-teacher teachers to full-time teachers
		Proportion of part-time teachers in enterprises to full-time teachers
		Proportion of full-time teachers to part-time teachers in enterprises
		Proportion of part-time teachers teaching professional courses in enterprises
		Number of on-campus training bases jointly built by schools and enterprises (one)
		Number of off-campus training bases jointly built by schools and enterprises (one)
Industry-education integration process indicators	Professional Development	Matching degree of professional settings with regional key industries
		Total number of cooperative enterprises(pcs)
		Percentage of majors integrating education and industry
	Course Construction	Relevance of science, engineering, agriculture and medicine majors
		Number of jointly developed courses (courses)
		Number of jointly developed teaching materials (kinds)

		Number of order-trained students (persons)
		The number of students in on-the-job internship(person)
		Number of students in modern apprenticeship pilot system
Teaching and Training		Number of employees trained for enterprises (person days)
		Amount of non-academic training arrivals (million yuan)
		Number of graduates employed in cooperative enterprises (people)
	Corporate Benefits	Economic benefits created by the integration of industry and education (RMB million)
		Social benefits and popularity enhancement of enterprises (agreeing ratio %)
Industry-education integration effect indicators		Employment rate of graduates
	School Benefits	Job Matching Rate of Graduates
		Acquisition rate of dual certificates of graduates
		Employer satisfaction rate
		Percentage of graduates employed in top 500 companies
	Student Satisfaction	Student satisfaction Satisfaction with companies
		Satisfaction with teachers Satisfaction with the effect of their internship

2. Secondly, the constructed index system is used to evaluate the work of the three colleges that are typical representatives of the integration of industry and education, I conclude the following assessing results:

(1) All three colleges were rated as "good" in the input aspect of industry-education integration.

(2) In the process of integration, DL was "excellent," JX was "fair," and HW was "good."

(3) In terms of the effectiveness of the integration of industry and education, the rating of DL was "excellent," while the ratings of JX and HW were "good." Although the three colleges have achieved outstanding results in industry-education integration, there are still many development difficulties and problems funding, faculty, training base construction, professional development, curriculum construction, education and training, enterprise benefits, school benefits, and student satisfaction.

3. Thirdly, because of the current problems in the development of integration of industry and education, specific strategies and suggestions are put forward from three levels of input-process-effect, from three aspects of improving the input link of integration of industry and education in higher vocational colleges, optimizing the process link of integration of industry and teaching in higher vocational colleges, and

guaranteeing the effect link of integration of industry and education in higher vocational colleges.

5. Conclusion and Recommendation

5.1 Conclusion

First, the constructed indicators are scientific and effective. Basing on the IPO model, I constructed a performance evaluation index system for integrating of industry and education in higher education institutions. Taking the "input-process-effect" evaluation model and stakeholder theory as the guiding ideology, based on the combing of policy and academic literature and the existing evaluation index framework of the integration of education and industry, the performance index system of the integration of education and industry in higher education institutions is initially determined, which mainly includes three primary indicators: input, process, and effect of the integration of education and industry. The indicators are primarily composed of input, process, and impact. After that, the needles were revised and supplemented (He, 2021). I eventually identified three primary indicators, nine secondary indicators, and 32 tertiary indicators.

Secondly, the constructed index system is operable and can evaluate the sample and obtain the evaluation results. By assessing the level of school-industry-education integration performance of the three sample colleges, I conclude the following assessing results:

Table 5.1 Performance evaluation results of production-education integration in three institutions

College	Comprehensive level
DL College	Excellent
JX College	Good
HW College	Good

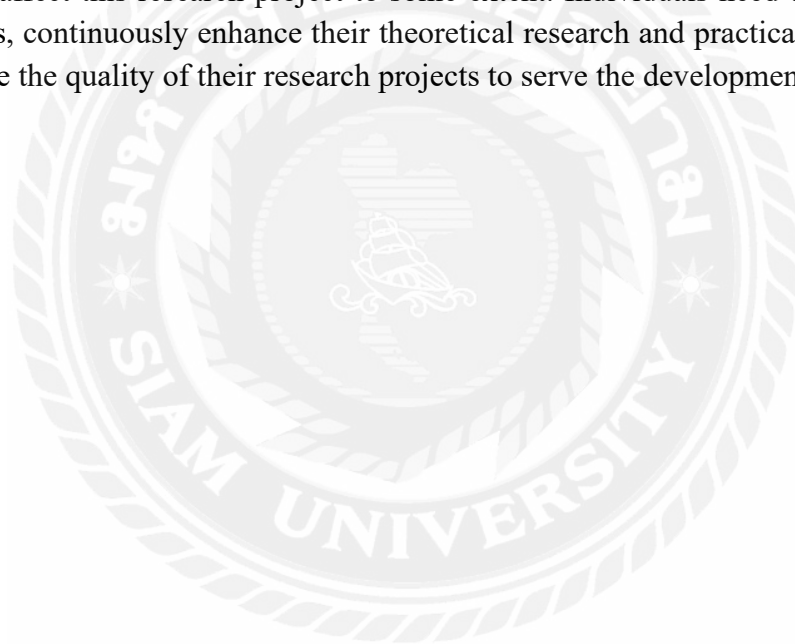
5.2 Recommendation

As a trend of the times, the integration of industry and education is not only a demand to accelerate China's economic development and industrial reforms but also an inevitable way to promote good cooperation between schools and enterprises in vocational education in China (Yu, 2022). The integration of industry and education involves multiple levels of vocational education operation and education of people, and how to evaluate the work performance of all participating parties and how to evaluate each stage of the integration of industry and education needs to be evaluated objectively and fairly. By constructing a performance index system, this paper is conducive to the objective and fair evaluation of the effectiveness of integrating industry and teaching. However, there are still many areas for improvement and in-depth research in this study regarding scientificity and practicality.

First, the amount of literature on the studies drawn from the empirical analysis is not yet large enough, and the quality needs to be improved. It may cause some bias in the research results and impact the scientificity of the evaluation indicator system. Based on different types of integration of industry and education, the evaluation indicators are optimized so that the evaluation results are as close to the overall as possible (Tang, 2022).

Secondly, in the data analysis part, because this study adopts the literature review method, no survey research was actually conducted. In evaluating the performance of industry-education integration in higher education institutions, the data may be biased. I will adopt diverse research methods in my further study to collect more accurate primary data through questionnaires.

Thirdly, due to the limited personal level and low research ability, the accurate understanding of the literature is not deep enough, the lack of systematic study of the theoretical system supporting this study, and the data calculation is not precise enough, which will affect this research project to some extent. Individuals need to strengthen their studies, continuously enhance their theoretical research and practical innovation, and improve the quality of their research projects to serve the development of society.



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