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Factors influencing cross-border e-commerce enterprises' engagement in vocational education partnerships

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ABSTRACT

This study investigates the factors influencing cross-border e-commerce enterprises' willingness to engage in vocational education partnerships, addressing talent shortages and improving practical skills in vocational education. It contributes to the field by applying the theory of planned behavior (TPB) to the collaboration between this emerging industry and vocational education, offering a novel perspective on the framework's utility. A quantitative research design was employed, with data collected through a survey of 401 cross-border e-commerce enterprises in Zhejiang Province, China. Key findings reveal that perceived benefits (PB) positively influence behavioral attitudes (BA), while perceived risks (PR) exert a negative effect. BA, subjective norms (peer influence (PI) and superior influence (SI)), and perceived behavioral control (self-efficacy and controllability) significantly predict cooperation intention (CI). These findings offer practical insights for policymakers and educational institutions. To promote effective collaboration, governments, and educational institutions should build trust through clear agreements and aligned expectations, while reducing PRs and enhancing PB. Additionally, providing training, consulting, and resource support can strengthen enterprises' self-efficacy and controllability. Leveraging information sharing, promoting successful case studies, and utilizing the influence of peers and superiors will help mitigate uncertainties and enhance CI.

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1. INTRODUCTION

In the knowledge economy, universities, as producers and disseminators of knowledge, play a crucial role in innovation and sustainable economic development [1]. Industries rely on collaborations with universities to maintain market competitiveness [2], whether through direct innovation or human resource training [3]. Universities, in turn, gain an understanding of business realities and market demands through these partnerships [4]. School-enterprise collaboration drives national innovation and, therefore, increasingly plays a vital role in the national economies of both developed and developing countries, fundamentally contributing to economic development [4], [5].

In recent years, cross-border e-commerce has become a significant driver of economic growth, particularly in China [6]. Recognizing the potential of this emerging industry, the Chinese Ministry of Education designated cross-border e-commerce as a new major for vocational colleges in 2019 [7]. The Chinese government advocates for cooperation between vocational colleges and enterprises to increase the supply of skilled workers and enhance labor productivity [8]. Effective partnerships between vocational colleges and

enterprises are crucial for optimizing curriculum design, aligning educational outcomes with industry needs, thereby enhancing graduates' employability, and addressing the talent shortages in the market [9].

However, various challenges hinder the successful implementation of school-enterprise collaboration, one of which is the lack of motivation for enterprises to engage in such partnerships. Studies indicate that the effective demand for school-enterprise collaboration among Chinese enterprises is insufficient, resulting in low enthusiasm for participation [10]–[12], alongside a prevalent phenomenon described as "school hot and enterprise cold" [13]. Enterprises often perceive an imbalance between the benefits and costs of school-enterprise collaboration, leading to a lack of motivation to collaborate [14]. Additionally, some enterprises participate in these partnerships primarily to address short-term labor needs and reduce labor costs, treating students as "cheap labor" [15]. This superficial and formalistic approach further undermines the effectiveness and sustainability of school-enterprise collaboration.

To address these challenges and enhance enterprises' enthusiasm for participating in school-enterprise collaboration, it is essential to identify the key factors influencing their engagement, thereby providing targeted strategies for policymakers and educational institutions. This study focuses on the emerging industry of cross-border e-commerce and explores the determinants of enterprises' willingness to engage in vocational education school-enterprise collaboration from the perspective of enterprises, filling a research gap in this field. By extending the traditional application of the theory of planned behavior (TPB) from individual behavior analysis to the organizational level, this research constructs an extended TPB model and incorporates subcomponents, offering a more detailed and comprehensive analytical framework. This multidimensional analysis not only enhances the explanatory power of TPB and enriches the theoretical framework but also provides practical insights for policymakers and educational institutions to promote effective school-enterprise collaboration.

School-enterprise collaboration involves participating in high-cost, high-difficulty, and high-risk technological innovation activities. Enterprises engaging in such collaborations can reduce their research investment costs and mitigate their research and development risks [4]. Sinnewe *et al.* [16] argue that school-enterprise collaboration allows for rational division of labor and efficient resource allocation, reducing the need for excessive human and financial resources in technical research and enabling a focus on market development. Sjöö and Hellström [17] highlight that prior experience affects firms' willingness to engage in school-enterprise collaboration. Using data from the Thai community innovation survey and a multivariate probit model, Opassuwan and Wannamakok [18] confirm that structural, behavioral, motivational, attitudinal, and policy-related factors significantly impact firms' participation in school-enterprise collaboration. From an industry perspective, Ariyawansa [19] discusses motivations for firms to engage in school-enterprise collaboration, including gaining academic expertise and training opportunities. In conclusion, the effectiveness of school-enterprise collaboration is driven by the careful balancing of risks, costs, and benefits, alongside the strategic allocation of resources and labor. Prior experience and specific motivations, such as gaining academic expertise and training opportunities, also play crucial roles. These findings highlight that reducing perceived risks (PR) and enhancing perceived benefits (PB) are essential to fostering more effective and sustainable collaborations.

School-enterprise collaboration is a crucial pathway for vocational education to cultivate skilled talents. The fundamental characteristics of vocational education dictate that skill development cannot occur without enterprise involvement [20]. The roles of school-enterprise collaboration in vocational education include enhancing students' employability, increasing practical skills training, addressing shortages of facilities and teachers, improving alignment between education and market demands, and reducing student learning fatigue [21]. Several scholars have studied the reasons affecting enterprises' willingness to participate. Haisheng *et al.* [22] argues that factors such as insufficient enterprise demand, issues with systems and mechanisms, and gaps in legal and policy frameworks have influenced enterprises' participation in vocational education. Zhang *et al.* [23], based on the TPB and a survey of 250 enterprises, confirmed that BA, subjective norms, and perceived behavioral control significantly impact enterprises' willingness to engage in school-enterprise collaboration.

2. UNDERPINNING THEORY AND HYPOTHESIS DEVELOPMENT

2.1. Underpinning theory of the study

The underpinning theory of the study is the TPB. TPB integrates various factors influencing individual behavior to facilitate the decision-making process [24]. For example, behavioral attitudes (BA) reflects the internal reflection and correlation of the subject, subjective norm indicates the effect of the external environment on the subject, and perceived behavioral control represents the subject's perception of actual conditions (such as ability, opportunity, and resources) [24]. TPB has been widely applied across various domains. By examining internal reflections, external influences, and perceived conditions, TPB

provides valuable insights into behavioral intentions and supports targeted interventions aimed at fostering behavior change.

When making decisions, enterprises typically need to consider multiple factors, including economic benefits, social responsibility, and long-term development [23]. Due to their economic agent attributes, enterprises are primarily driven by economic motives aimed at maximizing profitability. At the same time, enterprises also possess social agent attributes, meaning their decision-making processes are influenced by societal pressures [23], [25]. In this context, the TPB provides a comprehensive framework that helps integrate various factors influencing enterprises' participation in school-enterprise collaboration.

In this study, subjective norms are further divided into peer influence (PI) and superior influence (SI) [26], acknowledging that different social pressures can have distinct impacts on decision-making. Similarly, perceived behavioral control is divided into perceived self-efficacy (PS) and perceived controllability (PC) [27], recognizing that confidence in one's abilities and the perceived ease of performing the behavior are critical components in predicting intentions. This two-component approach has been reported to have improved predictive capability compared to the original single-component TPB [27], [28]. By examining these nuanced constructs, TPB provides a robust framework to analyze the intentions of cross-border e-commerce enterprises to participate in vocational education partnerships. This detailed understanding is essential for developing strategies to enhance collaboration, ultimately addressing talent shortages and promoting economic development. Therefore, a model was proposed based on this extended TPB framework, aiming to answer the research questions related to the factors influencing enterprises' willingness to engage in such collaborations shown in Figure 1.

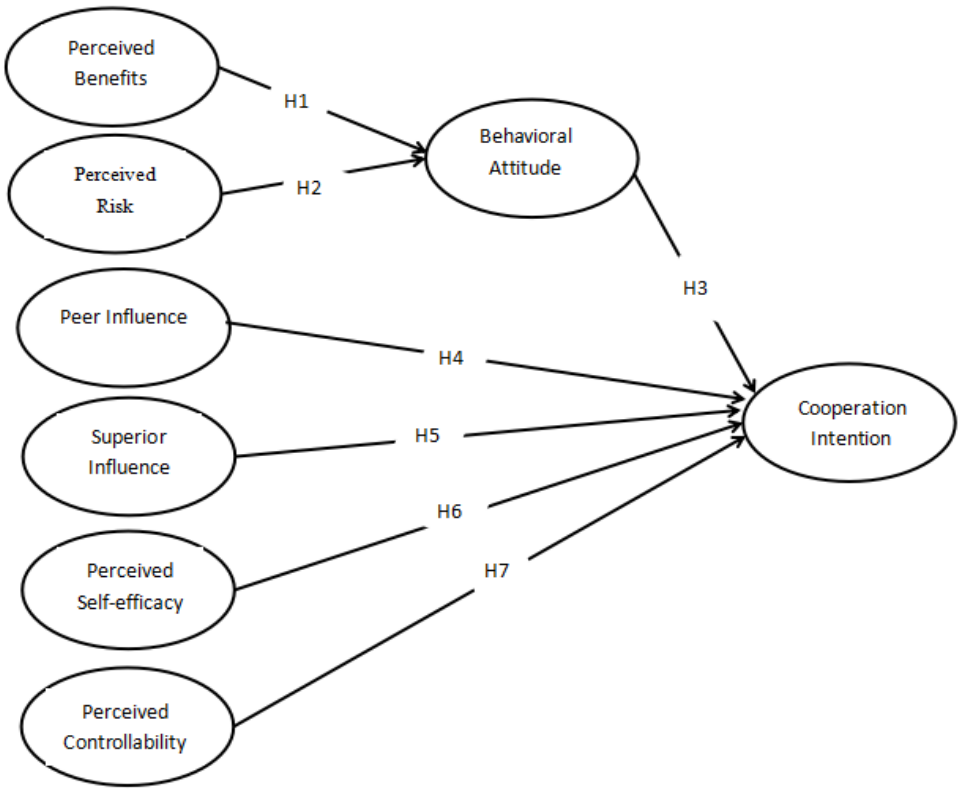

Figure 1. Research model

2.2. Hypothesis development

Research has consistently shown that PB positively influence BA [29]–[31], while PR negatively influence BA [32], [33]. For enterprises participating in school-enterprise collaboration, BA encompasses the evaluation of positive (PB) or negative (PR) feelings and preferences regarding involvement in vocational education partnerships [25]. A positive evaluation leads to a positive BA, while a negative evaluation results in a negative BA. Based on this, the study proposes the following hypotheses:

H1: PB positively affect enterprises' BA.

H2: PR negatively affect enterprises' BA.

BA refers to the evaluation of an individua's feelings towards a specific behavior in a given context, encompassing an overall assessment of the behavior's expected outcomes [24]. A positive evaluation results in a positive BA, while a negative evaluation leads to a negative BA [24]. Behavioral intention, on the other hand, represents the readiness to perform a behavior, indicating the subjective likelihood of adopting that behavior and reflecting the individual's willingness to do so [24]. In the context of school-enterprise collaboration, cooperation intention (CI) refers to the likelihood and effort businesses will invest in collaborating with schools [25]. An enterprise's CI is directly influenced by its BA. Thus, a more positive attitude towards participating in vocational education leads to a higher CI. Based on this, the following hypothesis is proposed:

H3: BA positively impacts enterprises' CI to participate in school-enterprise collaboration.

Subjective norms refer to the influence of the external social environment on an individual, including perceived social pressure from significant others or groups, and the impact of important institutions or organizations on decision-making [24]. Enterprises must consider ethics, principles, beliefs, social duties, expectations, and public opinion, alongside their own interests [23]. School-enterprise collaboration enhances educational quality, aligning with social responsibility objectives [34], [35]. The subjective norms affecting enterprise participation in school-enterprise collaboration include opinions from influential individuals or groups (e.g., government, industry associations, peer companies, internal employees, and society) regarding the enterprise's involvement. Positive evaluations from these entities increase the enterprise's support and intention to participate [25]. In this study, subjective norms are categorized into PI (impact from peer companies) and SI (influence from industry associations, government, and public opinion). PI relates to observed behavior of similar entities (descriptive norm), while SI pertains to normative recommendations and expectations from external stakeholders (injunctive norm) [26]. Therefore, the following hypotheses are proposed:

H4: PI positively impacts enterprises' CI to participate in school-enterprise collaboration.

H5: SI positively impacts enterprises' CI to participate in school-enterprise collaboration.

Perceived behavioral control refers to the extent to which an individual feels capable of performing a behavior, reflecting their perception of factors that may facilitate or impede the behavior [36]. The stronger the perceived control, the higher the likelihood of the behavior being carried out [36]. Perceived behavioral control consists of two components: PS and PC [27]. In the context of enterprises participating in school-enterprise collaboration, perceived behavioral control indicates how difficult enterprises find it to engage in such cooperation. Enterprises with more resources, opportunities, and fewer anticipated obstacles will have stronger perceived behavioral control [25]. Therefore, the following hypotheses are proposed:

H6: PS positively impacts enterprises' intention to cooperate in school-enterprise initiatives.

H7: PC positively impacts enterprises' intention to cooperate in school-enterprise initiatives.

3. RESEARCH METHOD

The research approach of this study is quantitative, utilizing a survey research design. The data for this study were collected through a questionnaire survey conducted among cross-border e-commerce enterprises in Zhejiang Province, China. To ensure the scientific accuracy and validity of the questionnaire, all measurement items were adapted from existing literature [23], [25], [37], [38] and appropriately modified to fit the objectives and context of this study. All items were measured using a 5-point Likert scale, ranging from 1 (strongly disagree) to 5 (strongly agree).

The reasons for selecting cross-border e-commerce enterprises in Zhejiang Province are as follows: located in southeast China, Zhejiang is one of the most economically developed provinces in the country and was the first to initiate cross-border e-commerce business. The province's cross-border e-commerce import and export volume accounts for approximately one-sixth of the national total. It hosts a large number of cross-border e-commerce enterprises and more than 40 higher vocational colleges. The survey questionnaire for this study was distributed via Wenjuanxing, the largest online survey platform in China. Core members with decision-making authority in cross-border e-commerce enterprises were invited to complete the questionnaire. Data collection for this study took place from December 10, 2023, to February 28, 2024, and resulted in 401 valid responses through extensive efforts. In the survey sample, 45.9% of the enterprises had been established for more than five years, while 54.1% had been established for less than five years. The ownership structure of the companies varied, with private enterprises accounting for 61.1% of the total. This was followed by Sino-foreign joint ventures, collective enterprises, foreign-funded enterprises, and state-owned enterprises, which accounted for 16.7%, 11.5%, 6.7%, and 4% respectively. Table 1 shows the frequency and percentage distribution of the demographic data.

Table 1. Respondent profile

Respondent demographics	Frequency (N=401)	Percentage (%)
Position:		
Chairman of the board	5	1.2
CEO	45	11.2
General Manager	275	68.6
Others	76	19.0
Gender:		
Male	236	58.9
Female	165	41.1
History:		
>5 years	217	54.1
≥5 years	184	45.9
Size:		
Small (5-19）	83	20.7
Medium (20-199)	219	54.6
Large (≥200)	99	24.7
Ownership:		
State-owned enterprises	16	4.0
Private enterprises	245	61.1
Sino-foreign joint ventures	67	16.7
Wholly foreign-owned enterprises	27	6.7
Collective enterprises	46	11.5

4. DATA ANALYSIS AND RESULTS

4.1. Reliability and validity

To assess the internal consistency and reliability of the questionnaire data, Cronbach's α was calculated for each construct. All values exceed the commonly accepted threshold of 0.7, indicating good internal consistency as in Table 2 (see in Appendix). Confirmatory factor analysis (CFA) was conducted using analysis of moment structures (AMOS) to evaluate the validity of the questionnaire. This method verifies whether the measurement items accurately reflect the latent constructs specified by the theoretical model [39]. Key fit indices were calculated to assess the model fit, and all indices met or exceeded acceptable standards, indicating a good model fit as in Table 3. Additionally, composite reliability (CR), and average variance extracted (AVE) values were calculated. In this study, the CR values for all constructs were above 0.7, and the AVE values were above 0.5, demonstrating good internal consistency and convergent validity [40] (see Table 2).

Discriminant validity was confirmed by ensuring that the AVE values were greater than the squared correlations between constructs and that the inter-factor correlation coefficients were ≤0.80, indicating that the constructs were distinct from each other. Our findings show that the constructs demonstrated good discriminant validity. For example, the square root of the AVE for PB is 0.808, which is greater than its correlation with any other construct. This indicates that PB is distinct from other constructs such as PR and BA. Similarly, other constructs like PS and PC also showed discriminant validity, as their AVE values were higher than the correlations with other constructs, confirming the constructs are unique and measure different concepts as in Table 4. Overall, the questionnaire used in this study demonstrated strong reliability and validity.

Table 3. Acceptable thresholds of the fit indices in the CFA model

Fit indices	Acceptable range	Results
Minimum discrepancy function by degrees of freedom divided (CMIN/DF)	Good <3, acceptable <5	1.137
Goodness of fit index (GFI)	Good >0.9, acceptable >0.8	0.886
Adjusted goodness of fit index (AGFI)	>0.8	0.874
Normed fit index (NFI)	Good >0.9, acceptable >0.8	0.911
Incremental fit index (IFI)	>0.9	0.988
Comparative fit index (CFI)	>0.9	0.988
Non-normed fit index (NNFI/TLI)	>0.9	0.988
Root mean square error of approximation (RMSEA)	Good <0.08, medium <0.08 to 0.1, and weak <0.1	0.019
Parsimony normed fit index (PNFI)	>0.5	0.859

4.2. Hypotheses testing

The results of the path analysis, as presented in Table 5 and Figure 2, reveal significant relationships among the variables. We found that PB positively correlate with BA (path coefficient=0.354, t=6.284, P<0.001), while PR negatively correlates with BA (path coefficient=-0.310, t=-5.627, P<0.001). BA significantly affects CI (path coefficient=0.149, t=2.885, P=0.004). Additionally, the study revealed that PI (path coefficient=0.178,

t=2.749, P=0.006), SI (path coefficient=0.155, t=2.325, P=0.020), PS (path coefficient=0.150, t=2.441, P=0.015), and PC (path coefficient=0.149, t=2.389, P=0.017) all significantly influence CI.

Table 4. Discriminate validity

Variables	PB	PR	BA	PI	SI	PS	PC	CI
PB	**0.808**							
PR	-0.420	**0.789**						
BA	0.473	-0.446	**0.783**					
PI	0.439	-0.467	0.381	**0.822**				
SI	0.448	-0.470	0.456	0.628	**0.822**			
PS	0.421	-0.389	0.366	0.330	0.370	**0.805**		
PC	0.380	-0.456	0.413	0.384	0.425	0.586	**0.808**	
CI	0.353	-0.469	0.389	0.430	0.443	0.400	0.423	**0.793**

Note: diagonals (in bold) present the square root of the AVE while the off-diagonals present the correlations.

Table 5. Path coefficients

Path	Path coefficient	S.E.	t-value	P	Results
PB→BA	0.354	0.053	6.284	***	Supported
PR→BA	-0.310	0.055	-5.627	***	Supported
BA→CI	0.149	0.051	2.885	0.004**	Supported
SN.PI→CI	0.178	0.059	2.749	0.006**	Supported
SN.SI→CI	0.155	0.057	2.325	0.020*	Supported
PBC.PS→CI	0.150	0.059	2.441	0.015*	Supported
PBC.PC→CI	0.149	0.055	2.389	0.017*	Supported

Note: ***P<0.001, **P<0.01, and *P<0.05.

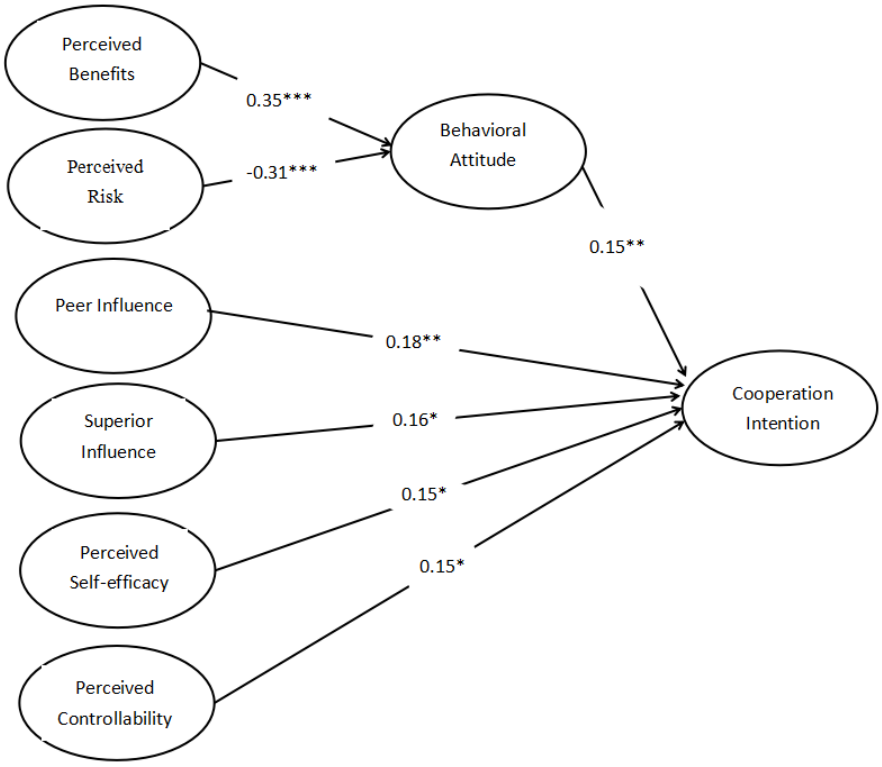

Figure 2. The results of the research model

5. DISCUSSION

Previous studies have primarily focused on the perspective of schools, with less attention paid to industry, especially in the emerging cross-border e-commerce sector. Therefore, this study aims to fill this research gap and provide a deeper understanding of the decision-making mechanisms behind cross-border e-commerce enterprises' participation in vocational education school-enterprise cooperation.

This study proves that PB significantly enhance the attitude of cross-border e-commerce enterprises toward participating in vocational education school-enterprise collaboration. The finding is consistent with the existing literature, which emphasizes the importance of anticipated positive outcomes in shaping organizational behavior [25]. In fact, these benefits may include talent acquisition, technological advancement, resource enrichment, and improved corporate reputation. A high proportion of enterprises (80%) prioritize talent acquisition, further corroborating the rapid development of the industry and the severity of talent shortages [41]. Thus, school-enterprise collaboration is perceived as a strategic approach to secure skilled professionals, providing a competitive edge [42].

Conversely, our analysis confirms that PR has a substantial negative impact on BA. Higher PR, such as talent loss, equipment failure, increased costs, unmet goals, and intellectual property disputes, significantly dampen the enthusiasm of enterprises towards participation in vocational education school-enterprise collaboration. This is consistent with prior research highlighting the detrimental effects of PR on BA [32], [33]. The fear of losing skilled employees to competitors, a common concern among cross-border e-commerce enterprises, can be a significant deterrent. This aligns with the human capital theory, which posits that investments in employee training may lead to increased turnover if employees are poached by competitors offering better opportunities [43]. Consequently, enterprises may be reluctant to engage in vocational education partnerships unless there are mechanisms in place to mitigate this risk. Moreover, unmet goals and intellectual property disputes represent significant risks that can undermine the perceived value of school-enterprise collaboration. Enterprises may worry that the outcomes of such collaborations will not meet their strategic objectives, or that proprietary knowledge and innovations could be compromised. This highlights the importance of clear agreements and aligned expectations between educational institutions and enterprises to ensure that both parties benefit equitably from the collaboration. To address these concerns, it is crucial for policymakers and educational institutions to develop frameworks that minimize PR and foster trust. Effective communication policies, as suggested by Boguszewicz-Kreft *et al.* [33], can play a crucial role in building trust and alleviating concerns. Clear, transparent, and frequent communication can help manage expectations and reduce PR, thereby fostering a more favorable attitude towards participation.

The study confirms that a positive BA significantly influences the intention of cross-border e-commerce enterprises to engage in vocational education school-enterprise collaboration. Cross-border e-commerce enterprises typically face intense market competition and rapidly changing technological environments. A positive BA indicates that these enterprises believe collaborating with educational institutions can provide them with a competitive advantage and long-term development. This finding supports existing theories that emphasize the critical role of attitude in decision-making processes [33], [44]. However, while BA is a strong predictor, it is not the sole determinant of CI. The complexity and uncertainty in the decision-making process require enterprises to assess perceived behavioral control and the influence of the external environment in addition to considering BA.

PI and SI both significantly impact CI. These findings emphasize the role of social pressures and influences in shaping business decisions. Observing peers succeed in school-enterprise collaboration can motivate enterprises to engage in similar initiatives, highlighting the importance of peer behaviors and outcomes in decision-making processes [45], [46]. Moreover, the influence of government, industry associations, public expectations, and media coverage underscores the multifaceted nature of subjective norms affecting corporate behavior intention [47]. To leverage these influences, managers and policymakers can promote information sharing and collaboration among peer companies, thereby driving school-enterprise collaboration. Media can play a crucial role in showcasing successful cooperation projects, enhancing the perceived value and encouraging broader participation.

Both PS and PC significantly predict CI. Enterprises with higher confidence in their skills, resources, and organizational capabilities are more likely to engage in school-enterprise collaboration. Enterprises with high self-efficacy are better equipped to handle challenges and issues that may arise during cooperation, as they believe in their ability to successfully complete collaborative projects. This confidence stems not only from their internal technical and management capabilities but also from their experience in selecting partners and managing projects. This finding aligns with studies on the role of self-efficacy in various behavioral intentions [48], [49]. PC reflects the degree to which enterprises believe they can effectively manage external environmental factors, such as funding, human resources, and technical support. This perception enhances their willingness to cooperate. Enterprises with high PC typically have robust risk management mechanisms and extensive project management experience, allowing them to foresee and mitigate potential risks. Governments and industry associations can provide relevant training and consulting services to help enterprises improve their technical capabilities and management levels, thereby enhancing their self-efficacy. Additionally, policy support and resource allocation can reduce uncertainties during cooperation, strengthening their control over external environments. For example, providing financial support, technical guidance, and legal advice can help enterprises better address various challenges during cooperation.

6. CONCLUSION

This study reveals the key factors influencing the willingness of cross-border e-commerce enterprises to participate in vocational education school-enterprise collaboration. The findings indicate that enhancing PB, reducing risks, and building trust through effective communication and robust risk management mechanisms are crucial for encouraging participation. Additionally, social influence, self-efficacy, and PC play significant roles in strengthening the intention to collaborate.

This research has twofold implications. Theoretically, it validates the applicability of the extended TPB model to cross-border e-commerce enterprises' engagement in school-enterprise collaboration, offering a fresh theoretical perspective for future research. From a practical perspective, the study provides actionable strategies for policymakers and educational institutions to promote successful collaboration. For the industry, fostering such partnerships can contribute to developing a more skilled workforce, thereby enhancing the competitiveness of the cross-border e-commerce sector. Future research should address limitations related to sample representativeness and geographic constraints by expanding sample diversity and incorporating additional variables (e.g., industry competition and enterprise characteristics) to provide a more holistic perspective. These efforts will advance both theoretical and practical understanding in this field.

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AUTHOR CONTRIBUTIONS STATEMENT

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C : **C**onceptualization
M : **M**ethodology
So : **So**ftware
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Fo : **Fo**rmal analysis
I : **I**nvestigation
R : **R**esources
D : **D**ata Curation
O : Writing - **O**riginal Draft
E : Writing - Review & **E**diting
Vi : **Vi**sualization
Su : **Su**pervision
P : **P**roject administration
Fu : **Fu**nding acquisition

CONFLICT OF INTEREST STATEMENT

Authors state no conflict of interest.

DATA AVAILABILITY

The data that support the findings of this study are available from the corresponding author, [MSR], upon reasonable request.

REFERENCES

[1] X. Shi, Y. Wu, and D. Fu, "Does university-industry collaboration improve innovation efficiency? evidence from Chinese firms," *Economic Modelling*, vol. 86, pp. 39–53, Mar. 2020, doi: 10.1016/j.econmod.2019.05.004.
[2] F.-C. Tseng, M.-H. Huang, and D.-Z. Chen, "Factors of university–industry collaboration affecting university innovation performance," *The Journal of Technology Transfer*, vol. 45, no. 2, pp. 560–577, Apr. 2020, doi: 10.1007/s10961-018-9656-6.
[3] V. Galán-Muros and C. Plewa, "What drives and inhibits university-business cooperation in Europe? A comprehensive assessement," *R&D Management*, vol. 46, no. 2, pp. 369–382, Mar. 2016, doi: 10.1111/radm.12180.
[4] A. L. Rossoni, E. P. G. de Vasconcellos, and R. L. de C. Rossoni, "Barriers and facilitators of university-industry collaboration for research, development and innovation: a systematic review," *Management Review Quarterly*, vol. 74, no. 3, pp. 1841–1877, Sep. 2024, doi: 10.1007/s11301-023-00349-1.
[5] M. O'Dwyer, R. Filieri, and L. O'Malley, "Establishing successful university–industry collaborations: barriers and enablers deconstructed," *The Journal of Technology Transfer*, vol. 48, no. 3, pp. 900–931, Jun. 2023, doi: 10.1007/s10961-022-09932-2.
[6] S. Ma, X. Guo, and H. Zhang, "New driving force for China's import growth: assessing the role of cross-border e-commerce," *The World Economy*, vol. 44, no. 12, pp. 3674–3706, Dec. 2021, doi: 10.1111/twec.13168.

[7] Y. Jun, S. Xiao-Hui, and G. Yan, "The 'competition' for training cross border e-commerce talents in China on the background of 'internet plus'," *Journal of Higher Education Theory and Practice*, vol. 21, no. 6, pp. 219–231, Jul. 2021, doi: 10.33423/jhetp.v21i6.4389.
[8] A. Müller, "Cooperation between colleges and companies: vocational education, skill mismatches and China's turnover problem," *The China Quarterly*, vol. 260, pp. 986–1004, Dec. 2024, doi: 10.1017/S0305741023001868.
[9] L. Rongmin and B. C. Y. Fah, "Rethinking education and training: creating high-quality employment opportunities for vocational students," *Advances in Vocational and Technical Education*, vol. 6, no. 2, pp. 90–95, 2024, doi: 10.23977/avte.2024.060214.
[10] Y. Zhou and G. Xu, "Vocational school–enterprise cooperation in China: A review of policy reforms, 1978–2022," *ECNU Review of Education*, vol. 6, no. 3, pp. 433–450, 2023, doi: 10.1177/20965311231167895.
[11] Z. Li, "Research on school enterprise cooperation mode under the mechanism of 'craftsman leading and collaborative education'," *SHS Web of Conferences*, vol. 157, EDP Sciences, 2023, doi: 10.1051/shsconf/202315702019.
[12] Y. Liu, M. Jun, and Y. Zhang, "Exploration and practice of the 'tailor-made' talent cultivation model under the mode of deepening school-enterprise cooperation," *Journal of Modern Educational Theory and Practice*, vol. 1, no. 3, pp. 1–10, 2024, doi: 10.70767/jmetp.v1i3.476.
[13] Q. Qin and Y. Lei, "Research on existing problems and countermeasures in school-enterprise cooperation in private higher vocational colleges," *Journal of Education and Educational Research*, vol. 7, no. 1, pp. 222–226, Jan. 2024, doi: 10.54097/qw8h8522.
[14] B. Zhang and D. Yuan, "Research and exploration of school-enterprise collaboration-driven nurturing mode based on PBL-CDIO," *Journal of Combinatorial Mathematics and Combinatorial Computing*, vol. 127, pp. 871–888, 2025, doi: 10.61091/jcmcc127a-051.
[15] G. Wang, "Training the 'craftsmen of the nation': young people's experiences of VET reform in China," *Journal of Vocational Education & Training*, pp. 1–21, Jan. 2025, doi: 10.1080/13636820.2025.2460004.
[16] E. Sinnewe, M. B. Charles, and R. Keast, "Australia's cooperative research centre program: a transaction cost theory perspective," *Research Policy*, vol. 45, no. 1, pp. 195–204, Feb. 2016, doi: 10.1016/j.respol.2015.09.005.
[17] K. Sjöö and T. Hellström, "University–industry collaboration: a literature review and synthesis," *Industry and Higher Education*, vol. 33, no. 4, pp. 275–285, Aug. 2019, doi: 10.1177/0950422219829697.
[18] T. Opassuwan and W. Wannamakok, "Deciphering the determinants of firm's engagement with universities: an insight into the thai industrial landscape," *Journal of Open Innovation: Technology, Market, and Complexity*, vol. 10, no. 1, p. 100248, Mar. 2024, doi: 10.1016/j.joitmc.2024.100248.
[19] R. G. Ariyawansa, "University industry collaborations: trends and practical difficulties faced by Sri Lankan public universities," *Humanities and Social Sciences Education in Sri Lankan Universities: Past, Present and Future*, vol. 3, pp. 240–254, 2022,
[20] S. Yang, "Mechanism of deepening the cooperation between schools and enterprises in higher vocational education," *Educational Sciences: Theory & Practice*, vol. 18, no. 6, pp. 3681–3688, 2018, doi: 10.12738/estp.2018.6.280.
[21] Suharno, N. A. Pambudi, and B. Harjanto, "Vocational education in indonesia: history, development, opportunities, and challenges," *Children and Youth Services Review*, vol. 115, p. 105092, Aug. 2020, doi: 10.1016/j.childyouth.2020.105092.
[22] P. Haisheng, W. Shibin, and L. Deyi, "Analysis of the current state of school-enterprise cooperation in Chinese higher vocational education and influencing factors," *Chinese Education & Society*, vol. 49, no. 3, pp. 152–165, 2016, doi: 10.1080/10611932.2016.1218253.
[23] Y. Zhang, J. Wang, X. Shen, and J. Song, "Research on the influence mechanism of enterprises' participation in school enterprise cooperation based on the analysis framework of theory of planned behavior," *Frontiers in Psychology*, vol. 13, Mar. 2022, doi: 10.3389/fpsyg.2022.860045.
[24] I. Ajzen, "The theory of planned behavior: frequently asked questions," *Human Behavior and Emerging Technologies*, vol. 2, no. 4, pp. 314–324, Oct. 2020, doi: 10.1002/hbe2.195.
[25] Y. Ran, "On the formation mechanism of the cooperation between the enterprises and the vocational schools: based on the theory of planned behavior," (in Chinese) *Research in Educational Development*, vol. 41, no. 7, pp. 44–52, 2021.
[26] I. M. Shaikh, F. M. Shaikh, and K. Noordin, "Predicting customers' acceptance towards islamic home financing using DTPB theory," *Journal of Islamic Marketing*, vol. 13, no. 11, pp. 2331–2346, Nov. 2022, doi: 10.1108/JIMA-12-2020-0372.
[27] Z. M. Machaka-Mare, M. Mpinganjira, and D. K. Maduku, "Understanding binge drinking quitting intention and behaviour using an extended TPB," *Social Marketing Quarterly*, vol. 29, no. 2, pp. 107–126, Jun. 2023, doi: 10.1177/15245004231171888.
[28] V. Vamvaka, C. Stoforos, T. Palaskas, and C. Botsaris, "Attitude toward entrepreneurship, perceived behavioral control, and entrepreneurial intention: dimensionality, structural relationships, and gender differences," *Journal of Innovation and Entrepreneurship*, vol. 9, no. 1, p. 5, Dec. 2020, doi: 10.1186/s13731-020-0112-0.
[29] T. H. Do, H. P. T. Nguyen, and T. H. Dang, "Factors influencing the intention of using solar energy household appliances with an extended TPB model approach: evidence from Vietnam," in *Contemporary Economic Issues in Asian Countries: Proceeding of CEIAC 2022, Volume 1*, Singapore: Springer Nature Singapore, 2023, pp. 25–44, doi: 10.1007/978-981-19-9669-6_2.
[30] D. Wang, S. Jiang, B. Liu, X. Li, and X. Yuan, "Research on antecedents of residents' willingness to cooperate in urban regeneration projects: based on an extended theory of planned behavior (TPB) model," *Buildings*, vol. 12, no. 8, p. 1251, Aug. 2022, doi: 10.3390/buildings12081251.
[31] Z. Wu, A. T. W. Yu, and L. Shen, "Investigating the determinants of contractor's construction and demolition waste management behavior in mainland China," *Waste Management*, vol. 60, pp. 290–300, Feb. 2017, doi: 10.1016/j.wasman.2016.09.001.
[32] A. A. E. Astari, N. N. K. Yasa, I. P. G. Sukaatmadja, and I. G. A. K. Giantari, "Integration of technology acceptance model (TAM) and theory of planned behavior (TPB): an e-wallet behavior with fear of COVID-19 as a moderator variable," *International Journal of Data and Network Science*, vol. 6, no. 4, pp. 1427–1436, 2022, doi: 10.5267/j.ijdns.2022.5.008.
[33] M. Boguszewicz-Kreft, S. Kuczamer-Kłopotowska, and A. Kozłowski, "The role and importance of perceived risk in medical tourism. Applying the theory of planned behaviour," *PLoS ONE*, vol. 17, no. 1, Jan. 2022, doi: 10.1371/journal.pone.0262137.
[34] J. J. Watters, H. K. Pillay, and M. Flynn, *Industry-school partnership: a strategy to enhance education and training opportunities*. Queensland, Australia, 2016.
[35] S. Mukhuty, A. Upadhyay, and H. Rothwell, "Strategic sustainable development of industry 4.0 through the lens of social responsibility: the role of human resource practices," *Business Strategy and the Environment*, vol. 31, no. 5, pp. 2068–2081, Jul. 2022, doi: 10.1002/bse.3008.
[36] M. S. Hagger, M. W.-L. Cheung, I. Ajzen, and K. Hamilton, "Perceived behavioral control moderating effects in the theory of planned behavior: a meta-analysis.," *Health Psychology*, vol. 41, no. 2, pp. 155–167, Feb. 2022, doi: 10.1037/hea0001153.
[37] Y. H. S. Al-Mamary and M. M. Alraja, "Understanding entrepreneurship intention and behavior in the light of TPB model from the digital entrepreneurship perspective," *International Journal of Information Management Data Insights*, vol. 2, no. 2, p. 100106, Nov. 2022, doi: 10.1016/j.jjimei.2022.100106.

[38] L. Xu, M. Ling, Y. Lu, and M. Shen, "Understanding household waste separation behaviour: testing the roles of moral, past experience, and perceived policy effectiveness within the theory of planned behaviour," *Sustainability (Switzerland)*, vol. 9, no. 4, p. 625, Apr. 2017, doi: 10.3390/su9040625.
[39] P. C. Austin, D. S. Lee, and G. Leckie, "Comparing a multivariate response bayesian random effects logistic regression model with a latent variable item response theory model for provider profiling on multiple binary indicators simultaneously," *Statistics in Medicine*, vol. 39, no. 9, pp. 1390–1406, Apr. 2020, doi: 10.1002/sim.8484.
[40] A. F. Kharuddin, N. Azid, Z. Mustafa, K. F. Ku Ibrahim, and D. Kharuddin, "Application of structural equation modeling (SEM) in estimating the contributing factors to satisfaction of taska services in East Coast Malaysia," *Asian Journal Of Assessment In Teaching And Learning*, vol. 10, no. 1, pp. 69–77, May 2020, doi: 10.37134/ajatel.vol10.1.8.2020.
[41] Y. Luo, "Research on the talent training of cross-border e-commerce," *OALib*, vol. 10, no. 01, pp. 1–9, 2023, doi: 10.4236/oalib.1109725.
[42] W. Wu, "Research on talent training mode of cross border e-commerce foreign trade based on school enterprise cooperation," in *2020 Asia-Pacific Conference on Engineering Education, Advanced Education and Training (EEAET 2020)*, UK: Francis Academic Press, 2020, pp. 40–45, doi: 10.25236/eeaet.2020.009.
[43] P. W. Hom, T. W. Lee, J. D. Shaw, and J. P. Hausknecht, "One hundred years of employee turnover theory and research," *Journal of Applied Psychology*, vol. 102, no. 3, pp. 530–545, Mar. 2017, doi: 10.1037/apl0000103.
[44] K. Joo, J. Lee, and J. Hwang, "NAM and TPB approach to consumers' decision-making framework in the context of indoor smart farm restaurants," *International Journal of Environmental Research and Public Health*, vol. 19, no. 21, p. 14604, Nov. 2022, doi: 10.3390/ijerph192114604.
[45] A. K. Lingappa, A. Shah, and A. O. Mathew, "Academic, family, and peer influence on entrepreneurial intention of engineering students," *SAGE Open*, vol. 10, no. 3, Jul. 2020, doi: 10.1177/2158244020933877.
[46] L. Xu *et al.*, "Understanding the role of peer pressure on engineering students' learning behavior: a TPB perspective," *Frontiers in Public Health*, vol. 10, Jan. 2023, doi: 10.3389/fpubh.2022.1069384.
[47] T. Rajwani, T. Lawton, and N. Phillips, "The 'voice of industry': why management researchers should pay more attention to trade associations," *Strategic Organization*, vol. 13, no. 3, pp. 224–232, Aug. 2015, doi: 10.1177/1476127015590963.
[48] Z. Cao, J. Zheng, and R. Liu, "Factors affecting users' continuous usage in online health communities: an integrated framework of SCT and TPB," *Healthcare (Switzerland)*, vol. 11, no. 9, p. 1238, Apr. 2023, doi: 10.3390/healthcare11091238.
[49] Z. Yan, G. T. L. Brown, J. C.-K. Lee, and X.-L. Qiu, "Student self-assessment: why do they do it?," *Educational Psychology*, vol. 40, no. 4, pp. 509–532, Apr. 2020, doi: 10.1080/01443410.2019.1672038.

APPENDIX

Table 2. Standardized factor loadings, CR, and AVE

Construct	Item	Standard loading	Cronbach's α	CR	AVE
PB	School-enterprise collaboration helps in precisely nurturing the talents required by company.	0.799	0.904	0.904	0.653
	School-enterprise collaboration can enhance our company's access to advanced knowledge and technology in the cross-border e-commerce industry.	0.807			
	School-enterprise collaboration can help our company obtain richer resources.	0.848			
	School-enterprise collaboration helps enhance our company's social reputation.	0.784			
	School-enterprise collaboration helps increase our company's policy support.	0.801			
PR	Interruption of the cooperation process may lead to the risk of invalidation of dedicated training venues, equipment and other inputs.	0.781	0.929	0.930	0.623
	Our company may face the risk of losing the talent cultivated by the cooperation.	0.781			
	Our company may face the risk of leakage of professional technology or management secrets.	0.799			
	In the process of cooperation, our company may face increased operating costs.	0.797			
	Our company may face the risk of not achieving the expected cooperation objectives.	0.788			
	During school-enterprise collaboration, our company may face potential personal safety risks for students.	0.796			
	Lack of effective cooperation management with the school may result in the ineffective protection of company interests.	0.784			
	Intellectual property disputes may arise with the school during the cooperation process.	0.790			
BA	Our company has a positive attitude towards school-enterprise collaboration.	0.786	0.905	0.905	0.613
	Our company views school-enterprise collaboration as a valuable partnership.	0.788			
	Our company values the role of vocational colleges in workforce development.	0.789			
	Our company is enthusiastic about collaborating with vocational colleges.	0.760			
	Our company recognizes the importance of school-enterprise collaboration.	0.781			
	Our company will recruit new employee from cooperated school.	0.794			

Table 2. Standardized factor loadings, CR, and AVE (continue)

Construct	Item	Standard loading	Cronbach's α	CR	AVE
PI	Prominent companies within the industry actively participate in school-enterprise collaboration.	0.824	0.926	0.926	0.675
	Peer companies actively participate in school-enterprise collaboration.	0.832			
	School-enterprise collaboration has provided access to more resources for those participating enterprises.	0.814			
	School-enterprise collaboration has led to a better talent pool for those participating enterprises.	0.832			
	Enterprises participating in school-enterprise collaboration have received government support.	0.821			
	School-enterprise collaboration has enhanced the reputation of those participating companies.	0.808			
SI	The government provides incentives to encourage companies to participate in school-enterprise collaboration.	0.816	0.913	0.913	0.676
	The government offer guidelines to assist companies in engaging in school-enterprise collaboration.	0.819			
	Industry associations help enterprises with school-enterprise collaboration.	0.815			
	The public believes that companies should participated in school-enterprise collaboration.	0.824			
	Publicity and reports by the media highlight the company's involvement in school-enterprise collaboration.	0.839			
PS	Our company is highly confident in its ability to carry out school-enterprise collaboration.	0.806	0.917	0.917	0.649
	Our company will provide necessary resource of facility when school need it.	0.835			
	We believe our company can perform well in school-enterprise collaboration.	0.780			
	We believe our company is helpful to vocational colleges through school-enterprise collaboration.	0.808			
	We have confidence in achieving our established objectives through school-enterprise collaboration.	0.802			
	We have confidence in improving the quality of vocational college education through school-enterprise collaboration.	0.800			
PC	Our company has a comprehensive understanding of relevant information about participating in school-enterprise collaboration.	0.801	0.944	0.944	0.653
	Our company can efficiently establish cooperative relationships with schools.	0.796			
	Our company can effectively maintain good cooperation relationships with vocational colleges.	0.796			
	Participating in school-enterprise collaboration is entirely within our control and management.	0.824			
	Our company has the resources to cooperate with schools.	0.793			
	Our company has the knowledge to cooperate with schools.	0.818			
	Our company has the ability to cooperate with schools proficiently.	0.802			
	Our company has the capability to effectively manage school-enterprise collaboration.	0.824			
	Our company can afford the expenses related to school-enterprise collaboration.	0.816			
CI	Our company plans to cooperate with vocational colleges.	0.800	0.911	0.910	0.628
	Our company will try to cooperate with vocational colleges.	0.811			
	Our company is willing to undertake responsibilities and tasks in cooperation.	0.810			
	Our company is willing to actively promote the positive effects of school-enterprise collaboration.	0.788			
	Our company is open to forming partnerships with vocational colleges.	0.760			
	Our company desires collaborative opportunities with vocational colleges.	0.786			

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