

RESEARCH ARTICLE

Vocational education facilitating the high-quality development of Chinese SMEs: theoretical mechanisms, real constraints and proposed strategies

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ABSTRACT

The 20th National Congress of the Communist Party of China highlighted that “high-quality development is the primary task in building a modern socialist country comprehensively.” The development quality of Small and Medium-sized Enterprises (SMEs) plays a pivotal role in achieving the modernization of socialism in China. Against the backdrop of the state’s strong support for vocational education, the mechanism and pathway through which vocational education impacts the high-quality development of SMEs remain unclear and warrant further investigation. This study focuses on the theoretical mechanisms and real constraints of vocational education in aiding the high-quality development of SMEs. It explores the following areas: First, starting from the concept of high-quality development and the needs of SMEs, the study discusses the ideal orientation of talent cultivation in vocational education. Secondly, it delves into the pathway mechanism of how vocational education influences the high-quality development of SMEs and clarifies the crucial aspects of vocational education talent training. Finally, the study confronts the real issues faced in the development of vocational education and seeks possible solutions. The key to vocational education talent cultivation lies in how colleges and businesses achieve deep integration of industry and education and science and education. Strengthening the demand orientation of vocational education and promoting the structural match between vocational education talent cultivation and the talent needs of SMEs in high-quality development is crucial for enhancing the quality of talent cultivation in vocational education.

Keywords: vocational education; small and medium-sized enterprises; innovation; high-quality development

1. Introduction

The 20th National Congress of the Communist Party of China emphasized that high-quality development is the foremost task in comprehensively building a modern socialist country. Chinese President Xi Jinping has highlighted that “high-quality development is a development that can satisfactorily meet the people’s ever-growing needs for a better life. It embodies the new development concepts, with innovation serving as the primary driver,

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coordination as an inherent feature, green development as a ubiquitous form, openness as the only path forward, and shared benefits as the fundamental goal.” This interpretation reflects China’s understanding of the essence of high-quality development in accordance with its national conditions.

The era of economic growth driven solely by cheap labor is irrevocably over^[1], and high-quality development has become the inevitable path for China’s future economic progress. Human Capital Theory posits that human capital, as an essential productive element embodied in the workforce, is a vital driver for enterprises to achieve technological innovation, transformation, and economic growth, necessitating continuous investment in education^[2]. Studies have proposed that vocational education, aimed at serving the development of local small and medium-sized enterprises (SMEs)¹, continually provides high-quality technical and skilled personnel^[3].

The rapid development of vocational education cannot be separated from the long-standing emphasis placed on it by the Chinese government. The report of the 20th National Congress clearly stated the need to “coordinate vocational education, higher education, and continuing education for collaborative innovation, and to promote the integration of vocational and general education, as well as the amalgamation of industry and education, science and education, thereby optimizing the positioning of vocational education types.” To develop vocational education further, the state has specifically revised laws affirming the equal legal status of vocational and general education. “Vigorously developing vocational education” has risen to the level of a national strategy.

Despite the strong promotion of vocational education by the Chinese government, there are two starkly different views in the theoretical realm regarding its economic consequences. One view holds that vocational education significantly enhances employees’ knowledge, skills, and innovation capabilities, which is crucial for serving the development of SMEs^[4,5]. Conversely, other studies argue that most recipients of vocational education are of lower quality, and the training has inherent limitations, thus failing to meet the demand for high-quality talent in society^[6,7]. Besides theoretical disputes, society holds two starkly different attitudes toward the quality of talent cultivation in vocational education. On the one hand, the high employment rate of graduates from vocational institutions indicates societal recognition of vocational education. On the other hand, some businesses, especially large corporations with higher academic requirements, still view vocational education through a biased lens, labeling it as inferior in capability and level.

Although existing theories and practices have extensively discussed the economic consequences of vocational education, focusing primarily on aspects such as individual income, regional development, and national economic growth, discussions on the economic development of enterprises remain relatively scarce. Compared to general education, vocational education recipients enjoy higher employment income and are more welcomed in the labor market^[8,9]. However, some studies have found through surveys that recipients of vocational education are not highly

¹ On March 23, 2023, the Department of Development Planning of the Ministry of Education highlighted that the total number of various vocational institutions across the nation, including secondary vocational technology schools, higher vocational colleges, and vocational undergraduate colleges, has exceeded 8,600. The student enrollment in secondary vocational colleges alone has surpassed ten million, with the numbers showing an annual growth trend.

satisfied with their wage and salary levels, and vocational education does not necessarily enable them to find their ideal jobs^[10] and may even lead to a greater possibility of future wage depreciation^[11].

In terms of macroeconomic impact, vocational education plays a significant role in national and regional economic development. Tam et al. (2012)^[11] empirically studied the impact of vocational education workers and general education workers on economic growth in major countries worldwide, finding that vocational education has a better effect on national economic development, primarily benefiting from providing workers with necessary skills earlier, thereby promoting economic development. Siddiqui et al. (2017)^[12] empirically studied the impact of vocational education on economic development in Asian countries, finding that vocational education helps promote economic development in Asia. Michael Harloe and Beth Perry (2004)^[13] studied the impact of vocational education on regional economic development, also supporting the idea that vocational education promotes inter-regional connections and economic development.

However, evidence suggests that the contribution of vocational education to economic growth may not be as significant as that of general education. Krueger and Kumar (2004)^[14], through modeling studies on the impact of two different types of education on national economic development, found that economic growth in Europe was not as robust as in the United States, with Europe and the United States oriented towards vocational and academic education, respectively. The authors believe this indicates that vocational education's effect on economic growth in European countries is not as significant as the contribution of general education to economic growth in the United States.

Besides, vocational education can promote local economic development^[15], especially improving the level of innovation in local cities and maintaining social stability^[16]. Hence, vocational education can produce certain economic consequences for both individuals and regional economic development. However, how vocational education affects micro-enterprises and its underlying mechanisms remains unclear. This paper, combining Chinese educational practices, analyzes possible constraining factors in the vocational education talent cultivation process and proposes potential solutions.

This paper's potential contributions are twofold: first, it theoretically clarifies the relationship between vocational education and the high-quality development of SMEs, providing theoretical support for eliminating societal prejudices against vocational education; second, from a social supply and demand perspective, it offers potential directions for further deepening reforms in vocational education talent cultivation.

2. Microscopic implications of high-quality development and the desirable orientation of vocational talent cultivation

2.1 Microscopic implications of high-quality development

Historical experience indicates that enterprises focusing solely on growth rate while neglecting development quality struggle to sustain and strengthen their operations^[17-18]. High-quality development presents differently at macro, meso, and micro levels. Microscopically, it is characterized by "innovation, coordination, green development, openness, and sharing"^[19], emphasizing a development model where quality and efficiency coexist^[20]. With growing

societal demands, the model of SMEs trading high resource consumption for rapid growth is obsolete. SMEs must gradually adapt to integrated embedding with emerging technologies like big data, the Internet of Things, and artificial intelligence, improving resource efficiency and product competitiveness, leading to industrial upgrades, and ultimately achieving high-quality development^[21]. In essence, the microscopic content of high-quality development is a balanced development of multiple factors driven by innovation.

2.2. Desirable orientation of vocational education in supporting high-quality development of SMEs

The optimal orientation of vocational education in fostering the high-quality development of Small and Medium-sized Enterprises (SMEs) is both the core and benchmark of its contributory value. The crux of enabling vocational education to underpin SMEs' high-quality growth rests on nurturing talents tailored to the evolving demands of these entities^[22,23]. The embodiment of high-quality development for SMEs, characterized by innovation-driven growth complemented by coordination, environmental sustainability, openness, and inclusivity, demands that vocational education's talent cultivation strategies are in harmony with SMEs' developmental needs. This research asserts that the preferred direction of vocational education in this milieu should exhibit distinct attributes:

Firstly, an enduring capacity for innovation is paramount. SMEs, noted for their prevalence, potential, and agility^[24,25], require a persistent capability for innovation to emerge successfully in a competitive and intricate marketplace^[26-28]. Consequently, SMEs place a high value on the innovative abilities of their workforce, deeming it an indispensable component for achieving high-quality growth. It is noteworthy that SMEs account for more than 70% of technological innovations in China, underscoring the importance placed on workforce innovation capabilities.

Secondly, adaptability and flexibility are critical. Due to their constrained size and financial resources, SMEs favor employees who can immediately engage in productive activities without the need for protracted and repetitive training, which is attributable to their unfamiliarity with business dynamics. Furthermore, SMEs operate within a competitive landscape that is both volatile and multifaceted^[29,30], necessitating personnel capable of swiftly adapting and executing timely modifications to align with business exigencies.

Finally, vocational culture. For high-quality development, SMEs need talents with continuous learning ability and an innovative spirit. This requires vocational education to focus more on the long-term value of its trainees, providing a sustained growth impetus for enterprises. Vocational culture helps nurture and acquire excellent character and spirit in the developmental process of enterprises^[31], such as dedication, integrity, and innovative thinking. These are the driving forces behind the high-quality development of SMEs.

3. The pathway mechanism of vocational education in facilitating high-quality development of SMEs

According to Human Capital Theory, the impact of vocational education on the economy unfolds through the logic of "human capital investment - personal improvement economic growth". Most vocational education

recipients come from groups engaged in the economy through a singular labor factor, such as farmers, students of suitable age, and laid-off workers. Through the integration of industry and education and the fusion of science and education in vocational training, these individuals significantly enhance their cognitive abilities, vocational cultural literacy, technical skills, and social resources. These improvements align with the basic needs of SMEs for personnel capable of supporting high-quality development. Owing to the teaching model that integrates industry and education in vocational training, these employees receive practical and technical training as part of their daily learning. Consequently, they achieved breakthroughs in three key areas:

3.1. Vocational education enhances personal improvement

Knowledge transforms destiny, and education can generate positive economic outcomes for individuals. The current income distribution model is based on a multi-factor allocation system that includes land, capital, labor, technology, and knowledge, where the weight of each factor varies and changes according to external environmental demands^[32]. With the advent of the information age, the level of technological productivity has continuously risen, leading to a decline in the proportion of labor, capital, and land in distribution, while the share of technology and knowledge has increased. For impoverished groups like farmers and unemployed individuals who rely solely on labor or land for income, economic growth does not translate into significant income changes. To break free from poverty caused by the diminishing value of single human capital and adapt to modern production methods that demand technically skilled personnel, vocational education has flourished.

Education is a vital means to break the cycle of intergenerational poverty^[33]. Most recipients of education previously lacked distribution factors or were overly dependent on labor, leading to an excess of labor input and low economic returns. Vocational education, tailored to local business development needs, imparts cognitive, cultural, and technical skills, enabling recipients to align correctly with market demands. It meets the varied needs of rural, town, or urban areas for different factors, reversing the critical issue of declining personal income and increasing wealth disparity among people experiencing poverty caused by reliance solely on labor contributions. By receiving vocational education and training, individuals benefit in multiple ways, participating in the distribution of labor, technology, and knowledge, thereby interrupting the cycle of intergenerational poverty. The impact of vocational education on individual development can be categorized into the following four aspects.

Firstly, reshaping cognition is a crucial function of education^[34]. Vocational education, as a form of education, plays a significant role in guiding the psychological health of learners and reshaping their cognition. It incorporates advanced theoretical knowledge and technical principles, helping learners broaden their horizons, increase their talents, refine their character, and strengthen their beliefs. Vocational education transmits healthy and positive thoughts to learners, guiding their healthy growth and reshaping their perceptions of life and worldview.

Secondly, vocational education inherently carries vocational characteristics, making the culture of vocational schools distinct from other educational entities, namely, the professional culture. The core of professional culture is the sense of responsibility and mission that firmly links an individual's fate with corporate development^[35]. epitomized by dedication to one's job. The process of skill training and knowledge impartation in vocational

education, including school history, mottos, faculty, alums, architectural styles, and library collections, all integrate the cultural spirit of becoming a professional.

Additionally, full-time teachers often emphasize connecting with business practices and conducting regular practical research in enterprises, while students receive instruction from part-time business teachers and engage in internships, fostering a professional culture.

Thirdly, as vocational education primarily targets students, migrant workers, and unemployed individuals, most of whom lack specialized skills and awareness of SME production technologies, it focuses not only on advanced theoretical knowledge but also on the application of production techniques and methods in business practice^[36]. Schools repeatedly train learners in technology through practical training platforms or bases. Moreover, vocational college students receive extensive technical guidance from a multitude of skilled teachers and corporate instructors and are required to participate in internships, as well as technical skill level training and examinations. Post-education, they acquire technical skills relevant to business needs.

Finally, vocational education expands social capital for learners in two ways: firstly, by bringing together learners with similar experiences, knowledge structures, and goals, it expands their social networks. Many entrepreneurial teams from vocational colleges initially find expert guidance, partners, or team members through innovation incubation projects facilitated by the school.

Secondly, vocational education enables learners to obtain a “dual certificate system” of academic and skill certificates. According to the signaling theory, this helps communicate the learner’s educational background and skill level to employers, improving their chances of securing a job that matches their qualifications.

3.2. Pathways for vocational education to assist in the high-quality development of SMEs

Employee quality is the most crucial driver of corporate development, and the caliber of staff determines the quality of business development^[37]. Vocational education shapes high-quality talents to meet the needs of SMEs and can promote high-quality corporate development through the following two pathways: integration of industry and education and fusion of science and education.

On one hand, the integration of industry and education has enhanced the alignment between talent supply and demand. With the ongoing development of the social division of labor, schools and enterprises have taken on the dual social functions of education and employment, respectively. However, there often exists a mismatch between the talents cultivated by schools and the needs of enterprises, which can limit enterprise development. The integration of industry and education is a crucial method to address the talent supply and demand issue. Collaborative efforts between vocational colleges and target enterprises, implementing a “dual-system” education model, help to advance the enterprise talent training phase, solving the difficulty of recruitment for small and medium-sized enterprises (SMEs).

On the other hand, the fusion of science and education has broadened the technical skill levels of talents. Chinese vocational colleges have always emphasized incorporating advanced production technologies from

enterprises into their teaching. Through joint research and development of new technologies, processes, and standards in specialized industry colleges and corporate mentorship systems, this approach promotes the integration of talents cultivated by schools with cutting-edge science and technology, enhancing the overall technical skill level of talents.

Through methods such as the integration of industry and education, as well as the fusion of science and education, schools have significantly promoted the effectiveness of the dual education system between schools and enterprises.

Specifically, this manifests in three ways. Firstly, the vocational nature of vocational education means it is primarily aimed at serving local businesses and local employment, leading to a high alignment between talent training and business needs. Local vocational schools and businesses deeply integrate industry and education, planning-related professional construction, faculty recruitment, and training programs. Regions with a particular industry concentration also focus on vocational school talent training layouts. This talent training model, oriented towards local SME development needs, can alleviate the labor shortage and recruitment cost issues faced by SMEs.

Secondly, SMEs participating in vocational education talent training can leverage school resources to advance the employee training phase^[38], reducing the burden on SMEs. Many senior engineers and technicians from SMEs participate directly as external guides or adjunct teachers in schools, moving the typically post-hire training phase to the school, thus reducing corporate HR training costs and familiarizing students with professional culture and business practices.

Lastly, SMEs can offer technology and equipment relevant to vocational education, expanding their business and reputation. Besides providing professional personnel and technical support, businesses can help vocational schools train talents by offering standardized teaching equipment and technical support. This not only enhances the quality of vocational education but also promotes business reputation and growth. For instance, vocational education groups providing related products can receive government subsidies and school procurement revenue and may even be awarded titles like 'Model Enterprise for Industry-Education Integration'. Furthermore, Small and Medium-sized Enterprises (SMEs) place particular emphasis on engaging in activities that blend science and education with schools. They collaborate with schools to establish specialized industry colleges or joint research and development centers to explore new technologies that meet market demands. This partnership not only allows for the utilization of school resources for scientific research and development but also enables participants to experience the dynamics of industry technology.

Since the reform and opening up, the quality and competitiveness of Chinese enterprise products have continuously improved. The development model has shifted from economic growth driven by cheap labor to driving business development with high-value-added innovative products. This change in development mode is inseparable from enterprises' recognition of the importance of technology-driven innovation. Vocational education, rooted in serving the development of small, medium, and micro enterprises, especially in supporting innovative technologies, is legally defined in the newly revised Vocational Education Law regarding the service subjects and future direction

of vocational education. Therefore, the Party and the state proposed the concept of ‘fusion of science and education’ at the 20th National Congress, integrating technology into vocational education and promoting SME innovation through vocational education. Vocational colleges, with high-level theoretical talents and financial resources, and SMEs, with clear advantages in market information and application technology support, can jointly build innovation centers. Collaboratively developing high-tech new products demanded by the market and integrating the products’ R&D and practical application into vocational education teaching and research can foster collaborative innovation.

In summary, under the influence of the integration of industry and education and the fusion of science and education, vocational education can play a significant role in reducing transaction costs for SMEs, improving business process efficiency, and promoting technological innovation.

4. Constraints and strategies for vocational education in facilitating high-quality development of SMEs

4.1. Constraints on high-quality development

Despite the new Vocational Education Law mandating the development of vocational education, reform implementation, and quality enhancement to provide SMEs with more high-quality technical and skilled personnel, the process of cultivating talents that meet SME needs requires exploration based on societal demand variations. However, many vocational schools lack clarity on local enterprise needs, leading to a superficial integration of industry and education and a fusion of science and education (Zhao and Liu, 2019). Often emulating the approach of general education, they follow a theoretical knowledge transmission model with insufficient practical application, resulting in vocational education losing its practicality.

Currently, China’s vocational education levels are generally low and do not meet SMEs’ demands for high-quality technical and skilled personnel^[39]. The technologies taught at the secondary and tertiary vocational levels are often mature and do not cater to the innovative and exploratory high-tech talents required by enterprises in a complex and changing environment. This gap between the teaching content of most vocational schools and market changes has led to a mismatch between the talents trained and the structural needs, limiting vocational education’s ability to serve the high-quality development of SMEs.

Local governments primarily fund vocational schools in China, so the financial income of the locality and the attention paid to the school determine its funding. In big cities, economically developed areas, and higher vocational schools, resources are relatively abundant, facilitating the implementation of industry-education integration and science-education fusion with quality infrastructure. They can hire excellent teachers and cooperate with top industry enterprises in joint academic-industry programs. However, in central and western China, remote areas, and some secondary vocational schools, resources are severely lacking^[40].

Struggling to sustain daily operations, they are far from achieving effective talent cultivation.

The majority of full-time teachers in vocational schools come from general higher education backgrounds, with some from enterprise technical and managerial positions. Some, engaged in theoretical research for extended

periods, lack an understanding of enterprise practical scenarios and cannot provide students with relevant skill training guidance^[41].

Others focused on teaching without recent enterprise contact and have outdated perceptions of enterprise needs. Due to these factors, vocational school graduates often lack an understanding of current enterprise technology applications and proficient technical skills, leading to a mismatch with the developmental needs of SMEs^[42].

In conclusion, vocational education faces several challenges in aiding the high-quality development of SMEs, including unclear talent development focus, superficial integration of industry and education, inadequate educational levels, regional and level development imbalances, and a mismatch between teacher expertise and enterprise skill demands. Addressing these issues is crucial for vocational education to contribute to the effective, high-quality development of SMEs.

4.2. Strategic research for reform

Despite current challenges in vocational education's talent cultivation model in meeting individual and enterprise needs, its role in propelling the high-quality development of SMEs cannot be overlooked. Optimizing vocational education programs and aligning them with the development needs of SMEs is crucial. This study briefly discusses strategies for vocational education reform based on individual and enterprise needs.

School-enterprise cooperation is a distinctive and vital feature of vocational education^[41]. The failure of some vocational schools to meet societal talent structure needs fundamentally stems from neglecting industry-education integration and disconnecting from local enterprise development needs, resulting in graduates lacking vitality. Local SMEs are the primary demanders of vocational talent; establishing effective long-term communication and cooperation mechanisms with SMEs is essential to ensure the alignment of trained talent with their needs. For example, establishing industry colleges with local enterprises, implementing order-based class cooperation, and setting up internship programs can help. Regular visits by senior leadership and relevant officials to enterprises can understand changing enterprise and market needs, driving the educational focus of vocational education and ensuring it meets enterprise development needs.

With the comprehensive advent of the information and intelligence era, SMEs are undergoing rapid technological and scientific transformations. Vocational education must keep pace, providing technological support for SMEs' high-quality development. However, current vocational education levels are relatively low, mainly at secondary and tertiary vocational levels, with technologies taught being mature and unable to meet enterprise development needs^[43]. There is a need to cultivate higher-level talents with technological foresight, exploratory nature, and innovativeness. Only then can SMEs stand out in a competitive environment.

The country has already implemented strategies for undergraduate and vocational talent cultivation and detailed talent development plans. In the future, exploring and developing vocational education at the master's, doctoral, or even higher levels is essential. Collaborating with renowned domestic and international research institutions and universities to develop technologies meeting enterprise needs and involving students in these processes will truly achieve the fusion of science and education and promote high-quality enterprise development.

Building high-quality vocational education to drive SMEs' high-quality development requires the participation of national and local governments, industries, schools, enterprises, and other societal sectors.

At the national level, encourage SMEs and vocational schools to actively respond to the "Belt and Road" initiative, sharing their experiences in industry-education integration and science-education fusion with countries involved. The "Belt and Road" initiative is a long-term international project undertaken by China to integrate into the global economy, aiming to deepen global infrastructure construction and trade^[44]. Domestically, the government should adhere to the strategy of revitalizing the country through science and technology, practice the parallel development of vocational and general education, and provide top-level design for vocational education in terms of employment thresholds, institutional guarantees, and future development paths.

Local governments should provide guidance and policy support for vocational education's development direction, actively promoting vocational training and supporting distinctive local projects aligned with local industrial development and strategic planning.

Industry institutions should actively build platforms for school-enterprise cooperation, serving as an essential communication platform between schools and enterprises, establishing regular coordination mechanisms, and setting standards that meet enterprise needs.

Employers should discard inherent prejudices against vocational education. Understanding relevant applied technologies and skills not only aids personal income growth but also contributes to building a harmonious socialist society.

Schools should continue to embrace diverse development concepts such as openness, inclusiveness, and green sharing. They should deepen school-enterprise cooperation, industry-education integration, and science-education fusion, combining new technologies, new processes, and new ideas to enhance the quality of vocational education and dispel societal prejudices. Active exploration of cooperation with large enterprises and international exchanges in vocational education is encouraged, hoping to help more individuals escape poverty and assist more enterprises in achieving higher-level development^[45]. Vocational education is a type of education that involves multiple parties, with each stakeholder playing a crucial role in the cultivation of vocational education talents. How to motivate and guide all parties to play a more significant role in the process of vocational education talent cultivation holds substantial importance for the future development of small and medium-sized enterprises.

5. Conclusion

Vocational education is integral to individual employment, enterprise development, and the realization of socialist modernization, representing a significant aspect of the great socialist cause.

In the context of the vigorous Chinese promotion of vocational education development, vocational education must seize opportunities, understand the development needs of SMEs, and effectively implement measures related to the integration of industry and education, as well as the fusion of science and education. There is great potential in vocational education, and all sectors of society should be confident in its development. Together, we must deepen

educational reforms and realize the path of revitalizing enterprises through education and strengthening enterprises with science and education.

Declaration of interest statement

All authors declare that No conflict of interest exists.

Data availability statement

The data supporting this study's findings are available from the corresponding author upon reasonable request.

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