

# Developing a cross-cultural competence model for cross-border e-commerce practitioners: Empirical validation and implications for entrepreneurial education

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## ABSTRACT

**Objective:** This study proposes a cross-cultural competence (CCC) model for Chinese college students in the cross-border e-commerce (CBEC) sector, aiming to identify key dimensions and support talent development in digital global trade.

**Research Design & Methods:** We conducted a cross-sectional questionnaire survey among 592 CBEC students from 10 universities in China. We applied a two-step structural equation modelling (SEM) approach to identify and validate key dimensions and test interrelationships. We performed the analysis using SPSS Statistics 26 and AMOS 24, ensuring statistical rigour.

**Findings:** The results support a validated second-order model of cross-cultural competence in CBEC, comprising five core dimensions: English Skills, Workplace Aptitude, Cultural Knowledge, Cultural Sensitivity, and CBEC Expertise. Among them, CBEC Expertise and Cultural Knowledge demonstrated the strongest contributions. The model showed a strong positive effect on CBEC performance and achieved good overall fit, confirming both its structural soundness and practical relevance.

**Implications & Recommendations:** This study provides practical implications for entrepreneurial education, offering a validated framework to guide the development of cross-cultural competence among CBEC practitioners, thereby enhancing their ability to operate effectively in global markets.

**Contribution & Value Added:** This study advances the theoretical understanding of cross-cultural competence in CBEC by empirically validating a multi-dimensional, second-order model, integrating factor structures and their relative influences, which scholars have not systematically examined in this context before.

**Article type:** research article

**Keywords:** entrepreneurial education; structural equation modelling; social media marketing; cross-cultural communication; intercultural competence; global mindset

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## INTRODUCTION

In recent years, global e-commerce has experienced sustained growth despite economic challenges posed by the COVID-19 pandemic. According to recent estimates, worldwide online retail sales reached USD 5.54 trillion in 2022 and are projected to climb to USD 7.39 trillion by 2025, further increasing their share in global retail markets (Liu *et al.*, 2022; Yan *et al.*, 2023; Yang *et al.*, 2024). Among the leading forces driving this trend is China, where rapid digital infrastructure development and widespread use of mobile internet have fuelled a booming e-commerce sector. China's total e-commerce transaction volume reached 43.8 trillion yuan in 2022, making it a global leader in online trade (Ministry of Commerce, 2021; Yang *et al.*, 2024). As a crucial part of this expansion, cross-

border e-commerce (CBEC) has become a strategic channel for China to engage in international trade, especially under the Belt and Road Initiative (Zhao, 2024). By enabling businesses to directly reach global consumers through digital platforms, CBEC contributes not only to national export growth but also to the internationalisation of Chinese brands and services.

In the CBEC context, social media platforms serve not only as marketing tools but also as interactive spaces where trust is built through direct communication (Bhattacharyya & Bose, 2020). The rise of social media has significantly reshaped how businesses engage with consumers (Adiandari, 2022). This is especially relevant in high uncertainty avoidance cultures, where consumers tend to avoid risk and prefer structured, predictable environments. In e-commerce, these cultural traits can significantly influence purchasing decisions and behaviour, making trust-building a critical component of digital engagement (Al-Adwan *et al.*, 2022). Empirical data also support this as CBEC users who engage via social media exhibit a 13.5% transaction conversion rate, compared to just 0.07% for those without such interactions (Luo *et al.*, 2020). However, effective engagement in social media-mediated CBEC depends on the practitioner's ability to communicate across cultural boundaries. As Hu and Zhu (2022) suggest, cross-cultural competence (CCC) plays a crucial enabling role in digital trust-building and relational marketing. Despite its importance, the specific dimensions of CCC required in CBEC environments remain under-defined and under-researched.

The diverse use of social media platforms across regions further complicates the CCC required in CBEC. With Facebook, YouTube, Instagram, TikTok, and X popular globally, while WeChat and Douyin dominate in China, Line in Japan, and VKontakte (VK) in Russia (Kumar *et al.*, 2025). However, China's regulatory environment does not permit access to many Western platforms, limiting practitioners' exposure to global digital communication norms (Lyulina & Efimenko, 2022). When Chinese CBEC practitioners, who have never used platforms such as X, Facebook, and Instagram, attempt to engage foreign consumers through them, they face notable challenges (Lin, 2022).

Existing studies tend to overlook this contextual constraint and often treat CCC as a general construct, without considering the interactive, informal, and real-time characteristics of social media communication. Improving CCC is an important factor in enhancing the effectiveness of digital engagement (Alfiyatul *et al.*, 2022). Although some literature has explored its dimensions in CBEC contexts, research rarely addresses these platform-specific demands or the institutional limitations in China. Furthermore, most studies focus on experienced practitioners, leaving a gap in understanding how students in CBEC-related disciplines are being prepared for these challenges (Song & Sahid, 2025).

To effectively prepare Chinese college students for careers in CBEC, it is essential to understand what specific cross-cultural competencies they need and how these competencies develop. Addressing this educational and professional imperative, this study seeks to identify the key dimensions and underlying mechanisms of CCC in the CBEC context. Building upon the foundational model of CCC in international business proposed by Johnson *et al.* (2006), this study developed and empirically validated a revised framework adapted to the realities of digital commerce and the socio-institutional context of Chinese CBEC students. Specifically, the model identifies five core dimensions: English Skills, Workplace Aptitude, Cultural Knowledge, Cultural Sensitivity, and CBEC Expertise. These dimensions reflect both the general intercultural requirements of international business and the specific competencies needed for CBEC activities, including platform-based communication, online negotiation, and digital brand engagement.

Theoretically, this study contributes to the literature by bridging international business theory and the emerging field of CBEC. It demonstrates how one can reinterpret the existing models of competence and expand them to meet the demands of digitally mediated, culturally diverse, and platform-dependent commercial interactions. Practically, the validated model provides actionable insights for educators, curriculum designers, and policymakers seeking to prepare students for global digital markets. Moreover, it offers a diagnostic tool for assessing training needs and competence development in CBEC enterprises.

To explore these contributions, the study addresses the following research questions:

**RQ1:** To what extent do the identified dimensions contribute to CCC in CBEC?

**RQ2:** How does CCC influence CBEC practitioners' performance?

## LITERATURE REVIEW AND HYPOTHESES DEVELOPMENT

### Existing Models of Cross-cultural Competence in International Business

Early models of CCC in international business, such as Johnson *et al.* (2006), emphasise the integration of knowledge, skills, and personal attributes to function effectively across cultures. Their model introduced affective, cognitive, and behavioural dimensions, and highlighted the importance of motivation in bridging the gap between knowing and doing. While foundational, Johnson *et al.* (2006) developed this model for traditional face-to-face business settings and did not consider the digital, asynchronous, and multimodal nature of communication in CBEC. Later frameworks, such as Wongkhamdi *et al.* (2020), responded to digital transformation by outlining e-commerce competence dimensions relevant to SMEs, including digital skills, business fundamentals, and language. However, cultural adaptability was underemphasised.

In addition to the above, Alon *et al.* (2016) introduced the Business Cultural Intelligence Quotient, which incorporates cultural knowledge, metacognition, cross-cultural motivation, and communication ability. This model aligns closely with the structure of the present study and reflects a comprehensive understanding of intercultural business competence. However, it does not address English proficiency, which is a critical skill gap among Chinese CBEC students. Moreover, it lacks consideration of domain-specific knowledge related to CBEC platforms, tools, and regulatory contexts. Similarly, the Consumer-Based Cultural Competency Inventory by Cornelius *et al.* (2004) includes multicultural attitudes, language ability, and respectfulness, offering valuable insight into consumer-oriented cultural competence. While this model does acknowledge the role of language, it does not account for the digital and multimodal communication features unique to the CBEC environment, such as real-time messaging, algorithm-driven marketing, and short-form video interaction. These limitations further underscore the need for a tailored framework and empirical validation in the CBEC context.

### Conceptual Foundations of Cross-cultural Competence

Scholars commonly define cross-cultural competence (CCC) as an individual's integrated capability to effectively communicate, interact, and adapt in multicultural environments, encompassing cognitive, affective, and behavioural dimensions (Feola *et al.*, 2024; Liao *et al.*, 2021; Richter *et al.*, 2023; Zamroni, 2021). The cognitive dimension refers to cultural knowledge and awareness, the affective dimension involves openness and respect toward cultural differences, and the behavioural dimension emphasises adaptive communication and action (Feola *et al.*, 2024; Liao *et al.*, 2021; Shadieff *et al.*, 2025). Moreover, scholars increasingly view CCC as a dynamic, developmental process involving sustained intercultural learning and engagement (Gu & Meng, 2021; Lakshman *et al.*, 2021; Sylwia *et al.*, 2024).

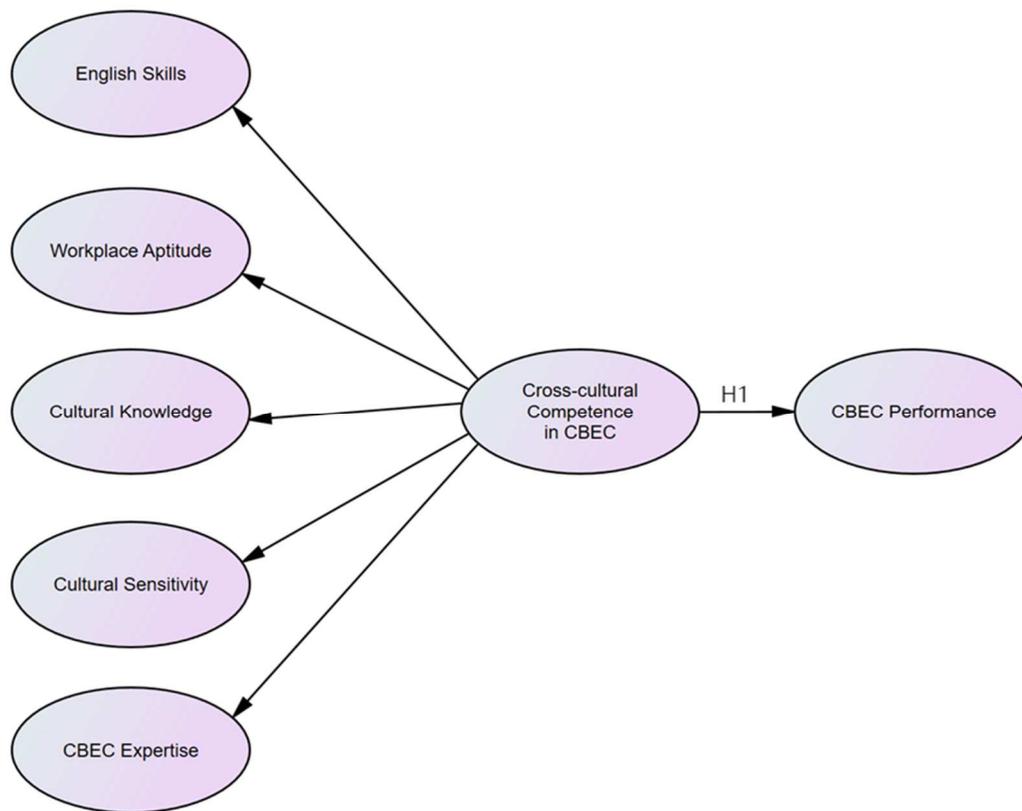
While these studies provide a comprehensive understanding of CCC, most of them are situated in traditional expatriation or academic exchange contexts and reflect a Western-centric perspective (Richter *et al.*, 2023). However, the fast-evolving field of CBEC demands a more nuanced application of CCC. In CBEC, communication takes place through digital platforms, live-streaming, and social media tools, modes of interaction that differ significantly from face-to-face or formal business communication. However, few studies explore how CCC manifests or influences performance in such technology-mediated environments. Therefore, although previous research highlights useful constructs and antecedents of CCC (Gu & Meng, 2021; Liao *et al.*, 2021; Qomariyah *et al.*, 2022; Sylwia *et al.*, 2024), these studies fall short of addressing how CCC functions in the CBEC setting, especially among underprepared student practitioners.

### Competency Requirements in Cross-border E-commerce Performance

Scholars widely recognise CBEC performance as a critical measure of international business success, encompassing outcomes such as market expansion, brand image, purchase intention, and word-of-mouth (Cassia & Magno, 2021; Wang *et al.*, 2023). Although technical and marketing inputs are important, recent research suggests that practitioner-level competencies, particularly in cross-cultural communication, are equally vital for success in international markets (Gu & Meng, 2021; Liao *et al.*, 2021). Liao *et al.* (2021) underscore the role of CCC as a mediating factor in expatriate effectiveness, implying its relevance in CBEC as well.

Nevertheless, the majority of CBEC performance studies focus on business strategy or consumer behaviour, without fully explaining how individual competencies, such as CCC, impact performance through the digital channels unique to CBEC. In this context, communication is asynchronous, multi-modal, and often driven by short-form media like live broadcasts and platform messaging. This raises questions about the applicability of traditional CCC frameworks. Consumers in CBEC markets, especially those in high uncertainty avoidance cultures, demand clear, trustworthy, and culturally tailored communication (Al-Adwan *et al.*, 2022). Practitioners' ability to bridge cultural gaps through digital means directly affects perceived value and customer loyalty (Wang *et al.*, 2023; Xu *et al.*, 2024). For Chinese students preparing to enter this workforce, the need for highly contextualised CCC becomes even more critical. Studies have observed that Chinese CBEC enterprises struggled with intercultural communication during the pandemic, highlighting cultural flexibility as a key driver of digital adaptation (Fodouop Kouam, 2025). Talent development and brand positioning are also increasingly tied to market performance in China's CBEC ecosystem (Xi *et al.*, 2023). However, few empirical studies connect these outcomes to students' CCC. These previous studies allowed us to assume the following research hypotheses, as shown in Figure 1:

**H1:** Cross-cultural competence has a positive and significant impact on CBEC performance.



**Figure 1. Proposed model**

Source: own elaboration.

## RESEARCH METHODOLOGY

### Research Design

This study adopted a cross-sectional survey design to examine the relationship between CCC and CBEC performance among Chinese college students. We collected data through an online questionnaire and analysed it using structural equation modelling (SEM) with AMOS 24. A pilot study confirmed the reliability and validity of the instrument before the main analysis.

### Sample and Data Collection

We selected respondents through stratified cluster sampling. We divided China into Western, Northern, and Southeastern regions, and selected one CBEC-offering institution from each. Within each institution, we used simple random sampling to recruit CBEC-major respondents. We collected a total of 654 responses. After excluding inattentive responses, 592 valid responses remained. This sample size exceeded the commonly recommended minimum of 384 for general survey research (Krejcie & Morgan, 1970) and met the requirements for structural equation modelling, which typically calls for 200 or more cases (Hair, 2019). Therefore, the sample was sufficient to ensure statistical power and generalisability.

### Measurement

This study employed a 7-point Likert scale to enhance response flexibility and precision, improving reliability and reducing central tendency bias (Tanujaya, 2022). To ensure reliability and validity, we adapted all items from well-established scales. We measured CBEC performance using the E-Commerce Competence Assessment Framework (Wongkhamdi *et al.*, 2020), and we adapted cross-cultural competence (CCC) from 'cross-cultural competence scale in cross-border e-commerce' (Song *et al.*, 2025). This study employed the back-translation method to ensure the accuracy and cross-cultural equivalence of the questionnaire.

### Pilot Study

We conducted a pilot study with 161 respondents to evaluate the reliability and validity of the research instrument. To assess data suitability for factor analysis, we performed the Kaiser-Meyer-Olkin (KMO) test and Bartlett's Test of Sphericity. The KMO values for all dimensions exceeded the 0.60 threshold, indicating sufficient sampling adequacy (Kaiser, 1974). Bartlett's Test of Sphericity was significant ( $p < 0.001$ ) for all dimensions, confirming that the correlation matrices were suitable for factor analysis. We further assessed the reliability and validity of the constructs through Cronbach's alpha and average variance extracted (AVE). The Cronbach's alpha values for all dimensions exceeded the recommended 0.7 threshold, indicating high internal consistency. The AVE values ranged from 0.484 to 0.696, confirming adequate convergent validity (Fornell & Larcker, 1981). These results demonstrate that the research instrument was reliable and valid for further data collection and analysis, as shown in Table 1.

**Table 1. Discriminant validity, convergent validity, and reliability assessment**

Dimension	Lan	Apt	Att	CI	CE	AVE	Mean	Std. Deviation	Cronbach's $\alpha$
Lan	0.813					0.66	4.554	1.279	0.936
Apt	0.344	0.834				0.696	3.463	1.042	0.912
Att	0.019	0.303	0.759			0.576	2.141	0.97	0.943
CI	0.499	0.491	0.156	0.74		0.547	4.093	1.135	0.901
CE	0.393	0.652	0.298	0.55	0.696	0.484	3.381	1.035	0.864

Note: the values on the diagonal are the square roots of the average variance extracted (AVE).

Source: own study.

### Data Analysis

This study employed a two-step structural equation modelling (SEM) approach with AMOS 24 to test the proposed model and hypotheses (Anderson & Gerbing, 1988). Firstly, confirmatory factor analysis (CFA) evaluated the measurement model's fit, reliability, and validity, using standard fit indices. We removed indicators with low factor loadings or high error covariance to improve reliability and model parsimony. We assessed reliability via Cronbach's alpha and composite reliability (CR), while we confirmed validity using standardised factor loadings, average variance extracted (AVE), and the Fornell-Larcker criterion (Fornell & Larcker, 1981). Secondly, we tested the structural model to examine hypothesised relationships. We verified model fit, and standardised path coefficients, critical ratios (C.R.), and p-values to evaluate the strength and direction of relationships between constructs.

## RESULTS AND DISCUSSION

### Profile of Respondents

The respondents' profiles reflect a diverse demographic composition, as shown in Table 2. Among the 592 participants, 78.38% were female, 20.61% were male, and 1.01% identified as other. In terms of age distribution, the majority (48.65%) were 18 years old, followed by 32.26% aged 19, 12.16% aged 20, and 6.92% aged 21 or older. Regarding academic background, most respondents majored in Business English (42.40%), followed by Marketing (19.76%), E-commerce (17.74%), Foreign Trade (5.74%), and other disciplines (14.36%). A considerable proportion (28.38%) reported having a family business background, while 71.62% did not. When asked about entrepreneurial intention, 47.30% of the respondents expressed an interest in entrepreneurship, whereas 52.70% did not. Furthermore, only 20.95% of participants reported possessing an overseas social media account, while 79.05% did not. Highlighting potential barriers to direct engagement with foreign consumers on global platforms.

**Table 2. Respondents' demographic**

Demographic variable	Category	Frequency (n=592)	Percentage
Gender	Male	122	20.61%
	Female	464	78.38%
	Other	6	1.01%
Age	18	288	48.65%
	19	191	32.26%
	20	72	12.16%
	21 & above	41	6.92%
Major	Business English	251	42.40%
	E-commerce	105	17.74%
	Foreign trade	34	5.74%
	Marketing	117	19.76%
	Other	85	14.36%
Family Business	Yes	168	28.38%
	No	424	71.62%
Entrepreneurial Intention	Yes	280	47.30%
	No	312	52.70%
Possession of overseas social media account(s)	Yes	124	20.95%
	No	468	79.05%

Source: own study.

### Model Fit Summary

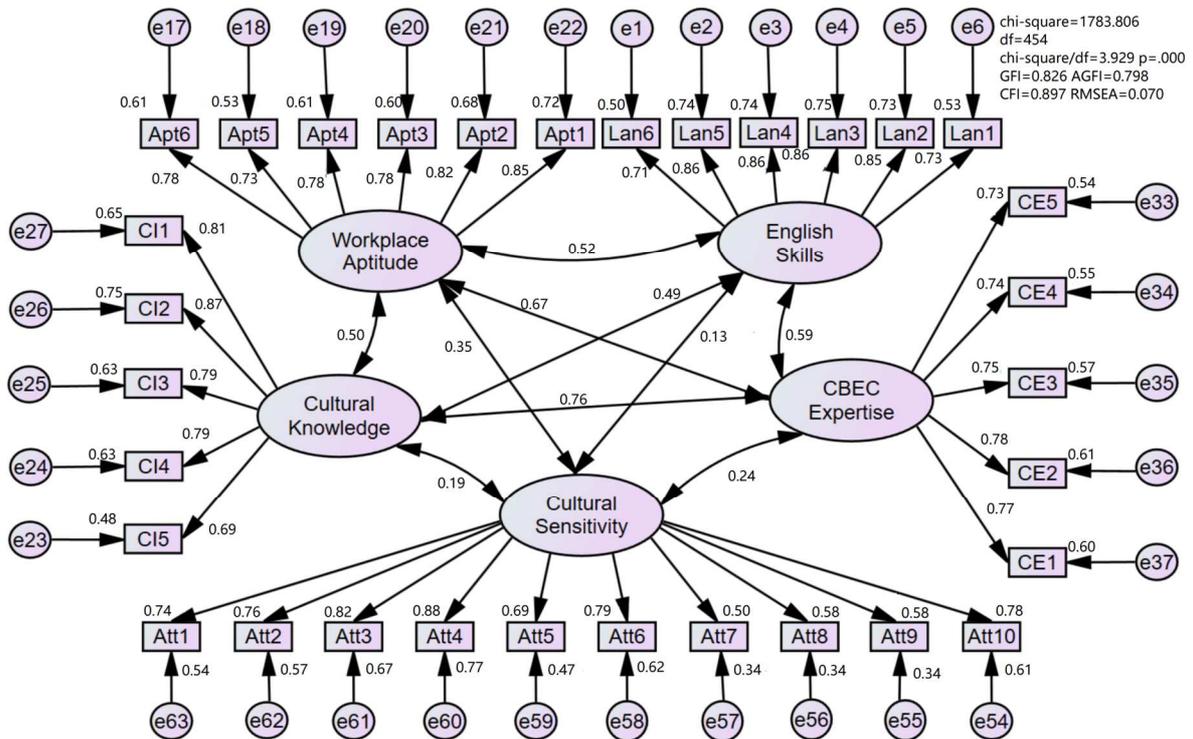
Before model estimation, we assessed univariate normality using skewness and kurtosis values (see Table 3). Except for Att3, which showed skewness and kurtosis slightly exceeding acceptable thresholds, all other items fell within tolerable limits. Given the large sample size ( $n = 592$ ), the data were sufficiently normal for SEM using maximum likelihood estimation (Hair, 2019).

The initial measurement model showed sub-optimal fit, as seen in Figure 2. The chi-square to degrees of freedom ratio was 3.93, above the preferred threshold of 3, indicating a need for refinement. The goodness of fit index (GFI) at 0.827 and adjusted goodness of fit index (AGFI) at 0.789 both fell below the recommended 0.90, suggesting inadequate capture of data variance. The comparative fit index (CFI) of 0.896 was slightly below optimal, and the root mean square error of approximation (RMSEA) of 0.070 indicated moderate fit. The standardised root mean square residual (SRMR) of 0.0649 exceeded the 0.06 threshold, showing residual discrepancies needing reduction. These results highlight the need for model adjustments (Anderson & Gerbing, 1988; Fornell & Larcker, 1981).

**Table 3. Normality test results based on skewness and kurtosis**

Variable	Min	Max	Skewness	CR (Skew)	Kurtosis	CR (Kurt)
Lan1	1	7	0.122	1.22	-0.364	-1.811
Lan2	1	7	-0.119	-1.19	-0.451	-2.244
Lan3	1	7	0.293	2.93	-0.431	-2.144
Lan4	1	7	0.148	1.48	-0.431	-2.144
Lan5	1	7	-0.036	-0.36	-0.496	-2.468
Lan6	1	7	0.2	2	-0.609	-3.030
Apt1	1	7	0.23	2.3	-0.256	-1.274
Apt3	1	7	0.165	1.65	-0.375	-1.866
Apt4	1	7	-0.005	-0.05	-0.04	-0.199
Apt5	1	7	0.316	3.16	-0.324	-1.612
Apt6	1	7	0.333	3.33	0.097	0.483
Att1	1	6	1.015	10.15	0.269	1.338
Att3	1	7	2.029	20.29	4.844	24.100
Att4	1	7	1.803	18.03	3.754	18.677
Att5	1	7	1.229	12.29	1.641	8.164
Att6	1	7	1.519	15.19	2.963	14.741
Att10	1	7	1.783	17.83	2.908	14.468
CI2	1	7	-0.028	-0.28	-0.405	-2.015
CI3	1	7	0.269	2.69	-0.216	-1.075
CI4	1	7	0.163	1.63	-0.296	-1.473
CI5	1	7	0.409	4.09	-0.162	-0.806
CE1	1	7	0.09	0.9	-0.077	-0.383
CE2	1	7	0.29	2.9	-0.058	-0.289
CE3	1	7	0.127	1.27	-0.404	-2.010
CE4	1	7	0.003	0.03	-0.48	-2.388
CE5	1	7	0.403	4.03	0.17	0.846

Source: own study.



**Figure 2. Measurement model (before modification)**

Source: own elaboration.

To enhance the model, we made several adjustments based on factor loadings and modification indices. We removed items Att7, Att8, and Att9 due to their low factor loadings, which fell below the recommended threshold of 0.60, suggesting weak relationships with their respective latent constructs. Moreover, we removed APT2, ATT2, and CI1 due to high modification indices, indicating significant cross-loadings or high residual correlations, which could compromise the model's discriminant validity, as shown in Figure 3. These modifications aimed to strengthen the reliability of the measurement model and improve overall model fit.

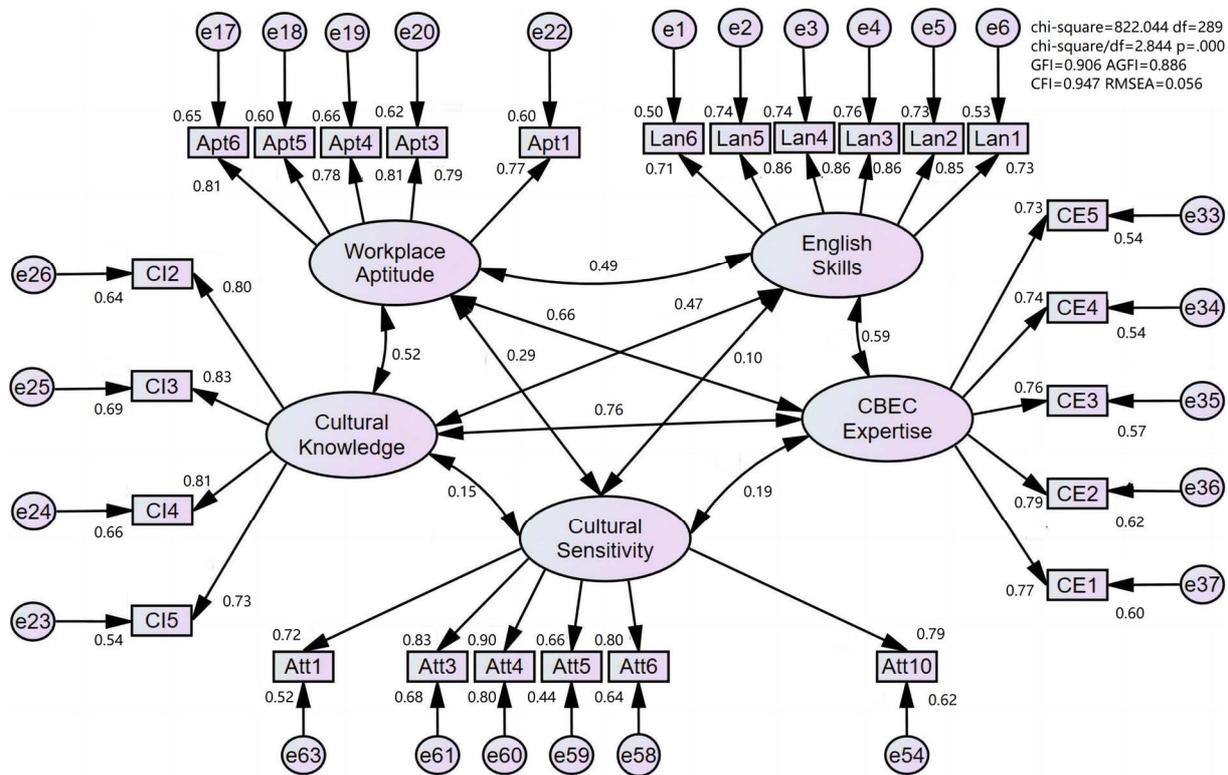


Figure 3. Measurement model (after modification)

Source: own elaboration.

The chi-square value reduced to 822.582 with 290 degrees of freedom, resulting in a chi-square to degrees of freedom ratio of 2.836. This value falls below the recommended cutoff of 3. The GFI increased to 0.906, exceeding the 0.90 threshold. Moreover, the AGFI improved from 0.789 to 0.886, indicating a better model fit and improved representation of the data structure. Moreover, CFI improved to 0.947, and RMSEA reduced to 0.056, further supporting good model fit. The SRMR also improved to 0.0536, now within the acceptable range of under 0.06, indicating reduced residual discrepancies and better alignment between observed and predicted correlations.

#### Reliability and Validity of the Modified Measurement Model

The CFA results showed that all observed variables significantly loaded onto their latent constructs, supporting convergent validity (Table 4). Standardised factor loadings ranged from 0.661 to 0.897, exceeding the 0.50 threshold (Hair, 2019), with t-values above 16.622 ( $p < 0.001$ ). CR values ranged from 0.870 to 0.922, surpassing 0.70, indicating strong internal consistency. The AVE values, between 0.572 and 0.666, exceeded 0.50 (Fornell & Larcker, 1981), confirming sufficient variance capture. These results affirm the modified measurement model's reliability and convergent validity.

Table 5 shows the discriminant validity assessment results. Off-diagonal elements indicate correlation coefficients between constructs. We confirmed discriminant validity as the square root of each construct's AVE exceeded its correlation coefficients with other constructs, establishing that the constructs were empirically distinct within the measurement model.

**Table 4. Construct reliability and convergent validity**

Dimension	Item	Unstd.	S.E.	t-value	P	Std.	SMC	CR	AVE
Workplace Aptitude	Apt3	1.16	0.058	19.976	***	0.786	0.618	0.894	0.628
	Apt5	1.046	0.054	19.314	***	0.777	0.604		
	Apt6	1.037	0.051	20.416	***	0.808	0.653		
	Apt4	1.019	0.05	20.483	***	0.815	0.664		
	Apt1	1				0.774	0.599		
English Skills	Lan5	1.221	0.059	20.783	***	0.86	0.74	0.922	0.666
	Lan3	1.214	0.058	21.094	***	0.865	0.748		
	Lan4	1.209	0.058	20.752	***	0.862	0.743		
	Lan2	1.186	0.057	20.977	***	0.855	0.731		
	Lan6	1.128	0.066	17.032	***	0.71	0.504		
Cultural Sensitivity	Lan1	1				0.729	0.531		
	Att4	1.064	0.044	24.009	***	0.897	0.805	0.906	0.62
	Att3	1.055	0.047	22.409	***	0.832	0.692		
	Att10	1				0.786	0.618		
	Att6	0.968	0.045	21.322	***	0.801	0.642		
Cultural Knowledge	Att1	0.952	0.052	18.433	***	0.723	0.523		
	Att5	0.887	0.053	16.622	***	0.661	0.437		
	CI3	1.093	0.056	19.614	***	0.832	0.692	0.874	0.634
	CI2	1.077	0.058	18.496	***	0.802	0.643		
	CI4	1.065	0.056	19.109	***	0.814	0.663		
CBEC Expertise	CI5	1				0.734	0.539		
	CE4	1.181	0.068	17.439	***	0.736	0.542	0.87	0.572
	CE1	1.092	0.061	17.947	***	0.772	0.596		
	CE2	1.07	0.059	18.29	***	0.785	0.616		
	CE3	1.049	0.06	17.603	***	0.755	0.57		
	CE5	1				0.732	0.536		

Source: own study.

**Table 5. Discriminant validity assessment**

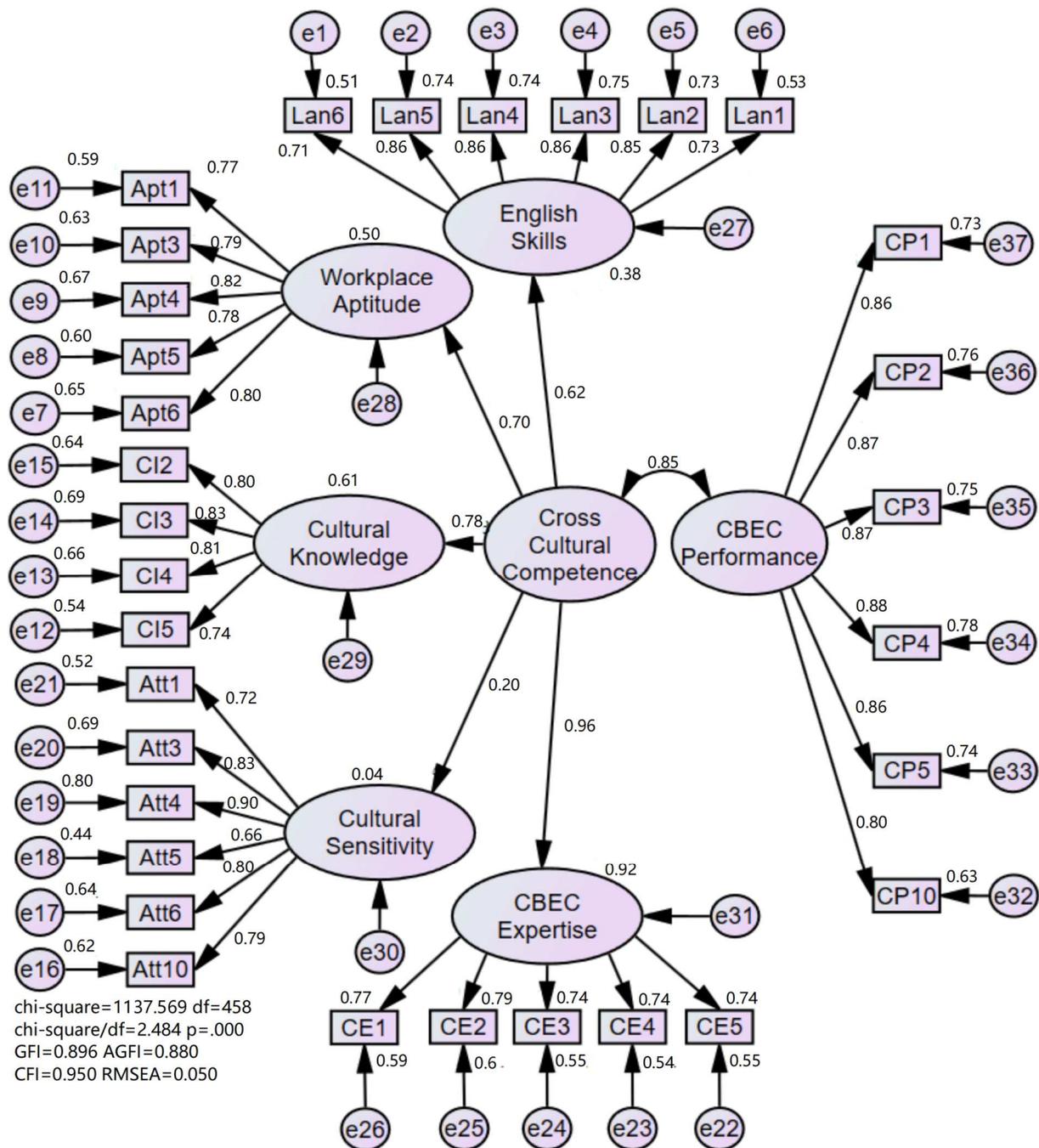
Variables	AVE	Cultural Sensitivity	CBEC Expertise	Cultural Knowledge	Workplace Aptitude	English Skills
<b>Cultural Sensitivity</b>	0.620	<b>0.787</b>				
<b>CBEC Expertise</b>	0.572	0.186	<b>0.756</b>			
<b>Cultural Knowledge</b>	0.634	0.147	0.759	<b>0.796</b>		
<b>Workplace Aptitude</b>	0.628	0.295	0.661	0.516	<b>0.792</b>	
<b>English Skills</b>	0.666	0.104	0.590	0.474	0.491	<b>0.816</b>

Notes: the diagonal value is the square root of AVE.

Source: own study.

**Pooled CFA**

The overall model fit indices indicated a good model fit. The chi-square statistic was 1137.569 with 458 degrees of freedom, resulting in a chi-square to degrees of freedom ratio of 2.484 with a p-value of 0.000. The GFI was 0.896, and the AGFI was 0.880, both approaching the recommended threshold of 0.90. The CFI was 0.950, exceeding the acceptable benchmark of 0.90, indicating a well-fitting model. The RMSEA was 0.050, which was within the preferred range of under 0.08, suggesting a reasonable approximation of the model to the observed data. Moreover, SRMR was 0.0572, further supporting the model’s good fit, as shown in Figure 4.



**Figure 4. Measurement model (pooled CFA)**  
 Source: own elaboration.

In the path diagram, the factors English Skills, Workplace Aptitude, Cultural Knowledge, Cultural Sensitivity, and CBEC Expertise all exhibit significant relationships with CCC and CBEC Performance. The standardised factor loadings for most indicators were above 0.70, indicating strong reliability. The correlations among factors were also significant, demonstrating good construct validity.

**Structural Model and Hypothesis Testing**

Before interpreting the path coefficients, we assessed multicollinearity to ensure the validity of the regression estimates. Multicollinearity diagnostics indicated no serious collinearity issues among the independent variables. All tolerance values ranged from 0.418 to 0.868, and all VIF values ranged from 1.152 to 2.392, which were within acceptable thresholds (Hair, 2019). The structural equation model (SEM) il-

illustrates the impact of CCC on CBEC performance and examines the roles of multiple latent variables. As shown in Figure 5, five latent variables influence CCC: English Skills, Workplace Aptitude, Cultural Knowledge, Cultural Sensitivity, and CBEC Expertise. CBEC Expertise and Cultural Knowledge strongly influence CCC, while Cultural Sensitivity has a minor effect. Moreover, CCC significantly boosts CBEC performance. The model's fit indices confirm its validity, with a chi-square to degrees of freedom ratio of about 2.48, indicating good fit. The GFI was 0.896, AGFI was 0.880, and CFI was 0.950, all reflecting a robust model. The RMSEA of 0.050 and SRMR of 0.0572 further support the model's strong explanatory power.

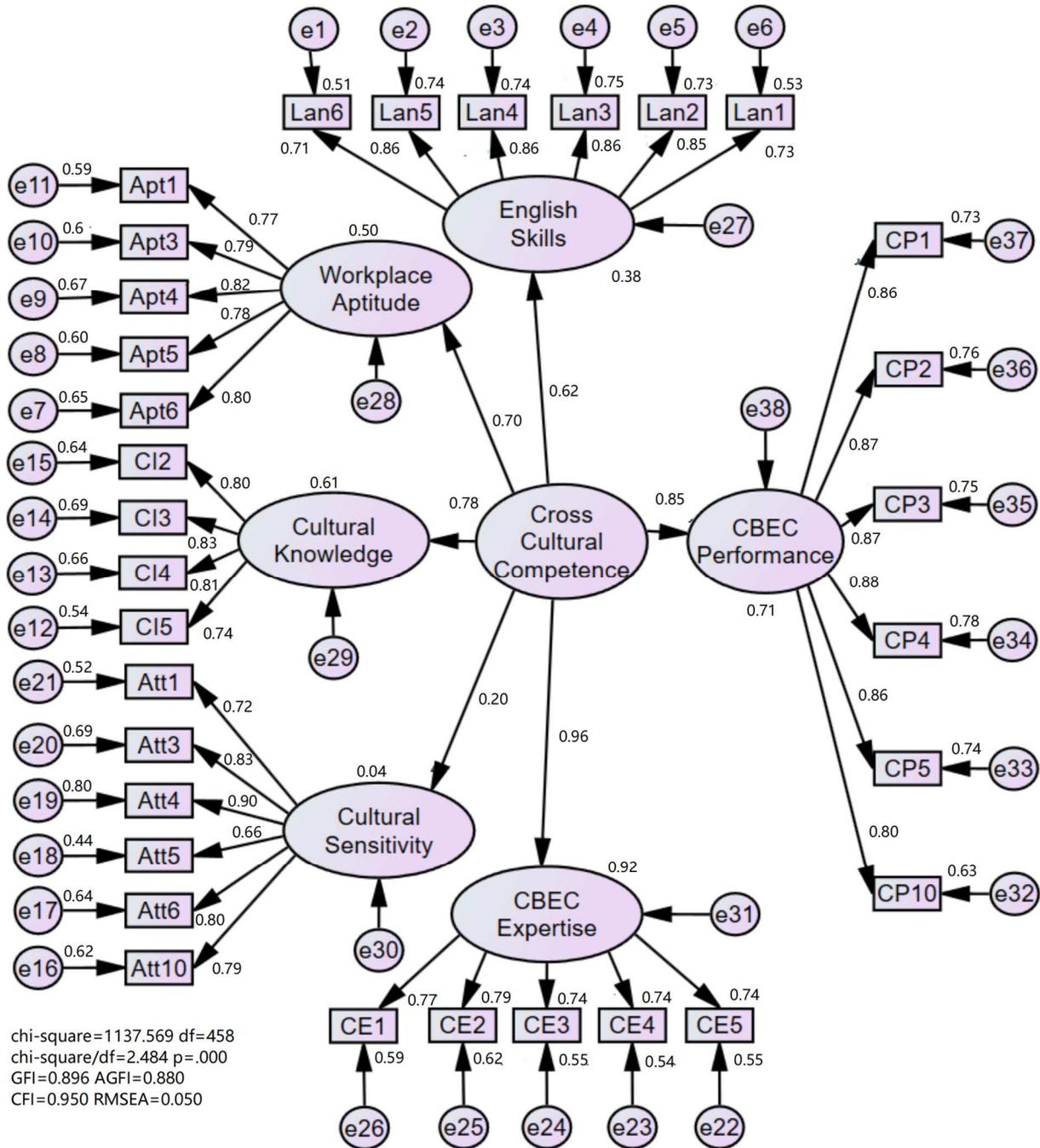


Figure 5. Structural model for cross-cultural competence in CBEC

Source: own elaboration.

The hypothesis of this study examines the impact of CCC on CBEC performance. The results show that CCC has a strong positive impact on CBEC performance, with an estimated effect of 1.529, a standard error of 0.123, a critical ratio of 12.446, and a significance level below 0.001. The critical

ratio (C.R.) exceeded the 1.96 threshold, confirming that the effect was statistically significant. These findings provide strong empirical support for the proposed hypothesis, demonstrating that higher CCC leads to improved CBEC performance.

### Discussion

This study addressed the growing competence challenges posed by shifting patterns of cultural interaction in the context of cross-border e-commerce (CBEC). Focusing on Chinese college students in this field, who operate in digital, social media-based environments with limited opportunities for Western social media exposure, we proposed and empirically validated a second-order model of cross-cultural competence (CCC). Centred on Chinese CBEC students, we proposed and validated a second-order model of CCC comprising five dimensions: English Skills, Workplace Aptitude, Cultural Knowledge, Cultural Sensitivity, and CBEC expertise. In response to RQ1, CBEC expertise and cultural knowledge made the strongest contributions, reflecting the integration of platform know-how and cultural understanding. Cultural sensitivity showed a weaker influence, suggesting underdevelopment of affective readiness in low-contact environments. Regarding RQ2, the model showed good fit across indices, and the standardised path from cross-cultural competence to CBEC performance reached 0.85, indicating a strong and meaningful impact. These findings affirm that CCC is not only foundational for digital communication but also a key driver of transactional outcomes and international adaptability, offering timely insights for talent development in the global digital economy.

The proposed model extends the foundational framework of CCC developed by Johnson *et al.* (2006) through contextualization to the CBEC environment. The original model conceptualised competence across affective, cognitive, and behavioural domains. It emphasised personal adaptability in international business contexts. However, it was developed for traditional face-to-face interactions and did not account for the multimodal, platform-based, and real-time nature of CBEC communication. The Business Cultural Intelligence model introduced metacognitive strategies and intercultural motivation (Alon *et al.*, 2016). However, it overlooked the critical role of language proficiency for non-native speakers and failed to distinguish the influence of industry-specific knowledge. The e-commerce competence model by Wongkhamdi *et al.* (2020) focused on platform operations and digital skills. However, it lacked theoretical depth in the cultural dimension. This study integrates the strengths of these models while addressing the specific challenges that Chinese CBEC students face, such as language barriers, platform restrictions, and limited cultural exposure. It proposes five key dimensions, which retain the core structure of earlier models while embedding essential task competencies and contextual knowledge needed for CBEC. The result is a model that offers stronger theoretical alignment and practical relevance in explaining how Chinese students engage in intercultural communication and market adaptation through online channels.

The findings of this study not only provide a theoretical basis for CBEC talent development in higher education but also highlight key mechanisms and gaps in students' CCC. Noteworthy, CBEC expertise and cultural knowledge made the strongest contributions to the overall construct, suggesting that competence development must go beyond traditional language or attitudinal training. It should be closely integrated with practical knowledge of digital platforms, transaction processes, and cultural norms in target markets. As Luo *et al.* (2020) note, effective use of social media platforms significantly improves CBEC performance, indicating that culturally informed digital engagement is central to building trust and facilitating market conversion. Xi *et al.* (2023) similarly note that essential capabilities in the CBEC ecosystem are increasingly oriented toward platform literacy and real-world applicability. This study reinforces the synergy between cultural knowledge and CBEC-specific expertise, helping to explain why general cultural awareness courses often fall short. Without a functional understanding of how culture shapes digital transactions, such training may fail to produce measurable improvements in student outcomes.

The model also confirmed that English skills and workplace aptitude play strong enabling roles in supporting CCC, with standardised loadings of 0.62 and 0.70, respectively. This aligns with findings by Alfiyatul *et al.* (2022), who emphasise the role of language proficiency and professional adaptability in enhancing cross-cultural performance. Moreover, CBEC students are often required to handle real-time negotiations, order processing, and dispute resolution. Those with accurate language

use and task-oriented flexibility are better equipped to overcome misunderstandings or trust issues arising from cultural differences. Therefore, language instruction should shift from abstract knowledge accumulation toward contextualised and functional communication. Educators should guide students to apply language skills in authentic business tasks through methods such as virtual customer service or simulated e-commerce operations (Shadiev *et al.*, 2025), thereby strengthening their behavioural expression in intercultural settings.

Although cultural sensitivity showed a relatively weak path coefficient of 0.20, this does not suggest diminished importance. Rather, it points to a structural issue rooted in limited exposure, insufficient experience, and fixed attitudes. As Hu and Zhu (2022) argue, social media plays a central role in building cultural trust today. However, Chinese CBEC students are disadvantaged in this regard, as they lack direct access to Western platforms like Facebook and Instagram. This may explain why students with solid cognitive and technical skills still struggle with nuanced cultural responsiveness. To address this gap, university administrators should consider adopting 'soft connection' strategies, such as implementing virtual exchange programs (Sylwia *et al.*, 2024), inviting foreign mentors through school-enterprise collaborations, or simulating multicultural customer scenarios. These approaches can create sustainable, near-authentic intercultural experiences that compensate for institutional limitations in cultural input.

## CONCLUSIONS

We developed and empirically validated a second-order model of cross-cultural competence (CCC) tailored for Chinese college students in the cross-border e-commerce (CBEC) context. By identifying five key dimensions, *i.e.*, English Skills, Workplace Aptitude, Cultural Knowledge, Cultural Sensitivity, and CBEC Expertise, this model provides a comprehensive yet context-sensitive framework to understand and enhance students' readiness for global digital commerce. The findings confirm that CCC exerts a significant and positive influence on CBEC performance, with CBEC Expertise and Cultural Knowledge playing particularly critical roles. These results not only refine existing theoretical models by integrating platform-specific and task-oriented competencies but also offer actionable insights for educators and policymakers to design targeted interventions that bridge cognitive, behavioural, and affective gaps in cross-cultural preparation. Thus, this study contributes both theoretically and practically to the advancement of intercultural business education in the era of digital globalisation.

Despite its theoretical and empirical contributions, this study has several limitations. Firstly, the sample was limited to three Chinese universities, which may restrict generalisability due to regional differences in educational resources. Future research should include students from central and western provinces or international programs. Secondly, the cross-sectional design cannot capture the developmental process of cross-cultural competence; longitudinal studies are needed to examine its evolution through coursework and practical experience. Third, the model does not include possible mediators or moderators such as social support, self-efficacy, or emotional regulation, which have been linked to intercultural adjustment (Alfiyatul *et al.*, 2022; Liao *et al.*, 2021). Lastly, future studies could explore how digital tools like virtual reality or simulation platforms may help overcome institutional barriers to cultural exposure, especially in technology-enhanced learning environments.

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### Use of Artificial Intelligence

The manuscript is free of AI/GAI usage.

### Conflict of Interest

The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

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