

ORIGINAL ARTICLE

Exploration of mixed-ownership vocational colleges in China: Models and influencing factors

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The mixed-ownership vocational college (MOVC) is an original form of vocational education institution initiated in China. The current study collected 11 administrative documents and nine interview transcripts from seven MOVCs. Using thematic analysis and grounded theory, three MOVC models were developed: the tripartite co-funded model, the secondary institute model, and the joint training base model. Five influencing factors were identified: legal and institutional factors, production and income, management factors, personnel factors, and students and learning. The findings were discussed in relation to stakeholders and Chinese culture. It is recommended that due consideration be given to the interests of the diverse stakeholders within a MOVC and that the relationships between educational departments, socio-cultural contexts, political traditions, and socio-economic sectors be effectively coordinated during the process of educational reform.

Key words: mixed-ownership vocational colleges, models, influencing factors, vocational education

INTRODUCTION

Cooperation between colleges and enterprises is crucial for vocational education. A number of well-established vocational education models, including modern apprenticeship, dual systems, work-integrated vocational education, and work-based vocational education, have demonstrated efficacy in enhancing the learning of vocational school students (Bouw *et al.*, 2021; O'Regan *et al.*, 2023; Pylväs *et al.*, 2022). The mixed-ownership vocational college (MOVC) refers to a kind of college owned and operated by different individuals. It breaks the Chinese tradition of government-led college operation, allowing enterprises to join in school management, curriculum design, teaching standard formulation, and others (Jin & Jin, 2022). It is considered to have both macro and micro values. On a macro level, it is posited to align with the talent

requirements of local industries and stimulate regional economic growth. On a micro level, it is believed to enhance students' employability and occupational competencies. However, because most MOVCs are still in the pilot stage, they lack unified theoretical support and thus usually adopt different ways of operation (Jin & Jin, 2022). Consequently, synthesizing and developing a theoretical model of this innovative practice in Chinese vocational education can augment our knowledge regarding the cooperation between colleges and enterprises in vocational education.

CONCEPTUAL FRAMEWORK***The Chinese context of MOVCs***

MOVCs in China have long confronted a multitude of challenges. These include deeply entrenched traditional educational concepts, which have historically prioritized

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academic education over vocational and technical education. For example, the cultural emphasis on academic achievement has often led to the relative undervaluation of vocational training. Additionally, there is a lack of sufficient incentive policies to encourage enterprises to engage with vocational education. The current market economy model in China also presents obstacles. For instance, employers frequently exhibit a preference for hiring graduates from general universities rather than those from vocational education institutions. These factors have resulted in the failure of vocational education to meet the needs of the industry (Li & Li, 2021; Xu, 2021). Pan et al. (2016) conducted a survey on enterprise employers and higher vocational college staff and found that vocational colleges and enterprises in China have inadequate and low-quality cooperation as well as disparities in the interests of different entities. For example, vocational schools require enterprises to provide resources and internship sites, which may potentially reduce the production efficiency of businesses. Based on these findings, they suggested that the influence of industry organizations, policy systems, and school management systems should be improved to strengthen the connection between colleges and enterprises. Han and Singh (2004) pointed out that the weak linkage between vocational education and industry in China has led to two serious problems: (1) graduates from vocational colleges cannot become high-skilled talents who can meet the changing demands of the nation, and (2) the existing curriculum standards, teaching methods, pedagogic models, and teaching content are unable to adapt to the fast-developing market economy and industrial technology. Additionally, traditional Chinese culture indirectly hinders cooperation between colleges and enterprises in Chinese vocational education. Confucius's famous sayings "a cultured man is not a tool" and "those who do mental labor rule, and those who do manual labor are ruled" gave vocational education a poor reputation, positioning it at the bottom of the educational hierarchy (Wang, 2024). Students inadvertently end up in vocational colleges but still try their best to enroll in an academic university, leading some secondary vocational schools to concentrate on offering academic subjects to students rather than vocational subjects.

In the above context, the State Council and the Ministry of Education of China have issued a number of policy documents requiring innovation in MOVC models and strengthening the adaptability of vocational education to industry. For example, the *Decision on Accelerating the Development of Modern Vocational Education* mandates and stipulates the following: "Actively support all kinds of college participators to the vocational education through various forms, such as sole proprietorship, joint ventures and cooperation ... Vocational colleges run by social forces have the same legal status as public vocational colleges and enjoy relevant policies on education,

finance, taxation, and land in accordance with the law" (The State Council of China, 2014).

Subsequently, the People's Government of Shandong Province issued *The Opinions on Further Improving the Modern Vocational Education Policy System* in 2015, which proposed deepening the reform of management systems and actively exploring the form of joint-stock ownership or mixed ownership in vocational education. The policy document also detailed the implementation plan for MOVCs, such as encouraging enterprises and public vocational colleges to cooperate in establishing mixed ownership-based secondary colleges and public training bases with both production and teaching functions (The Provincial Government of Shandong, 2015). However, the Chinese policies on mixed ownership in vocational education are mostly just guiding opinions, lacking complete legal support, which accounts for the significant differences in the construction of MOVCs among regions, colleges, and enterprises. Such inconsistencies are detrimental to the evolution of the concept of MOVCs and hinder the establishment of a stable institutional framework.

Studies on MOVCs

MOVCs seem to be a unique concept in China because there has been limited research on this topic in the field of international vocational education. Thus, we also reviewed studies on MOVCs in vocational education, such as co-founded training, apprenticeship, co-construction of learning environments, and work-based vocational education.

The value and effectiveness of MOVCs appear to be a matter of debate. Some prior studies have suggested that they can help vocational education promote socioeconomic development and enhance students' occupational competence and job satisfaction (Bouw et al., 2021; O'Regan et al., 2023; Pylväs et al., 2022). Bouw et al. (2021) compared the effects of college-enterprise co-constructed training programs with training in vocational colleges and found that the former had a stronger focus on productivity and the quality of the services provided than the latter. They argued that vocational education institutions and industry need to collaborate to design learning programs that meet current societal demands. The research from China also has similar findings. Chen and Zhu (2021) analyzed the value, problems, and countermeasures of MOVCs and concluded that the main functions of such institutions were highly aligning with the political requirements of the current Chinese vocational education reform, promoting the diversified development of vocational colleges, innovating how talent is cultivated, and promoting the improvement of teachers' and students' professional abilities. However, there have also been studies that have investigated the problems of MOVCs

(Luo & Lertamornsak, 2022; Zhao *et al.*, 2022). For example, Zhao *et al.* (2022) analyzed the necessity and existing problems of mixed-ownership reform in vocational colleges in China and found that MOVCs urgently require more specific legal support, more sufficient incentive measures, and more comprehensive evaluation systems.

The varying outcomes of MOVCs and the difficulties in their construction may stem from the lack of a unified implementation model. Different vocational colleges and enterprises have diverse resources, management systems, property rights structures, and capital gain distribution systems, which ultimately produce disparate effects. For example, Thomas *et al.* (2007) examined the effects and challenges of employer co-funding publicly funded vocational education and training in the UK and discovered that there was no clear model specifying how and why employers engaged in co-funding publicly funded training. They argued that more specific policies could guide collaboration between enterprises and colleges. Based on the analysis of four typical cases, Guo *et al.* (2021) summarized the practice modes of the current MOVCs in China and argued that the current models of MOVCs exhibit significant differences. These differences are reflected in 11 key issues, including construction mode, investment mode, capital management, legal person registration, governance system, personnel system, and financial support. Zhu and Li (2017) analyzed the construction modes of MOVCs from the perspective of capital gain distribution and identified three modes: payment of dividends, sharing of value-added shares, and bonus distribution. Additionally, they concluded that the construction of MOVCs is influenced by three factors: laws and regulations, vocational schools, and shareholders.

In summary, extensive research has been conducted on the Chinese context of MOVCs, their value and effectiveness, and their varying effects or the difficulties in their construction, yielding valuable insights. One key conclusion is that the effects of MOVCs are influenced by their specific implementation measures. Thus, it is essential to model these different practices and analyze their influencing factors to provide insights for future vocational colleges. Thus, in the present study, we focused on the following research questions: (1) How can MOVCs in China be modeled, and (2) What factors influence the effectiveness of MOVCs in China.

METHODS

Participants and data collection

Based on the two aforementioned research questions, the present study focused on the model and influencing factors of the current MOVCs in China. We selected several mixed-ownership colleges in Shandong Province,

China, and their leaders as participants. Shandong Province established China's first MOVC in 2011 and has built 40 MOVCs to date, ranking first in the country.

The research was conducted using the snowball sampling method. Initially, we asked the leaders of MOVCs we were acquainted with whether they were willing to participate in the interviews and share with us their documents related to school operations, which were used as the sources of research data for the present study. Additionally, they were requested to help contact the leaders of other MOVCs they knew and to give them the invitations for the interviews. Nine school leaders from seven MOVCs in Shandong Province agreed to participate in the interviews, and 11 college administrative documents were collected as sources of research data (Table 1). For the data analysis, the author examined each interview transcript and administrative document. By the time the seventh interview transcript and eighth administrative document were analyzed, it was observed that no new codes were emerging. Thus, it was concluded that theoretical saturation had been reached. We posit that the 13 interviews and 9 documents are sufficient for a qualitative study. Drawing on a prior investigation into qualitative methodology, it has been demonstrated that saturation is typically achieved within a narrow range of 9-17 interviews or 4-8 focus group discussions (Hennink & Kaiser, 2022). Thus, we assumed that our sample size was acceptable.

Table 1: Information about data type and participants		
College	Data type	Participants type
C1	Interview	Vice-principal of college
	Interview	Director of administrative office
	Regulation	
	Brochure	
C2	Interview	Director of administrative office
	Interview	Vice-director of administrative office
	Regulation	
	Year book	
C3	Interview	Vice-principal of college
	Regulation	
	Contract	
C4	Interview	Director of institute
	Regulation	
	Year book	
C5	Interview	Vice-director of institute
	Regulation	
C6	Interview	Vice-director of institute
	Brochure	
C7	Interview	Vice-director of institute
	Brochure	

Each interview lasted approximately 50-60 min and was

conducted in an empty classroom, with only the first author and the interviewee attending. The participants were informed of the following: (1) the interview data would be used only for research purposes, and their personal and college information would be anonymized during the presentation of the research results, and (2) the participants could demand that the recording be stopped at any moment during the interview, and they could refuse to answer any question asked during the interview.

Data analysis

We coded and analyzed the data obtained from the 11 administrative documents and nine interview transcripts based on thematic analysis and grounded theory. We generally followed the process suggested by Braun and Clarke (2006) to generate themes and utilized the concepts of axial coding and selective coding in grounded theory to generate models for MOVCS (Glaser et al., 1968; Strauss & Corbin, 1990).

First, we familiarized ourselves with the text and segmented the analysis units. The 11 administrative documents and nine interview transcripts were carefully read through and segmented into analysis units. A meaningful unit is composed of coherent continuous text on a single theme (Chi, 1997). In this article, an analysis unit is usually a paragraph with descriptions of MOVCS measurements, management regulations, or influencing factors.

Second, we coded the collected data. The sentences and phrases were initially labeled as analysis units. All measurements, regulations, and influencing factors were assigned distinct codes. All authors coded independently. Following the initial coding, three rounds of discussion were conducted to compare and resolve discrepancies in the coding. This iterative process continued until all authors reached a consensus on the final coding results.

Third, we generated influencing-factor themes. We identified the connections and similarities between the codes through axial coding and categorized the codes into 17 preliminary themes. These preliminary themes were subsequently generalized into five main themes based on their similarities. Additionally, an independent researcher was invited to encode the original interview text in a top-down manner, guided by the 17 themes we had summarized. The independent researcher's coding was then compared with our original coding to ensure reliability.

Lastly, we generated models. The selective coding method was used to build connections between codes relevant to the implementation and construction of MOVCS. Three MOVCS models were generated.

RESULTS

Models

The tripartite co-funded model

The tripartite co-funded model of MOVCS is generally established at the whole-college level, which usually requires the local government, college, and enterprises to jointly finance the construction of the college (Figure 1). There are some obstacles in the legal system when this model is implemented because colleges and enterprises are required to be integrated as legal persons in this model, but some enterprises have no independent legal person status. Consequently, the number of MOVCS belonging to the tripartite co-funded MOVCS category is relatively small. Only two schools (C1 and C3) showed this pattern in the study sample.

In terms of funding, the MOVCS in the tripartite co-funded model are usually funded by the local government and enterprises, and they distribute the college income according to the shares. In this model, the proportion of enterprise shares is usually higher than that of government shares. The model also enables enterprises to participate deeply in all aspects of vocational education, including professional planning, curriculum design, textbook development, teaching design, and teaching delivery. For example, the current shareholding ratio of C1 vocational college, a transportation-related professional vocational college, is 1.47% for the municipal government and 67.79%, 15.37%, and 15.37%, respectively, for three transportation-related enterprises. The main sources of school revenue are student tuition fees and social training fees from the paid training programs carried out by the college.

In terms of school management, the MOVCS in the tripartite co-funded model usually combine the traditional management model of public colleges with the core of modern enterprise management, effectively separating decision-making power, management power, and supervisory power from each other. For example, the C1 vocational college is directed by the school board, which has seven members, including enterprise personnel, education department personnel, and school personnel, who are responsible for decision-making leadership, of which the chairman is the largest shareholder. The selection of the principal of this college is recommended by the government, and the candidate must receive unanimous approval from all shareholders before taking office. The principal is mainly responsible for teaching and school management. In addition, the college has established a supervisory board composed of representatives from Weifang City Financial Holding Group, enterprises, and teachers. The supervisory board exercises the functions of supervision and oversight over

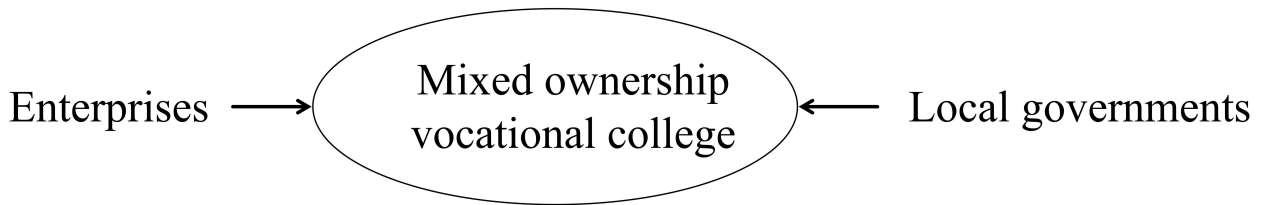


Figure 1. The tripartite co-funded model.

the leadership and decision-making of the school board and the college's management of education.

In terms of faculty management, the employment system is adopted, and performance evaluation is conducted in this model, with a particular emphasis on the teachers' experiences from the enterprises. The professional teachers at the college are generally from the enterprises, and these specialized teachers are required to work in the enterprises for two and a half years within a five-year period. Regarding teacher salaries, a corporate-style approach is adopted, with remuneration based on teachers' performance contributions and promotions based on their ability levels.

The secondary institute model

The secondary institute model refers to vocational colleges whose subsidiary colleges are established through enterprises, social capital, and others, and jointly managed by the enterprises and colleges. This model primarily utilizes a market-based operation mechanism, in which the vocational college and the enterprise jointly establish a shareholding company to oversee and manage the college's affairs (Figure 2). The local government does not necessarily have a stake and rarely intervenes in the cooperation between a college and an enterprise (shown by the dotted line in Figure 2). This model has become the most popular form of MOVC because most secondary institutes can obtain independent legal status for their nature as shareholding companies.

Colleges and enterprises employ various methods to clarify ownership and allocate shares, and they distribute profits according to their shares. In the secondary institute model, the input mechanisms of the secondary institute are diversified, encompassing both tangible assets (e.g., funds, equipment, and premises) and intangible assets (e.g., the college's brand). In the process of specific implementation, the college and the enterprise utilize disparate equity allocation methods because they use different mechanisms when converting equity. For example, according to the interview with the director of the C4 vocational college, the shareholding ratio of the college is 20% because of its intangible-asset

investment, while that of the enterprise is 80% for its investment of actual funds in the secondary institute. The college and enterprise usually distribute profits according to their respective shareholdings.

Regarding management systems, the dean assumes responsibility for the secondary institute under the direction of the institute's board, while the general manager of the joint-stock company is given full responsibility for the company also under the direction of the institute's board. However, in general, the two management groups have the same administrative members, all of whom are given similar rights in the two different management systems. The board is composed of representatives from both the college and the enterprise or multiple investing enterprises. The chairman of the joint-stock company is the legal representative of the majority shareholder company, which is the largest investor of the secondary institute according to the result of the equity converted. The general manager of the joint-stock company and the dean of the secondary institute are both recommended by the college, and the candidates must obtain permission through a unanimous resolution by all board shareholders before taking office. Additionally, these two positions are often held by the same individual.

Regarding student training, the "dual-track" system is generally adopted, with both general courses and college-enterprise joint courses offered. The college-enterprise collaborative courses are mainly practice-oriented and jointly developed by the college and the enterprise. Enterprises are typically required to participate in the entire talent cultivation process. The proportion of theoretical and practical courses can be adjusted appropriately based on the needs of the enterprises. The practical courses are mainly implemented by enterprises, while the theoretical courses are implemented by colleges. Usually, enterprises provide practical cases used by colleges to revise to come up with new textbooks., and then assign the professional teachers to teach. At the same time, enterprises carry out on-the-job training for students.

The joint training base model

MOVCs based on joint training are also established in

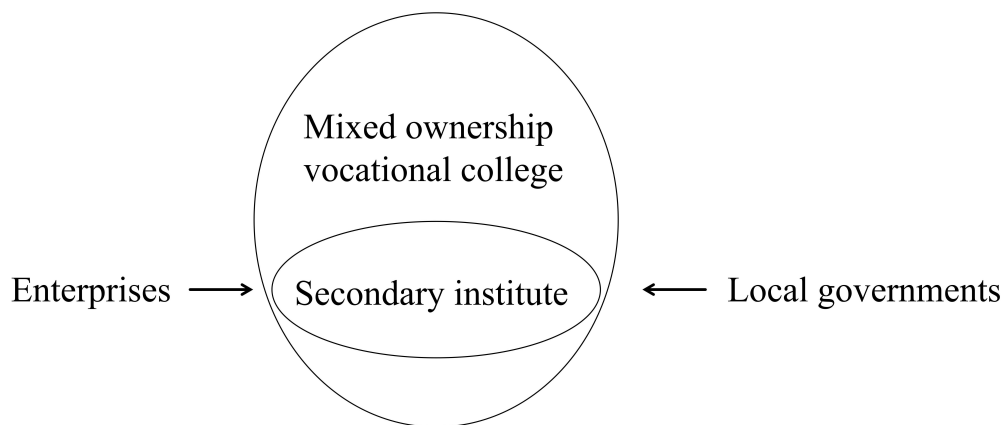


Figure 2. The secondary institute model.

the form of joint-stock companies founded by both a college and an enterprise. The college and enterprise jointly establish a for-profit joint-stock company based on a specific joint construction of the major, using the productive training base as the school-running entity (Figure 3). The joint investment of this MOVC model is solely focused on the practical training base, which involves fewer assets compared to the two previous models. Hence, local governments typically do not participate in the joint construction of a training base.

The joint training base model typically allocates shares according to the actual capital input and distributes profits accordingly. Under this model, both the college and the enterprise generally invest actual funds to establish productive mixed-ownership training bases within the college premises upon the request of the enterprise. For example, C6 College signed an agreement with a metallurgical equipment materials company to establish a mixed-ownership company registered within the college and to jointly build production lines, also serving as a training base. The enterprise contributed RMB 5.1 million for a 51% stake, while the college contributed RMB 4.9 million for a 49% stake. The joint-stock company sells the molds produced on these bases, dividing the profits between the two parties according to their respective shareholding percentages.

The general manager of the joint-stock company assumes responsibility for the management of the company under the direction of the board. The board is composed jointly of representatives from both the college and the enterprise, and the chairman of the joint-stock company is the head of the enterprise, while the general manager is a representative of the college. Additionally, the supervisory board is set up by the joint-stock company to oversee educational outcomes, corporate development, and preservation of assets belonging to the Chinese government. In terms of teacher management, the type of staff participating in

the practical training base remains unchanged whether they come from the college or the enterprise. Moreover, the salaries of the college staff remain unchanged.

Influencing factors

To address the second research question (what factors influence the effectiveness of MOVCs in China), nine interview transcripts were analyzed for their themes. Five main themes of the influencing factors were identified, which contained 17 primary themes (Table 2).

Table 2: Influential factors generated from interview

Themes	Preliminary themes
Legal and institutional factors	Specificity the of regulation and law
	Incentive policy for the enterprises
	Criteria for the property valuation and pricing
Production and income	Ownership of the intellectual property
	Type of the income distribution
	Cooperative mode of the co-production
Management factors	Management of multiple department
	Distribution of power
	Government interference
Personnel factors	Multiple job responsibilities
	Teachers' "double qualified" competence
	Salary and welfare
	Recruitment standard
Students and learning	Career planning
	Time allocation between the internship and study
	Awareness and altitudes

Legal and institutional factors

Legal and institutional factors pertain to the norms, standards, and measures formulated by the government on the relevant matters in the construction of MOVCs. Several important issues often discussed in the interviews included the specificity of regulations and

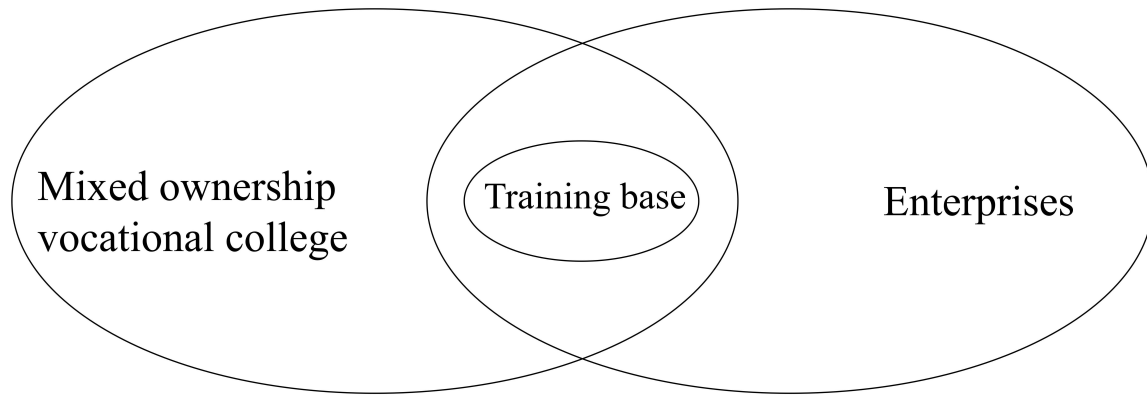


Figure 3. The joint training base model.

laws, incentive policies for enterprises, property rights evaluation, and criteria for property valuation and pricing. In the interviews, the leaders of MOVCS often talked about the criteria for property valuation and pricing. The current policies do not specify which assets can be used for investment, and there is a lack of specific criteria for the property valuation and pricing of various types of assets, especially for intangible assets. Thus, enterprises do not know how to invest in MOVCS and do not dare to invest in them. As the vice director of C5 College remarked: "There is no reliable method to price patent rights, trademark rights, brand reputation value, *etc.*, so there is no way to clarify the respective shares of enterprises and colleges. When it comes to negotiations, it's hard to reach an agreement because both sides think they offer more".

The incentive policy for enterprises is another common topic mentioned by the interviewees. Most of the leaders of vocational colleges who participated in the present study believe that the government does not provide sufficient funding for enterprises participating in running colleges, and how these enterprises can apply for funding is unclear. This may yield two results. First, enterprises may have no motivation to participate in the construction of MOVCS and may refuse to cooperate with the college. Second, enterprises may try to bargain with vocational colleges in the process of cooperation, hoping to obtain more benefits from them.

Production and income

Production and income refer to how local governments, colleges, and enterprises cooperate in the production process and how to distribute the profits obtained from the production. According to the interviews, most MOVCS currently distribute income according to stock equity. However, it is difficult to distribute ownership of intangible products, such as intellectual property (*i.e.*, innovative inventions or patents). In addition, there are often challenges in the co-production process. In

particular, how the teachers from vocational colleges participate in enterprises' production, how to pay the teachers for their extra workload, and how to arrange the schedules of the teachers' and students' participation in the production will affect the success or failure of MOVCS. For example, the vice director of C7 College stated the following: "The cooperation in the production process is relatively shallow ... Students regularly go to the enterprise for practice, [and] some college experts may give some advice on the technical problems in the production of enterprises ... In the majority situation, the teachers are too busy to participate in the production of enterprises".

Management factors

Management factors refer to issues that MOVCS may encounter in their management structures, such as the management of multiple departments, the distribution of power, and government interference. Most MOVCS usually combine the traditional management model of public colleges with the core of modern enterprise management to form a new management system. However, there are some new challenges to this new system. For example, some new departments may be established due to MOVCS, such as the Department of Innovation and Entrepreneurship, the Center of Industrial Development Research, the Center of Industrial Research and Development and Transformation, and the Department of Production Training. To ensure that these departments operate effectively, it may be necessary to carry out the targeted management reform and formulate new management regulations. In addition, because local governments, enterprises, and colleges all hold shares in MOVCS, it is very important to allocate power among these different stakeholders in management and avoid conflicts of interest among them. Given that there is a state-oriented political tradition in China, it is possible that the local government will have greater power, with a small share

in some vocational colleges.

Personnel factors

Personnel factors refer to the problems that teachers of vocational colleges or employees of enterprises may face in running MOVCS. There are four preliminary subthemes under this theme: multiple job responsibilities, salary and welfare, recruitment standards, and teachers' "dual competence" (*i.e.*, having both professional practice ability and teaching ability). Multiple job responsibilities were frequently mentioned in the interviews, mainly because the personnel from enterprises and colleges need to collaborate closely to promote the teaching effect and improve the production efficiency of enterprises in MOVCS. For example, the skilled workers from enterprises are expected to work as part-time teachers in vocational colleges, while the teachers from vocational colleges are expected to help companies solve the technical bottlenecks in production through research and development. The other three preliminary subthemes can all be seen as the results of the theme of multiple job responsibilities. Because people need to take on more kinds of tasks, MOVCS require employees to have a variety of abilities, which raises the bar for recruitment. In turn, employees will demand higher salaries and benefits. In an interview, the vice director of the administrative office at C2 College stated the following: "Our current salary is actually higher than those of other non-MOVCS because we have introduced a corporate merit-based pay system from the enterprises. If the teacher participates in the enterprise research and development or applies for patents, the teacher will be highly rewarded. However, it remains challenging to recruit a sufficient number of 'dual-qualified' teachers during the recruitment process".

Students and learning

The concept of students and learning refers to how students' learning styles and attitudes may influence their willingness to study at MOVCS. As mentioned in the conceptual framework section, Confucian culture and traditional Chinese values make most students prefer academic universities, but MOVCS typically employ apprenticeship training models and work-integrated learning, which limits students' opportunities to move to academic universities. Consequently, only students with a clear career plan and strong motivation to learn technologies can obtain better learning results in MOVCS. Additionally, the allocation of time between practice and study can impact students' learning effectiveness and teachers' pedagogical methods. Traditionally, teachers from Chinese vocational colleges spend considerable time transmitting professional theoretical knowledge in the classroom, while teachers from MOVCS may need to spend more time on the practical training base than in the classrooms to guide students'

technical learning. This presents a great challenge to teachers' competence and requires students to adapt to the new learning styles required.

DISCUSSION

Three models of MOVCS and five influencing factors were identified in the present study through grounded theory and thematic analysis. Based on the study's results, we draw the three conclusions cited below.

First, the operation model of MOVCS in China exhibits diversity and flexibility, but it is difficult to achieve a balance of interests between colleges and enterprises. This may be attributed to the Chinese policy tradition, which usually focuses on providing the overall blueprint without specifying the specific operation rules (Ahlers, 2018). Consequently, enterprises and colleges need to play games constantly to pursue their maximal interests. Each of the three MOVCS models has advantages and disadvantages. For example, the tripartite co-funded model can promote more in-depth cooperation between the two parties and can enable the whole school to carry out all-round reform in the professional setting, school culture, curriculum, teaching methods, teaching content and materials, and personnel system, among others. However, the model is also more susceptible to government intervention and legal constraints on the establishment of joint-stock companies, which are likely to lead to the unequal distribution of benefits between colleges and enterprises. The three different MOVCS models can provide a theoretical framework for future academic research on the effect of MOVCS on vocational education. Moreover, practitioners can use the findings of the present study to anticipate challenges and opportunities in the operation of vocational colleges. Managers from colleges and enterprises should flexibly build different types of MOVCS according to regional economic and industrial conditions so as to maximize the advantages of various types of MOVCS and improve the effects of the education that they offer.

Second, the interests of the various stakeholders in an MOVCS require greater attention. Only by aligning the interests of all stakeholders can the long-term and stable development of MOVCS be ensured. For example, the preliminary themes of the influencing factors were predominantly related to the interest relationship between colleges and enterprises: the incentive policy for enterprises, the ownership of intellectual property, and the type of income distribution. As indicated by prior research, vocational colleges are more dependent on enterprise resources and usually require enterprises to make a large amount of capital and technology investment in advance to construct MOVCS in China; thus, enterprises face huge risks in the first few years

(Luo & Lertamornsak, 2022; Xu & Yang, 2018). This reduces the enthusiasm of enterprises to participate in the co-construction of MOVCS. Thus, most previous studies have advocated for detailed incentive policies, government support, and the protection of enterprises' interests (Chen & Zhu, 2021; Zhu & Li, 2017). However, the interviews in the present study revealed that the interests of teachers and students receive less attention than those of enterprises. At present, the local government, colleges, and enterprises pay more attention to the utilitarian value of MOVCS for local economic development, enterprise benefits, and the school employment rate.

Finally, the present study highlighted the influence of the Chinese vocational education system and traditional culture on MOVCS. Among the influencing factors identified, government interference, the specificity of regulation and law, teachers' dual competence, and awareness and attitudes reflect the characteristics of Chinese vocational education. For example, the influencing factors of "government interference" and "specificity of regulation and law" may be due to the long-standing Chinese policy tradition of "top-level design", which means that a macro perspective is adopted in policy formulation, and guidance on specific implementation details is ignored (Ahlers, 2018). Thus, MOVCS must constantly explore and explore on their own in practice. Top-level designed policies may result in a lack of specific regulations for MOVCS to coordinate the interests of various stakeholders and guide their behaviors, thereby making it difficult to foster close cooperation between colleges and enterprises. Furthermore, insufficiently detailed policies necessitate continuous exploration by MOVCS in practice. While this may foster innovation and diversification, it could also lead to failure.

Limitations and suggestions for future studies

The present study has some limitations. The first is its insufficient sample size. Specifically, nine interview transcripts and 11 documents were analyzed, all of which described the MOVCS in Shandong Province. This cannot reflect the overall picture of MOVCS in China. Consequently, due to the small sample size, there is a potential limitation in the generalizability of the study's findings. We suggest that future researchers increase the sample size and expand the regional scope using the snowball sampling method to address this limitation.

Another limitation is that the three models developed in this study are more practice-oriented and have not been further developed into a more profound academic theory. This may be attributed to the research data that

we collected. Most of the questions in the interview guidelines focused on how colleges were managed and operated, and the selected materials were administrative documents from the participants' colleges. It was challenging to abstract the data obtained from these materials into academic theory. We hope that future research will integrate theories from the field of educational management to further develop our practice-oriented models.

DECLARATIONS

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None.

Author contributions

Wu Q: Data curation, Writing—Original draft. Jin XL: Conceptualization, Methodology. Gu Q: Investigation, Funding acquisition. All authors have read and approved the final version.

Ethical approval

Not applicable.

Informed consent

The informed consent was provided orally. The participants were informed that the interview data were only used for research purposes, and their information would be anonymized when presenting the research result. Moreover, they are also allowed to stop the recording at any moment during the interview, and they can refuse to respond to any question asked during the review.

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Conflict of interest

The authors have no conflicts of interest to declare.

Data availability statement

No additional data.

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