

# **School-Enterprise Cooperation Educational Management Mode of University in Anhui Province**

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## **Abstracts**

The objectives of this research were: (1) to Investigate the components of university-enterprise research cooperative education management in Anhui Province, and (2) to improve the guidelines of university-enterprise cooperation education management in Anhui Province.

The research methodology was a mixed methodology research, including qualitative and quantitative research. The research were divided to 3 steps as; (1) data corrected by literature reviews and interview 5 key informants; The 2<sup>nd</sup> step data corrected by a 5 rating scale questionnaire, The population of the research consisted total 10,710, who were universities Administrators or staff and enterprise managers or staff managers in Anhui Province. The sample size was 370 persons, determined by Krejcie and Morgan's Table (1970), and obtained by a stratified random sampling method, The instruments used for data collection were validity between .60-1.0, and reliability value was .89, and (3) step using on Delphi Technique discussions form which 17 expertise. The statistics used for data analysis were frequency, percentage, mean, Standard Deviation, Exploratory Factor Analysis median and Interquartile range.

The research found that: (1). there were seven components of university-enterprise research cooperative management in Anhui Province which consisted of (1) exploring new models of university-enterprise cooperation (2) formulating policies related to school-enterprise cooperation , (3) improving the practice platform of school-enterprise cooperation ,(4) building the information management platform of school-enterprise cooperation , (5) strengthening the management of tacit knowledge of school-enterprise cooperation ,(6) improving the management system of school-enterprise cooperation and (7) Improve the cooperation ability between the school and the enterprise; (2). There were four dimensions and total 59 managerial guidelines of school-enterprise cooperative education management of universities in Anhui Province.

**Keywords:** Management Mode; School-enterprise cooperation management; Anhui Province

## Introduction

In the past decade, China's higher education has made significant progress, and industry-university research cooperation has become a hot topic in universities, which has attracted wide attention from scholars and experts in the field of education. Through industry-university research cooperation on universities, enterprises and scientific research institutions can improve the practicality of higher education, improve the quality of talent training, improve the theoretical level of technology research and development, and get closer to and serve the society. Therefore, industry-university research cooperation is also an important measure to innovate their own education level. Industry-university research cooperation is a systematic project, which needs to build industry-university research cooperation institutions, innovate industry-university research cooperation mode, establish industry-university research investment mechanism, give full play to the advantages of universities themselves, and realize the benign interaction between universities, the government and the society. In the face of the problems existing in the management of universities under the current background of industry-university research institutes.

School-enterprise cooperative education mode is a part of industry-university research cooperative education. This paper aims to analyze the current situation and existing problems of school-enterprise cooperative education mode management under the current background of industry-university research cooperation, put forward the effective variables of relevant influence, and put forward suggestions and guidelines conducive to school-enterprise cooperative management.

The Yangtze River Delta is a key area of China's economic development. The Yangtze River Delta region includes Shanghai, Jiangsu, Zhejiang and Anhui. Since Anhui joined the Yangtze River Delta, it has had good development in economy, people's livelihood and education, but there are still some problems of insufficient application universities of science and technology, low per capita production level and low application level. Therefore, we should vigorously develop industry-university research cooperation, further deepen the combination of higher education, scientific research and practice, adhere to open cooperation, adjust the layout of majors most adapted to market and social development, and provide a strong and richest talent guarantee for the construction of an innovative high-tech industrial system.

The number of universities in Anhui province is more large, and the analysis of industry, university and research is more representative. Researchers through the university of Anhui universities under the background of the school and enterprise cooperation education mode analysis found that universities in Anhui province in the process of university-enterprise cooperation education encountered some problems and challenges, for university cooperation education pay more attention to university-enterprise cooperation of economic benefits, social service benefits, often ignore the basic attributes of colleges and universities is the cultivation of high-level talents. Only through school-enterprise cooperation education for external resources, through the combination of teaching and production process, to improve the quality of talent training idea is one-sided, also does not meet the needs of contemporary talent training, through the school and enterprise cooperation education mode management to improve the quality of talent training needs multi-dimensional management can be realized.

Therefore, from the perspective of talent training, it is of great theoretical and practical significance to explore the theory and practice of the cooperative education mode management between universities and enterprises in Anhui Province. Theoretical significance: providing reference for the institutional reform of higher education; practical significance: helpful for enhancing university popularity, creating more internship opportunities for students, increasing the employment rate; and promoting economic development.

## Research Objectives

1. Investigate the components of school-enterprise cooperative management in universities in Anhui Province.
2. Improve the guidelines of school-enterprise cooperation management of universities in Anhui Province.

## Research Methodology

Scope of content

The school -enterprise cooperation

Education management mode of universities

Guidelines for school-enterprise

The research design was a mixed methodology research, including qualitative and quantitative research, and divided to 3 steps as follow;

Step 1, To Investigate the composition of school-enterprise cooperative management in universities in Anhui Province. The data correcting on the literature review and interview on the 5 administrators of universities and 5 enterprise managers in Anhui Province. The instrument was semi-interview form which the validity value (IOC) between .80-1.00, and using content analysis.

Step 2, For Exploration factor analysis (EFA), Data correcting by a 5 rating scale questionnaires which validity (IOC) between .08-1.00, Reliability at .89. The population of the research consisted of 10,710 who were university managers or staff and enterprise managers or employees in Anhui Province. The sample size was determined by Krejcie and Morgan's Table (1970), and obtained by a stratified sampling method, totaling 450 samples. ( 238 Administrators staff and 212 managers staff of enterprise). The statistics for data analysis were frequency, percentage, mean, Standard Deviation, and Exploratory Factor Analysis.

Step 3, To improve the guidelines of school-enterprise cooperation management in universities in Anhui Province. by Delphi technique with 17 expertise and purposive selection (3 university Administrators, 3 Professors, 3 managers, and 2 Local governments official). On the three rounds discussion, The statistics for data analysis were frequency, Median and Interquartile range.

## Research Finding

Step 1, To Investigate the components of school-enterprise cooperative management in universities in Anhui Province.

The researchers conducted exploratory factor analysis on the School-Enterprise Cooperative Management Model of University in Anhui Province according to the following procedures: The variable analysis of the School-Enterprise Cooperative Management Model of University in Anhui Province. The researcher analyzed on the content analysis and interview form, there were 76 indicators of the School-Enterprise Cooperative Management Model of University in Anhui Province.

Step 2, For Exploration factor analysis (EFA),

The statistics for data analysis were mean at high level ( $\bar{X} = 3.59-3.74$ ), and The KMO test result of the data collected in this study is 0.98. Therefore, this set of data is suitable for good factor analysis. As the table

Order	Components	Number of Variables	Factor Loading
1	Component 1	16	0.681-0.802
2	Component 2	10	0.679-0.781
3	Component 3	10	0.682-0.787
4	Component 4	10	0.663-0.757
5	Component 5	10	0.608-0.705
6	Component 6	8	0.628-0.73
7	Component 7	12	0.502-0.621
	Total	76	0.502-0.802

From Table 4.9, it was summarized that : there were 7 qualified components as follows; component 1 containing 16 variables that described component, factor loading between 0.681-0.802; component 2 containing 10 variables that described component, factor loading between 0.679-0.781; component 3 containing 10 variables that described component, factor loading between 0.682-0.787; component 4 containing 10 variables that described component, factor loading between 0.663-0.757; component 5 containing 10 variables that described component, factor loading between 0.608-0.705; component 6 containing 8 variables that described component, factor loading between 0.628-0.73; component 7 containing 12 variables that described component, factor loading between 0.502-0.621. The total number of variables that described the 7 components were 76 variables, as follows;

Component I: Explore a new school-enterprise cooperation model.

Component II: Formulate policies related to school-enterprise cooperation.

Component III: Improve the practice platform of school-enterprise cooperation.

Component IV: Build a school-enterprise cooperation information management platform.

Component V: Strengthen the management of the tacit knowledge of school-enterprise cooperation.

Component V I: Improve the school-enterprise cooperation management system.

Component V II: Enhance the cooperation ability between the university and the enterprise.

Step 3, To improve the guidelines of school-enterprise cooperation management in universities in Anhui Province. by Delphi technique with 17 expertise and purposive selection. On the 3 round, there were median>3.50 and Interquartile range < 1.50

There are four dimensions and 59 items from the result on university-enterprise cooperative education management mode in university in Anhui Province" has a total of 4 dimensions, including the proposal of 59 guidelines.

Dimension 1: The school factors on the management of school-enterprise cooperative education (10 effective guideline)

1. The ability and resources of cooperative institutions determine the quality of talents cultivated by cooperation.

2. Improve the professional skills of college and university personnel.

3. We will improve training conditions in colleges and universities.

4. We will improve the development of a system of specialized courses in colleges and universities.

5. We will improve the teaching staff in colleges and universities.

6. To improve university research team scholars should actively participate in the cooperation behavior of industry, university and research.

7. Improve the appropriate cooperative and interactive relationship between university research teams and enterprises.

8. Establish a cooperative relationship of academic participation.

9. Establish the nonlinear cooperation network mode of industry-university-research.

10. Improve the knowledge heterogeneity of team members.

Dimension 2: The enterprise factors on school-enterprise cooperative education management (13 effective guideline)

1. Enterprises' own internal demand for investment in human capital with special skills.

2. Determine the impact of internal and external collaboration on university performance.

3. Strengthen the impact of additional resources on university-industry collaboration.

4. We will emphasize the protection of intellectual property rights.

5. We will build a platform for industry-university-research cooperation with regional characteristics.

6. We will establish a multi-agent and multi-channel innovation investment and financing system.

7. We will promote strategic coordination of innovation resources.

8. We will strengthen the internal driving force for industry-university-research interaction in innovation.

9. Establish an industry-university-research coupling – interactive innovation model

10. Establish a cooperative relationship between the government, the industry, the university, the research institute and the financial institutions.

11. Establish an organizational model with industrial technology innovation strategic alliance as the main body.

12. Scientifically design the incentive mechanism of industry-university-research

collaborative innovation.

13. We will increase investment in human resources.

Dimension 3: the social factors on school-enterprise cooperative education management (15 effective guideline)

1. Coordinate government policies with social educational needs.

2. Improve the impact and quality of more applied research.

3. Partner matching: goal synergy, cultural compatibility, and innovation resource/capability complementarity.

4. The knowledge identification stage, the knowledge sharing implementation stage and the knowledge sharing integration stage.

5. Advantageous resources integration and interaction.

6. Knowledge resource matching, knowledge transfer and creation, knowledge collaborative innovation.

7. Good combination of academic activities and industrial activities.

8. Economic situation, national policy and geographical environment.

9. Risk management of intellectual property sharing.

10. Change the protection concept, improve laws and regulations, and innovate the management mode.

11. We will create an atmosphere in which the whole society supports industry-university-research cooperation and innovation.

12. We will increase the proportion of government subsidies.

13. We will improve policy tools for public services and strengthen the overall application of demand-oriented policy tools.

14. We will establish government-university-industry research and development partnerships.

15. Establish a government-led mechanism for distributing benefits among enterprises, universities and research institutes with bilateral incentive effects.

Dimension 4: The organizational factors on school-enterprise cooperative education management (21 effective guideline)

1. Communication mechanism.

2. School-enterprise cooperation experience.

3. School-enterprise cooperation organization system.

4. School-enterprise communication channels.

5. Establish an effective intellectual property system.

6. Establish a model and mechanism for industry-university-research cooperation

7. We will build a game structure for cooperation.

8. We will establish a model of cooperation between government officials, universities, research institutes and industry.

9. Establish strategic alliances for industrial technology innovation.

10. Establish the trust function and process model of tacit knowledge sharing in industry-university-research collaborative innovation.

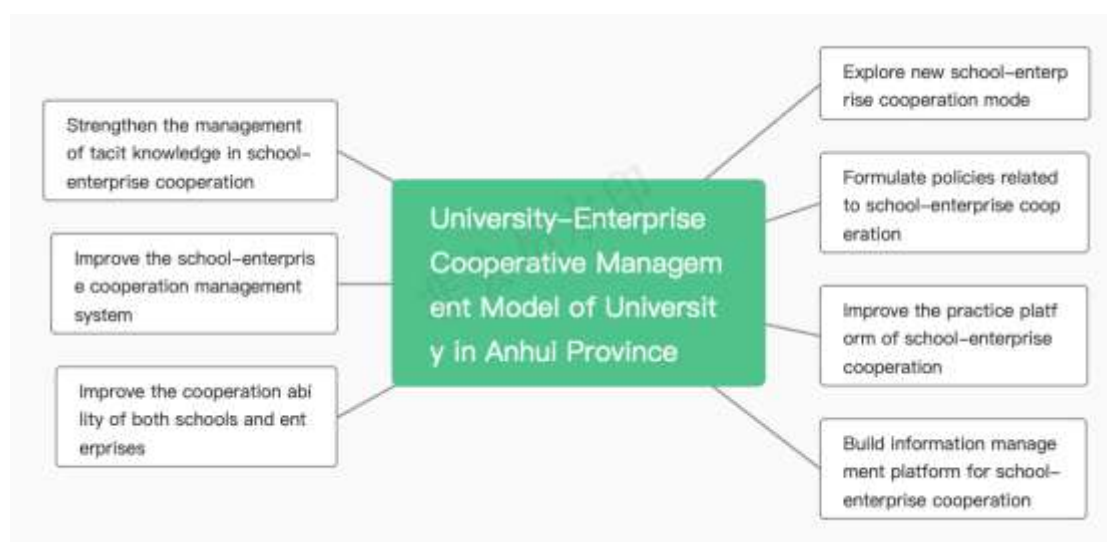
11. Deepen the understanding of the rules of knowledge and intelligence activities of R&D team.

12. Take certain measures to avoid knowledge damage.

13. Construct the relational transfer mode of tacit knowledge of industry, university and research institute from the relational level.

14. The factors affecting tacit knowledge transfer in industry-university-research cooperation are deeply explored.
15. Strengthening strategies for the implementation of knowledge management.
16. The importance of promoting a culture of cooperation and growing trust.
17. The overall size of the project investment.
18. The degree of risk involved in R&D of technological innovations.
19. The scarcity of technology provided by the research party.
20. The endowment effect should be considered in the income distribution mechanism.
21. Different benefit distribution schemes should be developed at different stages of innovation.

On the research finding above could be summary as the figure 1



On the 7 components had management depended on 4 dimensions			
Administrator Factors	Enterprise Factors	Organization Factors	Social Factors

Figure 1: The University-Enterprise Cooperative Education Management Mode.

## Discussion

1. The university-enterprise cooperative education management mode in University in Anhui Province. There were seven components of cooperation as followed:

Component 1: Exploring new school-enterprise cooperation modes. This may be due to, they think that in addition to the ability of the partner schools and resources directly decides the effectiveness of cooperation to develop, decided to cooperation training quality of talents, thus influence enterprise profitability of cooperation which Wang Bin and Zhang Yingjie (2012 : 5–7.) researched shows that cooperation motivation, cooperation relationship, communication mechanism, external environment and cooperation behavior all have significant influence on school-enterprise cooperation results.

Component 2: Develop policies related to school-enterprise cooperation, They believe that: by referring to the classic framework of "motivation-behavior-performance", formulating policies related to school-enterprise cooperation and exploring the participation of university

research team scholars driven by different motivations in industry-university-research cooperation can effectively influence school-enterprise cooperation education.

Component 3: Improve the school-enterprise cooperation practice platform, They believe that perfecting the practice platform of school-enterprise cooperation is crucial to improving the management of school-enterprise cooperation. In addition, studies by He Weihong (2013) also agree with this view. Meanwhile, Gao Hongwei (2011 : 30–34.) found that with the evolution of the innovation process, the leading power of cooperative innovation will be transferred from the university and research to the production side, and the transfer of the leading power of innovation will form the checks and balances between the production side and the university and research side, and form a voluntary supervision mechanism for moral hazard, so as to ensure that all parties of the cooperation decide their own cooperation investment level with the overall benefit maximization as the goal, and ensure the efficiency of the cooperation.

Component 4: Building school-enterprise cooperation information management platform, This study is consistent with the theoretical research of Maran Anriren (2016). Government support plays a positive guiding role in enterprises' active participation in cooperation, and the construction of an information management platform provides a supportive situation for enterprises' cooperative innovation, which can effectively improve the transformation of enterprises' cooperation motivation into cooperation behavior. The government can stimulate or stimulate enterprises to participate in cooperative innovation activities, stimulate enterprises' cooperation motivation and promote the success of inter-enterprise cooperation. In addition, Liu Mingguang and Li Gaoyang (2012 : 137–143.) formulated relevant policies, legal norms, management methods and information platform construction for industry-university-research cooperation, so as to create a good environment and conditions for industry-university-research cooperation and solve problems that may arise in strategic cooperation, such as property right definition, risk bearing, interest distribution and achievement ownership.

Component 5: Strengthening the management of tacit knowledge in school-enterprise cooperation, This study is consistent with the theoretical research of Hu Ren feng (2015 : online). This paper proposes to construct the role and process model of trust in collaborative innovation of tacit knowledge sharing, and points out that subject-object matching of trust is conducive to the formation of tacit knowledge sharing trust relationship. At the same time, Wang Peilin and Zhou Yan ,(2015 : 39-43.) found that in the context of industry-university-research, knowledge damage would make tacit knowledge unable to be transferred effectively, affect the recipient's absorption of tacit knowledge, hinder the collaborative innovation of industry-university-research, and lead to increased risk of the relationship between the subjects of industry-university-research. In order to avoid the occurrence of knowledge damage, all parties of the industry, university and research institute should make efforts in avoiding knowledge bias, establishing cooperative relationship and choosing appropriate transfer channels.

Component 6: Improving the management system of school-enterprise cooperation, This study is consistent with Dang Xinghua, Li Ling, and Zhang Wei's (2010 : 37–41+47.) theoretical research. The influence of enterprise cooperation behavior is not a simple linear relationship, but indirect influence through the motivation of cooperation between enterprises. In addition, Li Yongzhou and Wan Yuan (2014 : 60–65.) found that the establishment of a



multi-agent and multi-channel innovation investment and financing system can promote the strategic synergy of innovation resources.

Component 7: Improve the cooperation ability between the university and the enterprise, They believe that school-enterprise cooperation has become an important strategic measure for local universities to improve their educational level. However, there are contradictions between the two sides in talent training and human needs, emphasizing theory and practice, long-term strategy and short-term interests, and capital investment, resulting in school-enterprise cooperation only on the surface and unable to go deeper. Therefore, local undergraduate universities should improve their ability of school-enterprise cooperation by establishing application-oriented school-running orientation, highlighting development characteristics, improving cooperation agreements, establishing communication mechanisms, encouraging multi-party participation, establishing alliance platforms and other measures. In addition, the research of Jiang Yuanyuan (2021 : online) 12also agrees with this view. Liu Li (2018 : Online) believes that in the process of teachers' participation in school-enterprise cooperation, it is an important task for the development of school-enterprise cooperation education to improve teachers' school-enterprise cooperation ability based on the current adjustment of economic structure and the upgrading of industrial structure.

2: Improve the guidelines of school-enterprise cooperation management in universities in Anhui Province.

There were 4 dimensions for management guild line of 7 components as follows;

1. Dimension on school factors for school-enterprise cooperative education management, They believe that whether the management of school-enterprise cooperation is effective directly affects the effect of school-enterprise cooperation education. In addition, Bai Shengchao, Yao Huibo, Hao Linlin (2022 : 49-56) proposed that education level, location of institutions and educational level have a significant impact on school-enterprise cooperation,

2. Dimension on enterprise factors for school-enterprise cooperative education management, The research conclusion is consistent with the theoretical study of Pan Haisheng, Wang Shibin and Long Deyi (2013 : 143-2148.) Encouraging enterprises to participate in higher education, strengthening the construction of productive practice and training bases, and encouraging local governments to take the lead in the innovation and development of university-enterprise cooperation in higher education are the path choices. At the same time, Wang Wei (2019) proposed that university-enterprise cooperation can promote the development of vocational education, which has reached a broad consensus. School-enterprise cooperation is not only conducive to the future career development of students, but also conducive to the actual demand of enterprises for talents.

3. Dimension on social factors for school-enterprise cooperative education management, The research conclusion is consistent with the theoretical study of Wang Hongguang, Yin Shengbo and Liu Xuejun (2020). They pointed out that the higher education of school-enterprise cooperation is also inevitably affected by social and economic situation and other internal and external factors. In addition, Zhao Dongming and Zhao Jinghui (2016 : 42-46) proposed that with the economic development, the cooperation between schools and enterprises becomes more and more close, and the cooperation between schools and enterprises is mainly reflected in the scientific research projects of the cooperation between schools and enterprises. The rapid implementation and transformation of scientific and technological achievements into economic benefits can not only highlight the scientific

research ability of the school, but also bring economic benefits to the enterprise and the society, which has certain economic research value.

4. Dimension on organizational factors for school-enterprise cooperative education management, The research conclusion is consistent with the theoretical study of Sun Feng (2013). School-enterprise cooperation refers to the cooperation between colleges and universities, enterprises, industries, service departments and other off-campus institutions, which closely combines students' theoretical learning with practical operation or training, realizes the integration with the market, greatly improves the quality of education, and targeted training of first-line practical technical talents for enterprises. Meanwhile, according to Tang Guohua (2017), in order to ensure the long-term and stable development of school-enterprise cooperation in higher vocational education in a planned and step-by-step way, it is very necessary to build a reasonable school-enterprise cooperation organization model.

## Recommendations

1. The government or university could be the result for data information for policy development, curriculum and teaching development of school-enterprise cooperation
2. Improve the management system, Strengthen the management and the practice platform of school-enterprise cooperation

## Suggestions

1. Study on the factors affecting the management mode of school-enterprise cooperative education under the background of industry-university-research cooperation in Anhui Province.
2. The development and reform of school-enterprise cooperative education talent training plan.

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