



# Analyzing predictors of perceived graduate employability from sufficiency and necessity perspectives

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## Abstract

This study aims to understand the sufficient, necessary, and critical factors of students' perceived employability (PE). It employs an innovative combination of Partial Least Squares Structural Equation Modeling (PLS-SEM), Necessary Condition Analysis (NCA), and Importance-Performance Matrix Analysis (IPMA). PE is conceptualized as five dimensions: human capital (HC), social capital (bonding social capital, BOSC, and bridging social capital, BRSC), career self-management behavior (CSMB), protean career orientation (PCO), and labor market condition (LMC). Participants were 1155 university students in China. The findings highlight the importance of HC as an essential and influential component of perceived employability. Furthermore, they demystify the nuanced roles of BOSC and BRSC and emphasize their complementary nature in fostering employability confidence. The study also reveals the necessity of considering LMCs, which often dictate the realistic prospects of employment. A noteworthy revelation is the interplay between CSMB, as a vital active ingredient, and PCO as the foundational mindset. Theoretically, this study pioneers the investigation of the determinants of PE by employing both sufficiency and necessity logics. Practically, combining these analytical approaches could lead to more effective and informed decision-making.

**Keywords** Perceived graduate employability · Antecedents · Partial Least Squares-Structural Equation Modeling (PLS-SEM) · Necessary Condition Analysis (NCA) · Importance-Performance Matrix Analysis (IPMA)

## Introduction

Higher education is increasingly called upon to meet the needs of the labor market with well-equipped graduates (Bennett, 2019; Brown et al., 2011; Donald et al., 2024). Factors

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such as graduate employment results (e.g., salaries, job offers, and quality) and the skill sets required by employers are progressively utilized as indicators of educational excellence and methods of institutional regulation (Mok & Neubauer, 2016). The study reported here was located at the pre-career phase, and its focus was therefore students' perceived employability (hereafter abbreviated as PE), which is described as "the individual's perception of his or her possibilities of obtaining and maintaining employment" (Vanhercke et al., 2014). Perceived employability is known to impact student retention engagement and performance (Baruch & Peiperl, 2000). Donald et al. (2019, p. 599) add that undergraduates' PE is influenced by "social capital, cultural capital, psychological capital, scholastic capital, market-value capital, and skills". The influence of PE on student success more broadly has prompted growing attention from students, higher education institutions, policymakers, and employers.

This study was informed by Social Cognitive Careers Theory (SCCT) (Lent et al., 1994), which posits that people generate career interests by developing confidence in activities related to their interests, with outcome expectations validated through expended effort (Betz & Hackett, 1983; Johnson & Muse, 2017; Morrison, 2014). Drawing from various theoretical models (Bennett & Ananthram, 2022; Clarke, 2018; Donald et al., 2019, 2023; Tomlinson, 2017), scholars worldwide, such as those from UK (Donald et al., 2019; Tomlinson, 2017), Australia (Benati & Fischer, 2021; Bennett et al., 2022), India (Nimmi et al., 2021), Spain (Caballero et al., 2022), and China (Ma & Bennett, 2021), have conducted in-depth studies and discussions on the factors influencing PE.

Incorporating Bandura's triadic reciprocal causation model, SCCT provides a comprehensive framework that complements developmental theories and those that consider the interplay among personal, environmental, and behavioral factors (Brown & Lent, 2023). Despite its comprehensive nature, there has been limited exploration within SCCT studies on the specific factors necessary for ensuring high levels of PE (Dul, 2016). It is crucial to recognize that multiple necessary conditions may contribute to high perceived employability confidence and that these conditions may need to be simultaneously present.

Furthermore, prior research has not adequately identified factors that can guide decision-makers in prioritizing areas for investment and improvement to enhance PE (Ringle & Sarstedt, 2016). To address these gaps, the current study employs Clarke's (2018) PE model as a practical tool for our research. Clarke's model is instrumental in elucidating the relationships between various forms of capital, individual attributes, and the contextual factors that influence PE. By leveraging this model, we can operationalize the theoretical constructs of SCCT and integrate them into our research framework, thereby providing a more targeted approach to understanding and improving graduate employability.

Thus, the current study employs an innovative combination of Partial Least Squares Structural Equation Modeling (PLS-SEM), Necessary Condition Analysis (NCA), and Importance-Performance Matrix Analysis (IPMA), to provide a holistic understanding of the factors that contribute to PE, integrating insights from complex relationships, necessary conditions, and priority areas. The study has three aims. First, the study aims to model and uncover the complex relationships between capital, behaviors, attributes, and labor market conditions to understand their respective roles in PE. Second, it aims to identify which factors are necessary conditions, meaning which factors must be present for the desired outcome to be possible. Third, by incorporating IPMA, the study aims to visually map the factors based on their importance and performance. This helps in understanding which factors need immediate attention and resource allocation, and which are already performing well.

The article is structured as follows. We begin with an overview of the literature, and we propose our hypotheses. The method is presented prior to reporting the data analysis. A discussion follows, and we end with concluding remarks.

## Literature and hypotheses

This study focused on the micro-level subjective indicators of students' employability (Vanhercke et al., 2014), known as students' perceived employability (PE). In Clarke's (2018) model, PE is framed as five aspects: human capital, social capital, individual behaviors, individual attributes, and labor market conditions. In this study, we used career self-management behavior (CSMB) and protean career orientation (PCO) to represent behaviors and attributes, and students' subjective evaluation of labor market (LMC) to measure labor market conditions. We believe this measurement is appropriate: Clarke (2018) states that CSMB can serve as a dimension representing individual behaviors. Furthermore, Clarke (2018) attests that individual attributes are the foundations to career success and can assist individuals to cope with constant change, prepare for future work challenges, and achieve career outcomes. PCO is a career perspective that emphasizes self-direction and values-driven attitudes. In today's job market, the nature and demands of work are rapidly changing. Technological advancements, particularly in artificial intelligence and automation, are altering the way many industries operate. Additionally, globalization and economic uncertainty are influencing the job market. These changes have led to career uncertainty, making traditional career paths less stable. At the same time, job flexibility is increasing. Many people are opting for remote work, part-time jobs, or freelancing instead of taking traditional full-time jobs. This flexibility allows individuals more opportunities to explore different career paths and develop their skills. In the context of a career, individuals with a PCO continuously adjust and change their career paths based on their own values and goals, rather than relying on traditional organizational career paths. In this context, PCO, as an individual attribute, becomes especially important (Ayoobzadeh, 2022; Ghosh, 2021; Zhang et al., 2023).

### Human capital (HC)

HC theory is a fundamental theoretical concept and is central to discussions on PE (Donald et al., 2024), positing that skills, knowledge, and other intangible assets acquired via education and training can be directed to create economic value for employees and employers (Becker, 1962). Skills such as problem solving, critical thinking, teamwork skills, and social skills, when developed within the curriculum, can be transferred to the labor market and are valued attributes (Anderson & Tomlinson, 2021; Caballero et al., 2022). In addition, leadership experience (Sun and Guo, 2015), English language proficiency (Zainuddin et al., 2019), and, in China, Communist Party membership (Guo & Sun, 2019) are all used as indicators to measure PE. Thus, based on HC theory and these empirical studies, we posit: *H1*: HC is positively associated with PE.

### Social capital

Social capital refers to the networks, relationships, norms, and trust with which individuals can facilitate coordination and cooperation for mutual benefit. Social capital encompasses the social resources available to individuals through their connections and interactions with others (Claridge, 2020). The two types of social capital are bonding social capital (BOSC) and bridging social capital (BRSC). BOSC refers to the relationships and networks within a closely knit group, such as family, close friends, or members of the same ethnic or cultural community (Leonard, 2004). These relationships are usually characterized by strong

ties and high levels of trust and solidarity (Putnam, 1995). BOSC is essential for providing emotional support, and it often acts as a safety net in times of need (Pitas & Ehmer, 2020). BRSC, on the other hand, refers to relationships and networks that are more diverse and encompass individuals from different social backgrounds or groups (Putnam, 1995). These relationships are typically characterized by weaker ties but can provide access to a broader range of resources and information. BRSC can be vital for innovation, accessing new opportunities, and gaining different perspectives (Aral, 2016). We followed the approach of previous studies (Li, 2020; Yang et al., 2022) and examined the distinct roles that these two forms of social capital play in students' PE.

Although employability researchers have emphasized the role of social capital on PE (Batistic & Tymon, 2017; Caballero et al., 2022; Donald et al., 2024), few have differentiated them in an empirical study. We differentiate them because for both capitals have different characteristics such as resource diversity and networking scope and may have different impact on PE. Thus, we propose:

*H2: BOSC is positively associated with PE.*

*H3: BRSC is positively associated with PE.*

### **Career self-management behavior (CSMB)**

CSMB is defined as the proactive strategies and actions that individuals undertake to identify and realize their career goals (King, 2004). This includes setting career objectives, acquiring relevant skills, networking, seeking mentorship, and engaging in continuous learning (Clarke, 2018; King, 2004). In the context of adaptive responses to career development tasks, CSMB can be classified into three types: positioning, influence, and boundary management (King, 2004). Positioning involves strategically aligning oneself in a favorable position within the career landscape, such as acquiring relevant qualifications or skills. Influence encompasses efforts to exert control or sway decisions that affect one's career path, such as building a strong professional network or seeking mentors.

In line with Arthur's (2014) Boundaryless Career Theory, boundary management entails effectively navigating transitions or changes in one's career, such as switching roles or industries (King, 2004). These behaviors are employed to address or mitigate thwarting conditions or career barriers, and consequently lead to vocational adjustment. Many empirical studies (Jackson & Wilton, 2017; Santos et al., 2019) have identified a positive relationship between CSMB and PE. On the basis of this reasoning, we posit the following:

*H4: CSMB is positively associated with PE.*

### **Protean career orientation (PCO)**

PCO refers to an individual's personal management of their career, characterized by self-direction and values-driven attitudes, where success is largely self-determined rather than being defined by traditional measures (Briscoe & Hall, 2006). It is a career perspective that prioritizes adaptability, flexibility, continuous learning, and taking ownership of one's career development (Briscoe & Hall, 2006). Unlike the concrete actions encompassed by CSMB, PCO is the attitudinal framework that guides these behaviors. It shapes the "why" behind career choices, while CSMB addresses the "how" through specific career strategies

and actions. Together, PCO informs the motivational aspect of career progression, and CSMB represents the execution of this motivation into practical steps.

According to HC theory (Becker, 1962), individuals' employability is tied to their skills, knowledge, and abilities. Given that a PCO involves continuous learning and adaptability, it contributes to the augmentation of an individual's human capital, thereby increasing their chances of employment. From the standpoint of Boundaryless Career Theory (Arthur, 2014), similar conclusions can be drawn. Given that careers today often span across multiple organizations and industries, a PCO is necessary. Individuals with a PCO are more likely to embrace such mobility, further enhancing their employability. Many empirical studies (Cortellazzo et al., 2020; Donald et al., 2017) support this view. Based on these considerations, the study posits:

*H5: PCO is positively associated with PE.*

### **Labor market condition (LMC)**

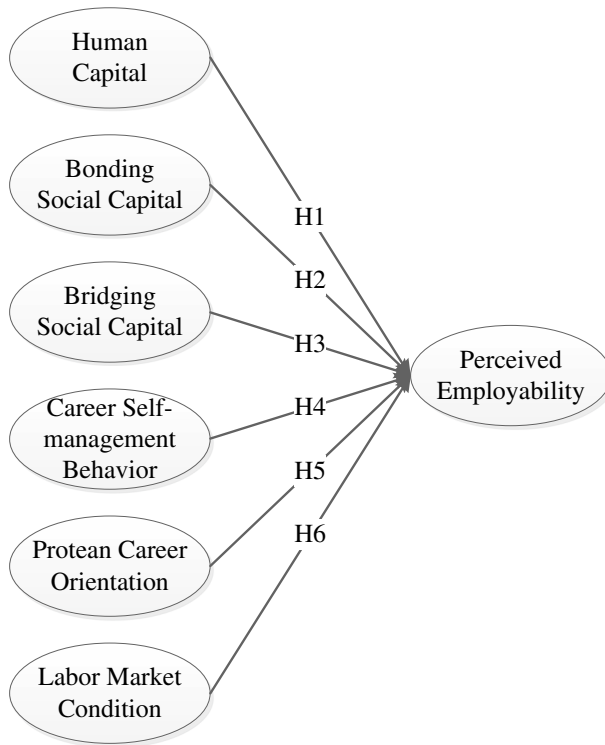
Context is important for understanding PE (Brown et al., 2003; Caballero et al., 2022; Clarke, 2018; Donald et al., 2024). LMC is one of such context and refers to the various factors that characterize the job market at a given time, including the availability of employment, the demand and supply for different skills and qualifications, wage levels, and the influence of economic and policy environments on employment opportunities. HC theory (Becker, 1962) suggests that the investments in education and skills are likely to yield employment returns when LMC is favorable. In contrast, during economic downturns or recessions, even highly skilled individuals may face employment challenges. Similarly, Dual Labor Market Theory (Piore, 2019) posits that labor markets are segmented into primary and secondary sectors. The primary sector consists of stable, well-paying jobs, whereas the secondary sector consists of low-paying, less stable jobs (Fig. 1). LMCs influence which segment is more accessible to job seekers. Students' perceptions of LMC are seen as a vital factor in determining their overall employability and the likelihood of obtaining employment (Caballero et al., 2022; Ma & Chen, 2022). Thus, we posit the following:

*H6: LMC is positively associated with PGE.*

## **Method**

### **Data collection and sample**

Peters and Besley (2019) define China's diverse higher education sector as having both horizontal-level universities (comprehensive universities, science and engineering-focused universities, and humanities and social sciences-focused universities) and vertical-level universities (Double First Class universities, primarily under the Ministry of Education of the People's Republic of China; provincial universities, under the jurisdiction of their respective provinces). Our sampling strategy was designed to capture this diversity. We chose three institutions: one Double First Class comprehensive university (DFCC), a provincial university with a focus on science and engineering (SE), and a provincial university with a focus on humanities and social sciences (HS). Career counselors assisted in



**Fig. 1** Theoretical framework

disseminating the survey to all bachelor students in those universities, and students were urged to circulate it among their acquaintances. Participants were furnished with a consent form and assured anonymity. The survey was disseminated through the online portal *Questionnaire Star* (<https://www.wjx.cn/>), which has distributed a total of 226 million questionnaires and garnered around 180.6 billion responses to date.

The final dataset contained 1155 valid responses, of which 472 students were from DFCC, 379 students were from SE, and the remaining students were from HS. The average age of the student participants stood at 21.01 with a standard deviation of 2.20. Of the respondents, 57.1% (660 individuals) were male and no respondents identified as other than male or female. Of the participants, 761 (65.9%) students were from rural areas. In terms of fields of study, 854 (73.9%) students were enrolled in science and engineering disciplines such as mathematics, physics, information technology, biotechnology, and environmental engineering. Humanities and social sciences students accounted for 301 (26.1%) students, who were majoring in philosophy, sociology, economics, and management.

## Measures

HC was measured using a binary scale where 0 denotes “not possessed” and 1 denotes “possessed”. The other variables were assessed using a seven-point Likert scale ranging from 1 (do not agree at all) to 5 (agree entirely). Content validity of the scales was ensured by using back-translation (Brislin, 1970). This involved having a native English speaker

adept in Chinese perform the translations, which were then assessed and validated by two experts in higher education to confirm that the items accurately represented the intended concepts. Questionnaire measurement items are shown in Table 1.

*HC* was assessed using a set of seven items relevant to the Chinese context (Guo & Sun, 2014, 2019; Huang, 2015; Sun & Guo, 2015). Using parcel technique (Bandalos & Finney, 2001), we transformed the categorical items into Likert-type response formats. The technique involved creating a total score (linear composite) from a group of homogeneous

**Table 1** Questionnaire measurement items

Construct	Measurement Items
HC	Communist Party membership
	English proficiency level (e.g., band four)
	Scholarship at the university
	Professional skill certification (e.g., Computer Level)
	Student leadership experience
	Part-time work experience
	Student association experience
BOSC	There are several people I trust to help solve my problems
	There is someone I can turn to for advice about making very important decisions
	There is someone I feel comfortable talking to about intimate personal problems
	When I feel lonely, there are several people I can talk to
	If I needed an emergency loan of \$500, I know someone I can turn to
BRSC	Interacting with people makes me interested in things that happen outside of my town
	Interacting with people makes me want to try new things
	Interacting with people makes me interested in what people unlike me are thinking
	Talking with people makes me curious about other places in the world
	Interacting with people makes me feel like part of a larger community
CSMB	I have gotten myself introduced to people who can influence my career
	I have talked to senior management at company social gatherings
	I have built contacts with people in areas I would like to work
	I make contacts with people who can influence my career
PCO	I am responsible for my success or failure in my career
	Overall, I have a very independent, self-directed career
	Ultimately, I depend upon myself to move my career forward
	Freedom to choose my own career path is one of my most important values
LMC	I am in charge of my own career
	Students from my course are much in demand in the labor market
	Students from my university are much in demand in the labor market
	It is easy for students from my course to get a job in the labor market
PE	It is easy for students from my university to get a job in the labor market
	Given my qualifications and experience, getting a new job would not be very hard at all
	I am sure I shall find work easily if I start looking
	I can think of a number of organizations that would probably offer me a job if I was looking

*PCO* protean career orientation, *PE* perceived graduate employability, *BOSC* bonding social capital, *BRSC* bridging social capital, *CSMB* career self-management behavior, *HC* human capital, *LMC* labor market conditions

items, which often results in greater reliability compared to individual items. Through parceling, the data could be interpreted as a human capital scale ranging from zero (lowest level) to seven (highest level).

*BOSC* and *BRSC* were assessed using a ten-item scale developed by Williams (2006) specifically for measuring social capital in the online era (Williams, 2006). The scale has been widely used and validated in diverse contexts, including within Chinese populations (Ni & Ishii, 2023; Zhou & Kaplanidou, 2023). The scale consists of items designed to capture both *BOSC* and *BRSC*. Cronbach's  $\alpha$  was 0.88 for *BOSC* and 0.93 for *BRSC*.

*CSMB* was assessed using the Individual Career Management scale developed by Sturges et al. (2000) (Sturges et al., 2000). The scale was designed to gauge the extent of students' engagement in *CSMB* following their participation in career counseling. The reliability was 0.94.

*PCO* was measured using five items from Briscoe et al.'s (2006) self-directed career management scale (Briscoe & Hall, 2006). In our study the reliability was  $\alpha = 0.92$ .

*LMC* was assessed using four items adapted from Álvarez-González et al. (2017) (Álvarez-González et al., 2017). The scale comprises items that gauge students' views on labor market conditions. This study reported a Cronbach's  $\alpha$  of 0.90.

*PE* was evaluated using three items adapted from De Cuyper et al. (2012). Reliability was 0.88 in this work.

## Data analysis

With the objective of pinpointing the sufficient, necessary, and critical conditions for *PE*, we employed a combination of three distinct analytical methods: Partial Least Squares Structural Equation Modeling (PLS-SEM), Necessary Condition Analysis (NCA), and Importance-Performance Matrix Analysis (IPMA). PLS-SEM (Hair et al., 2019) enables us to examine hypotheses through the lens of sufficiency logic, while NCA (Richter et al., 2020) assists in identifying the essential factors that must be present for *PE*. IPMA (Ringle & Sarstedt, 2016) is a technique that plots variables or attributes on a two-dimensional matrix, allowing for the visual identification of their relative importance and performance in a given context. It is particularly useful for prioritizing resources by highlighting areas that require immediate attention or improvement. SmartPLS was employed for the data analysis (Ringle et al., 2022).

Given that the dataset relied on self-reported metrics from a singular survey, we examined potential common method bias (CMB) through both procedural and analytical techniques, following Reio (2010). To mitigate the risk of CMB we assured respondents of their anonymity, crafted a concise survey, separated dependent and independent variables across different survey pages to minimize perceived causal links between constructs, and placed demographic questions at the survey's conclusion. Furthermore, we evaluated the variance inflation factor (VIF) outcomes. VIF values fell between 1.013 and 2.650, lower than the 3.3 threshold and indicating no prevalence of CMB (Kock, 2015).

## Descriptive statistics

Table 2 presents the mean values, standard deviations, and correlations, revealing significant associations among the variables.



**Table 2** Descriptive statistics and correlations

	1	2	3	4	5	6	7
1.HC	1						
2.BOSC	0.051	1					
3.BRSC	.096**	.632**	1				
4.CSMB	.066*	.530**	.515**	1			
5.PCO	.097**	.545**	.601**	.691**	1		
6.LMC	.110**	.504**	.563**	.557**	.664**	1	
7.PE	.129**	.487**	.505**	.555**	.585**	.729**	1
Mean	3.245	5.300	5.454	4.714	5.323	5.184	4.789
SD	1.740	1.256	1.187	1.336	1.138	1.208	1.172

\*Correlation is significant at the 0.05 level (two-tailed)

\*\*Correlation is significant at the 0.01 level (two-tailed)

*PCO* protean career orientation, *PE* perceived graduate employability, *BOSC* bonding social capital, *BRSC* bridging social capital, *CSMB* career self-management behavior, *HC* human capital, *LMC* labor market conditions

## Results of PLS-SEM: measurement model evaluation

We adhered to the recommendations outlined by Hair et al. (2019) for assessing measurement quality, which entailed evaluating construct reliability, convergent validity, and discriminant validity. Table 3 shows the results. All Cronbach's  $\alpha$  and composite reliability ( $\rho_a$  and  $\rho_c$ ) values were greater than 0.7, suggesting good construct reliability. All factor loadings were significant. Convergent validity was ascertained for all factor loadings except BOSC4 (0.669), and the average variance extracted (AVE) exceeded 0.7 and 0.5, respectively. BOSC4 (0.669) was retained contingent on its AVE value of 0.683 reaching a satisfactory level (Hair et al., 2019).

Discriminant validity was evaluated by heterotrait-monotrait ratios (HTMT) (Ringle et al., 2023). The maximum HTMT value was 0.82, which is below the most conservative HTMT value of 0.85. The 10,000 times bootstrapping approach was utilized to get the HTMT inference results. In Table 4, the numbers in parentheses show 95% confidence intervals. Upper confidence interval limits were below the 1 value; therefore, the HTMT inference criterion indicates that all HTMT values are significantly different from 1. Therefore, we concluded that discriminant validity had been established.

## Results of PLS-SEM: structural model evaluation

Drawing upon the outcomes from the bootstrapping procedure of 10,000 resample, four of six hypotheses were supported (Table 5). HC ( $\beta=0.075$ ,  $p<0.001$ ) was found to have a significant positive influence on PE. Thus, H1 was supported. Instead of BRSC ( $\beta=0.037$ ,  $p=0.227$ ), BOSC ( $\beta=0.069$ ,  $p<0.05$ ) had a significant positive impact on PE. Thus, H2 was supported but H3 was not. CSMB ( $\beta=0.157$ ,  $p<0.001$ ) was found to have a significant positive influence on PE. Thus, H4 was supported. PCO ( $\beta=0.044$ ,  $p=0.176$ ) was not found to have a significant positive influence on PE. Thus, H5 was not supported. LMC ( $\beta=0.556$ ,  $p<0.001$ ) was found to have a significant positive impact on PE. Thus, H6 was supported.

**Table 3** Construct reliability and validity

Latent variable	Indicators	Loadings > 0.70	Internal consistency reliability			AVE > 0.50
			Cronbach's $\alpha$	Composite reliability (rho_a)	Composite reliability (rho_c)	
PCO	PCO1	0.831	0.915	0.916	0.937	0.747
	PCO2	0.887				
	PCO3	0.878				
	PCO4	0.893				
	PCO5	0.831				
PE	PE1	0.896	0.878	0.881	0.925	0.803
	PE2	0.907				
	PE3	0.886				
BOSC	BOSC1	0.868	0.881	0.891	0.914	0.683
	BOSC2	0.874				
	BOSC3	0.848				
	BOSC4	0.669				
	BOSC5	0.854				
BRSC	BRSC1	0.886	0.936	0.937	0.951	0.797
	BRSC2	0.873				
	BRSC3	0.905				
	BRSC4	0.891				
	BRSC5	0.907				
CSMB	CSMB1	0.879	0.925	0.928	0.946	0.816
	CSMB2	0.898				
	CSMB3	0.934				
	CSMB4	0.900				
LMC	LMC1	0.882	0.904	0.905	0.933	0.777
	LMC2	0.911				
	LMC3	0.892				
	LMC4	0.839				

1. *PCO* protean career orientation, *PE* perceived employability, *BOSC* bonding social capital, *BRSC* bridging social capital, *CSMB* career self-management behavior, *LMC* labor market conditions

We ascertained the model's predictive power. All  $Q^2$  were more than zero, indicating the model had predictive relevance. Because our prediction errors were not symmetrically distributed, we used mean absolute error (MAE). We checked whether “PLS-SEM < LM” and found that for three items, two PLS-SEM MAEs were larger than LM-MAE; only one was smaller than LM-MAE. Based on Shmueli et al. (2016, 2019), the model was deemed to have low predictive power (Table 6).

To ascertain the predictive ability of the model, we next conducted a cross-validated predictive ability test (CVPAT) (Liengaard et al., 2021; Sharma et al., 2023). CVPAT tests whether PLS-SEM's average loss is significantly lower than the average loss of the benchmarks; the difference of the average loss values should be significantly below zero to substantiate better predictive capabilities of the model compared to the prediction benchmarks. Our empirical result showed a statistically significant superior predictive capability of the PLS-SEM model over the benchmarks. With an average loss difference of  $-0.786$  and a  $t$

**Table 4** Discriminant validity—heterotrait-monotrait ratio (HTMT) matrix

	PCO	PE	BOSC	BRSC	CSMB	HC	LMC
PCO							
PE	0.652 (0.597/0.699)						
BOSC	0.607 (0.553/0.659)	0.553 (0.493/0.608)					
BRSC	0.651 (0.597/0.698)	0.558 (0.500/0.612)	0.695 (0.640/0.743)				
CSMB	0.749 (0.705/0.789)	0.616 (0.556/0.669)	0.586 (0.531/0.639)	0.554 (0.497/0.608)			
HC	0.074 (0.023/0.132)	0.155 (0.095/0.210)	0.097 (0.044/0.153)	0.091 (0.032/0.152)	0.045 (0.013/0.103)		
LMC	0.73 (0.680/0.775)	0.82 (0.781/0.853)	0.565 (0.502/0.623)	0.613 (0.558/0.662)	0.609 (0.548/0.663)	0.096 (0.036/0.153)	

1. *PCO* protean career orientation, *PE* perceived graduate employability, *BOSC* bonding social capital, *BRSC* bridging social capital, *CSMB* career self-management behavior, *HC* human capital, *LMC* labor market conditions

2. Number of bootstrapping = 10,000; the numbers in parentheses are 95% confidence intervals

**Table 5** Structural model results

Hypotheses	$\beta$	<i>t</i>	<i>p</i>	Bias corrected confidence intervals [2.5%-97.5%]	
HC → PE	0.075	3.960	0.000	0.038	0.113
BOSC → PE	0.069	2.218	0.027	0.008	0.130
BRSC → PE	0.037	1.209	0.227	-0.023	0.097
CSMB → PE	0.157	5.182	0.000	0.096	0.215
PCO → PE	0.044	1.354	0.176	-0.020	0.107
LMC → PE	0.556	20.294	0.000	0.502	0.609

1. *PCO* protean career orientation, *PE* perceived graduate employability, *BOSC* bonding social capital, *BRSC* bridging social capital, *CSMB* career self-management behavior, *HC* human capital, *LMC* labor market conditions

**Table 6** PLS predict indicator prediction summary

	$Q^2$ predict	PLS-SEM_MAE	LM_MAE
PE1	0.421	0.777	0.760
PE2	0.427	0.764	0.767
PE3	0.534	0.670	0.653

PE1–3 are measurement items of perceived employability

value of 13.450, the analysis confirmed that the PLS-SEM model's predictions are not only closer to the actual values, but are superior at a statistically significant level.

## Results of NCA

To further understand the association between PE and capital, behaviors, attributes, and contexts, we augmented PLS-SEM with NCA. Scatter plots for all pertinent relations are shown in Fig. 2. Following the guidelines by Richter et al. (2020), we first utilized the latent variable scores of constructs acquired through PLS-SEM. To avoid making additional linear assumptions between the predictor and outcome variables, we employed the suggested ceiling envelopment-free disposal hull (CE-FDH) line, a non-decreasing step function depicted on the scatterplot between the predictor and outcome variables (Dul, 2016). For a condition to be classified as necessary, it has to satisfy three criteria: (i) theoretical rationale; (ii) an effect size  $d > 0$ ; and (iii) a small  $p$  value ( $p < 0.05$ ) (Dul et al., 2020). The NCA results (Table 7) indicate that HC, BOSC and BRSC, PCO, and LMC are conditions that fulfill these criteria. Of interest, BRSC and PCO were must-have factors but not should-have factors of PE, and CSMB was a should-have factor but not a must-have factor of PE.

We employed the bottleneck technique to pinpoint threshold levels of the necessary conditions required to attain a specific level of outcomes. Table 8 shows that to reach a 100% level of PE, five necessary conditions have to present: BOSC at no less than 3.03%; BRSC at no less than 7.879%; HC at no less than 3.377%; LMC at no less than 60.693%; and PCO at no less than 16.797%.

## Results of IPMA

Finally, we performed IPMA analysis to identify which constructs were underperforming despite being crucial, and which were performing well but were not as vital. IPMA results indicate that LMC (0.556), CSMB (0.157), and HC (0.075) are three most important drivers of PE (Table 9; Fig. 3).

## Discussion

### Theoretical implications

Prior research has predominantly relied on sufficiency logic through structural equation modeling or regressions to comprehend the factors impacting students' perceived employability (PE) (Caballero et al., 2022; Jackson & Tomlinson, 2020; Ma & Chen, 2022; Pitan & Muller, 2019). Nonetheless, these methodologies are only capable of identifying the should-have factors and not the must-have factors of PE. Should-have factors are sufficient but not necessarily indispensable for achieving a desired outcome. This study employed an innovative combination of PLS-SEM, NCA, and IPMA approaches to provide a holistic understanding of the capital, behavior, attributes, and context which contribute to the PE. The study pioneered investigation of the determinants of PE by employing both sufficiency and necessity logics.

*PLS-SEM* results suggest that when HC, BOSC, CSMB, and LMC are present, they are likely to lead to enhanced employability; however, the absence of one factor does not

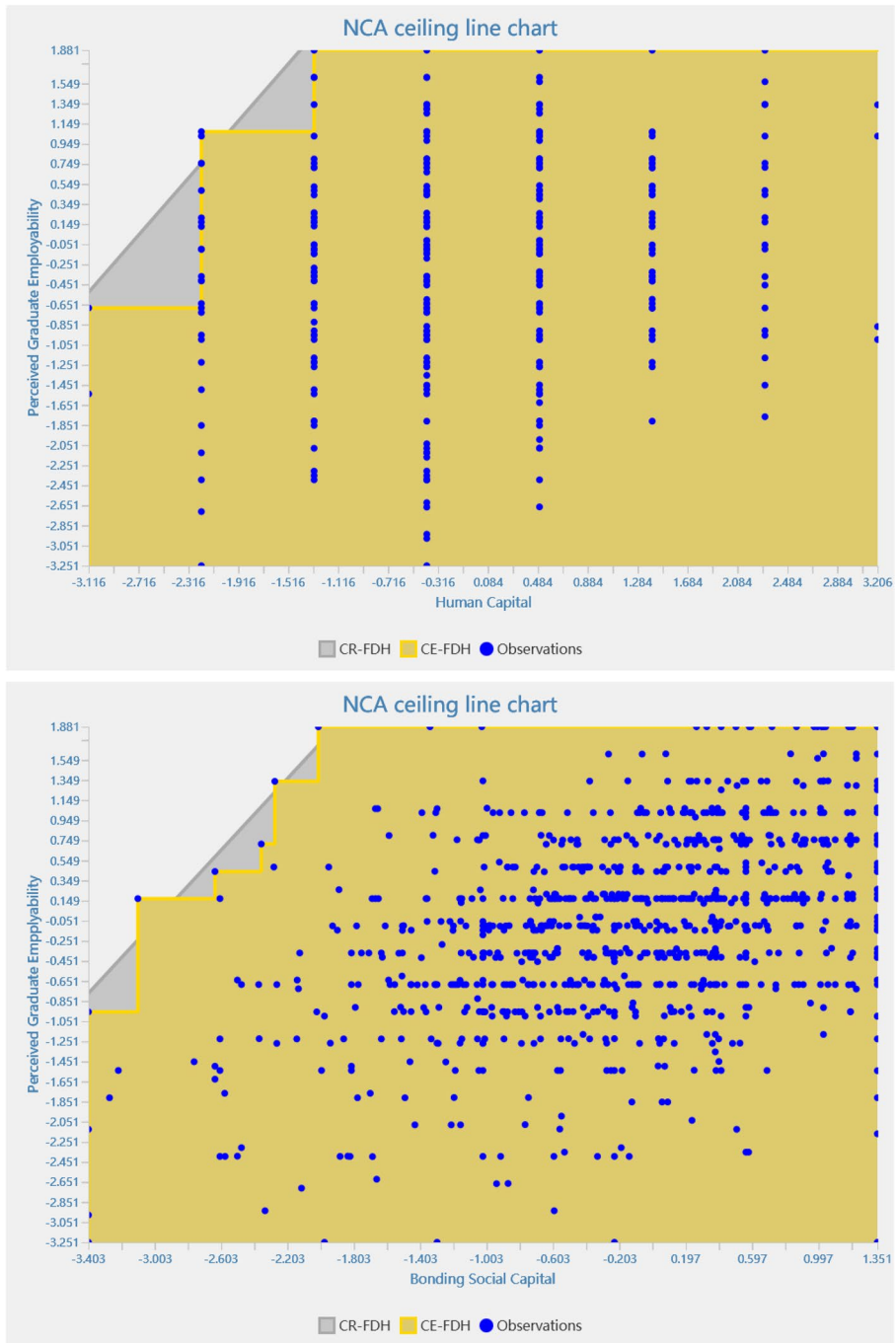


Fig. 2 NCA scatter plots

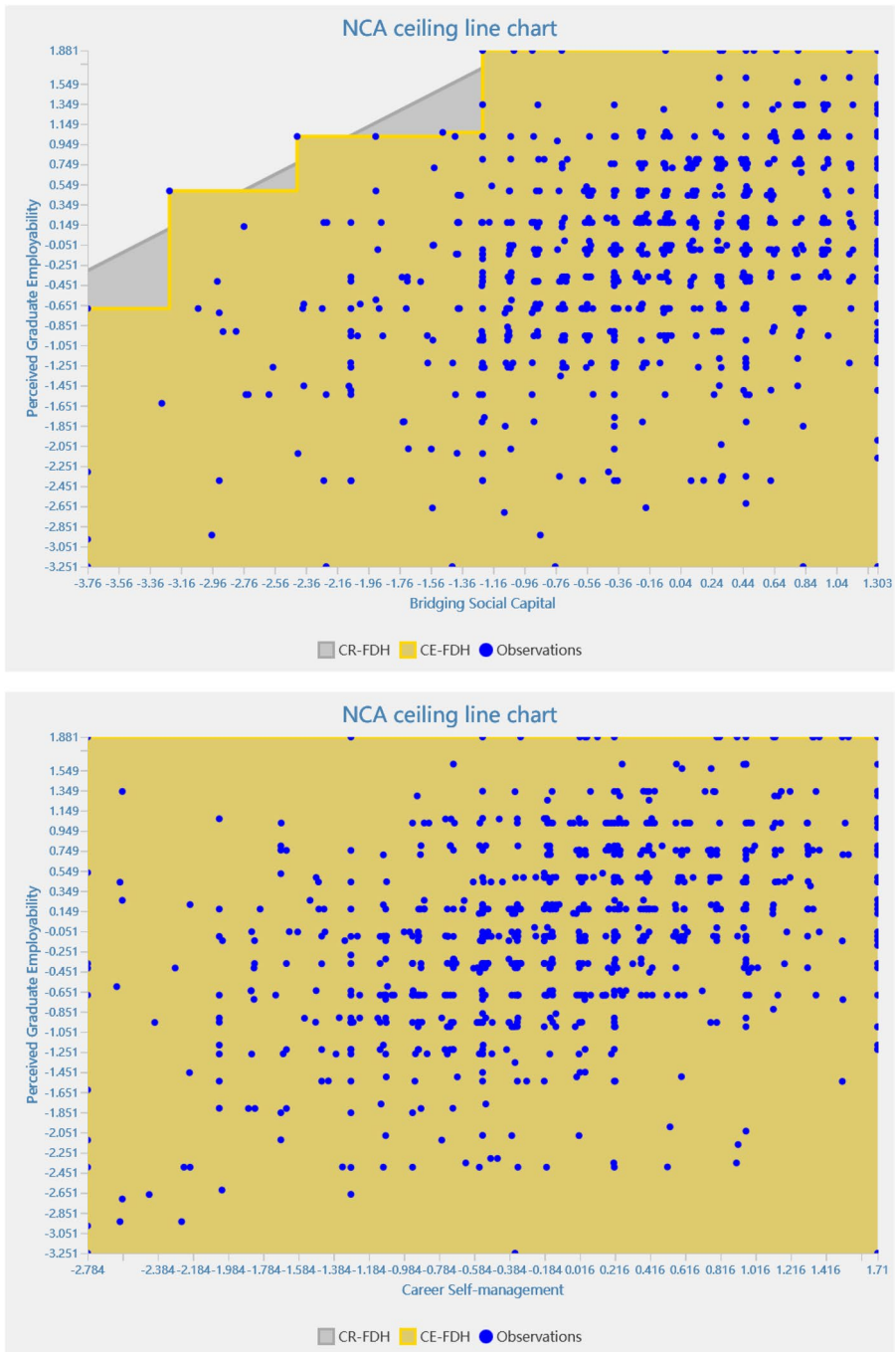


Fig. 2 (continued)

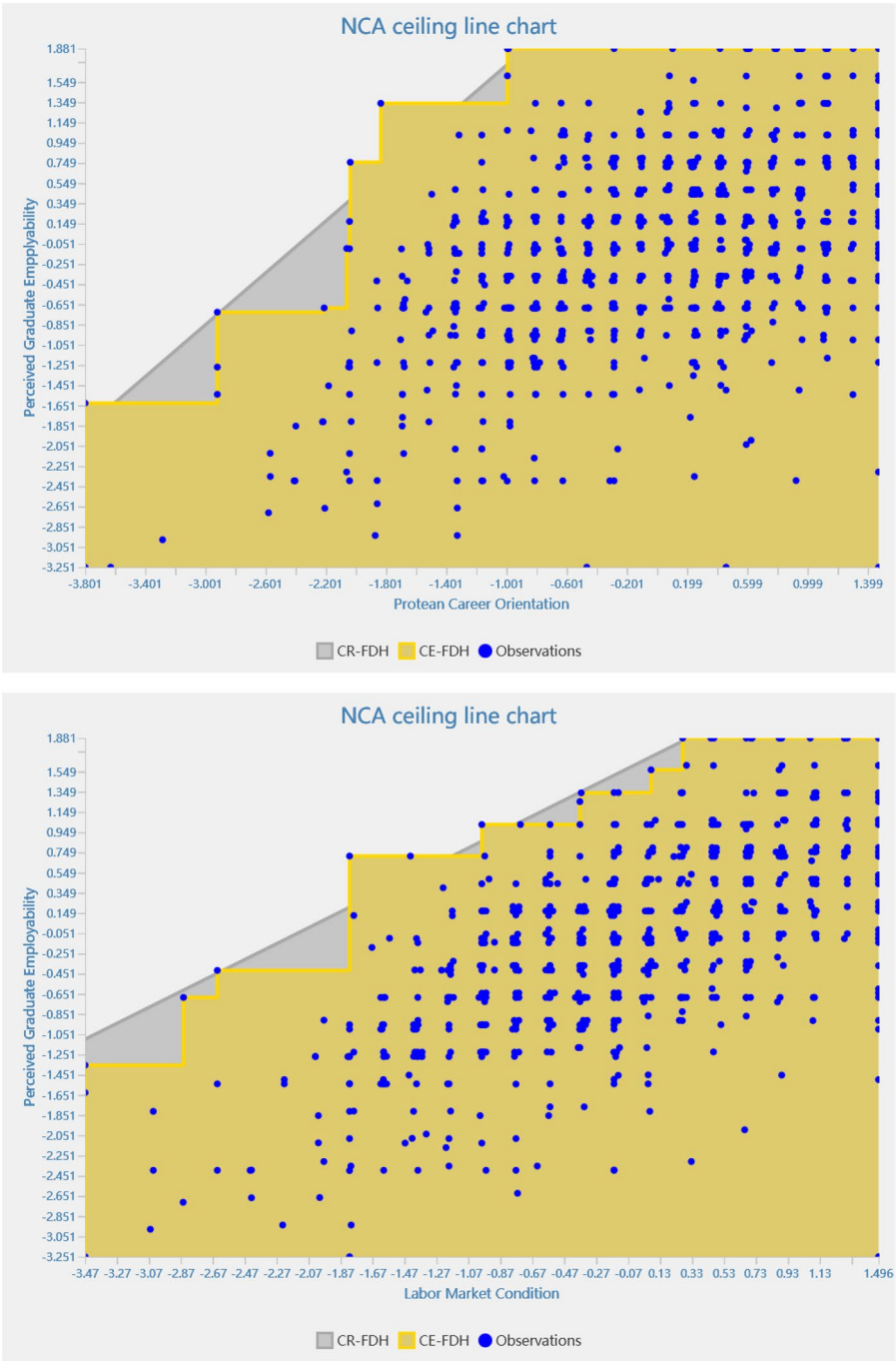


Fig. 2 (continued)

**Table 7** NCA effect sizes

Construct	Perceived graduate employability (CE-FDH)	<i>p</i> value
PCO	0.224	0.000
BOSC	0.093	0.000
BRSC	0.135	0.000
CSMB	−0.000	0.664
HC	0.094	0.005
LMC	0.245	0.000

1. *PCO* protean career orientation, *BOSC* bonding social capital, *BRSC* bridging social capital, *CSMB* career self-management behavior, *HC* human capital, *LMC* labor market conditions

**Table 8** Bottleneck table (percentages)

PE	BOSC	BRSC	CSMB	HC	LMC	PCO
0	NN	NN	NN	NN	NN	NN
10	NN	NN	NN	NN	NN	NN
20	NN	NN	NN	NN	NN	NN
30	NN	NN	NN	NN	NN	NN
40	NN	NN	NN	NN	0.952	0.433
50	0.519	0.433	NN	0.173	1.039	1.818
60	0.519	0.433	NN	0.173	2.684	1.818
70	0.693	0.433	NN	0.173	2.684	2.771
80	2.251	1.558	NN	0.173	11.688	3.55
90	3.03	7.879	NN	3.377	55.152	16.797
100	3.03	7.879	NN	3.377	60.693	16.797

1. *PCO* protean career orientation, *PE* perceived employability, *BOSC* bonding social capital, *BRSC* bridging social capital, *CSMB* career self-management behavior, *HC* human capital, *LMC* labor market conditions

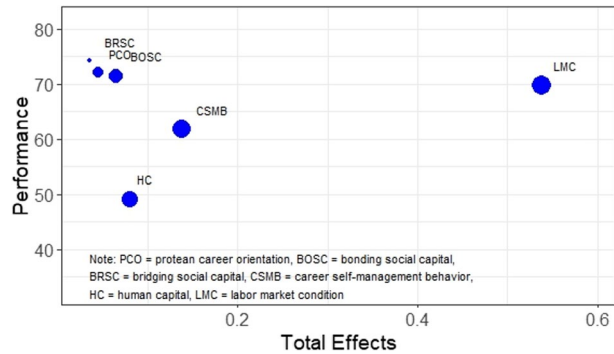
**Table 9** IPMA results

Construct	Importance	Performance	Ranking
PCO	0.045	72.122	5
BOSC	0.064	71.581	4
BRSC	0.036	74.262	6
CSMB	0.137	61.945	2
HC	0.080	49.289	3
LMC	0.538	69.869	1

1. *PCO* protean career orientation, *BOSC* bonding social capital, *BRSC* bridging social capital, *CSMB* career self-management behavior, *HC* human capital, *LMC* labor market conditions

necessarily impede employability. *NCA* shows that *HC*, *BOSC* and *BRSC*, *PCO*, and *LMC* are necessary for student employability: without them, the likelihood of employability is significantly reduced or impossible. *IPMA* identifies *LMC*, *CSMB*, and *HC* as the most



**Fig. 3** IPMA graph

important factors affecting student employability, suggesting that these are the areas where effort and resources should be concentrated.

Our study contributes to the PE literature in several ways. First, *HC* is identified as both a sufficient and necessary factor, and also important according to IPMA. This suggests that an individual's knowledge, skills, and abilities are central to employability, making it a priority area for investment and development regardless of theoretical model or institutional framework (Donald et al., 2024). In addition, the influence of *LMC* emerged as a significant and pivotal variable. Employability models such as that of Tomlinson (2017) focus on graduate capital and others such as those proposed by Donald et al. (2019, 2023) and Clarke (2018) prioritize an interplay between capital and context. Our study, with the inclusion of NCA and IPMA, indicates a consistent emphasis on the integral role of *LMC* as a context. Such external factors, including the economy, industry trends, and job market dynamics, undeniably impact employability. Recognizing these conditions might not only enlighten individual career strategies but also reshape the narrative around PE. Importantly, this perspective aligns with the earliest theoretical constructs about PE as proposed by Brown et al. (2003). Given our results, we advocate for a shift in perspective to emphasize models which incorporate context, especially labor market conditions. The inclusion of contextual elements in future PE will better reflect the complexities of employability, employment, and career.

Second, *BOSC* is both a sufficient and necessary condition for student employability, whereas *BRSC* is a necessary condition. This suggests that having close-knit relationships is not only essential for the possibility of employability but can also significantly contribute to achieving it. In contrast, having extended networks and connections is critical to opening the gateway for employability, but may not be enough on its own. This finding contributes discussions on social capital and employment; specifically, it demonstrates the *Dual Role of Bonding Social Capital*, emphasizing that strong intra-group ties are not only foundational but can be catalysts for employability. Meanwhile, it shows the *Gatekeeper Role of Bridging Social Capital*, implying that connections beyond close-knit groups are essential to accessing diverse opportunities and resources. Incorporating both in a single study helps us to ascertain the interplay between *BOSC* and *BRSC*. This may pave the way for theoretical frameworks which consider a synergistic relationship between *BOSC* and *BRSC* in explaining employability. Donald et al. (2023) contend that previous research and previous models have ignored this combination.

Finally, the theoretical implications of *CSMB* being identified as a sufficient and critical factor and *PCO* as a necessary factor highlight the multifaceted nature of career development. *CSMB*, being a sufficient condition, suggests that proactive actions such as goal

setting, skill-building, and networking can independently lead to employability. The identification of CSMB as a critical factor of IPMA further underscores its significant impact in determining successful career outcomes. Conversely, PCO, as a necessary condition, implies that it constitutes the foundational mindset for employability. It represents an individual's intrinsic adaptability and alignment of career pursuits with personal values. Although not independently sufficient, it is essential as it lays the groundwork for engaging in fruitful career self-management behaviors.

These findings shed light on a symbiotic relationship where PCO acts as the bedrock for CSMB. The intrinsic adaptability and values-driven focus of PCO likely fuel the motivation and direction for individuals to engage effectively in career self-management practices. This leads to a theoretical understanding that employability is not merely a product of practical actions or mindset alone, but a harmonious integration of both. It emphasizes the importance of cultivating an adaptive, internally driven career perspective and translating this into strategic actions for career development. Thus, contemporary career development theories could consider the interdependence and complementary nature of PCO and CSMB in shaping career trajectories. Our study provides robust empirical support for the calls of multiple scholars (Brown et al., 2003; Donald et al., 2024; Guilbert et al., 2016) to consider the proactivity of individual students in the job-seeking process.

## Practical implications

The integration of PLS-SEM, NCA, and IPMA in our study offers a nuanced understanding of the factors influencing students' perceived employability (PE) in China. Our findings underscore the importance, necessity, and sufficiency of various dimensions such as HC, BOSC, BRSC, CSMB, PCO, and LMC in shaping employability among Chinese undergraduates.

Chinese undergraduates would benefit from adopting a proactive stance (Hu et al., 2021) in enhancing their employability by focusing on the development of HC, CSMB, and social capital, which have been identified as both important and necessary for employability. Students are recommended to actively engage in skill-building and educational opportunities which align with labor market demands, focusing not only on technical skills, but on the professional or soft skills which underpin workplace socialization, teamwork, and professional norms. Networking through university clubs, societies, and events can help in developing BOSC and BRSC, which are crucial for navigating the competitive job market (English et al., 2021). Embracing a protean career orientation by setting personal career goals and being adaptable to change will further empower students to meet the challenges of the dynamic labor market in China.

Higher education institutions might prioritize curricular updates that reflect the evolving labor market, emphasizing experiential learning opportunities such as internships (Silva et al., 2016) and project-based learning (Guo et al., 2020). These experiences are not only necessary for developing industry-specific skills and networks but also for fostering a deeper understanding of career paths. Career education and counseling services (Okolie et al., 2020) should be expanded to include networking opportunities with industry professionals and alumni, thereby enhancing students' social capital and employability prospects. Specialized support for a diverse student body is essential to ensure inclusivity and equal access to employability resources.

The broader societal context, including government, industry, and community organizations, would benefit from collaborating to create an ecosystem that supports the

employability of Chinese undergraduates. In addition, government policies could incentivize internships, graduate recruitment programs, and entrepreneurial initiatives (Liu et al., 2020). Industry partnerships with educational institutions can provide practical experiences and networking opportunities that are necessary for student employability (Ramírez et al., 2017), and a culture of hosting interns and work-integrated learning students is to be encouraged. Community organizations can contribute by promoting public awareness about the value of continuous learning, adaptability, and networking in career development.

## Limitations and future research directions

The first limitation is the use of cross-sectional data. Future research could employ longitudinal designs to observe changes over time and infer causal relationships. Second, our data was collected from China, and we do not seek to generalize the findings to other locations: Hofstede's et al.'s research (Hofstede et al., 2010) indicates that even countries culturally close to China, including Japan, South Korea, and Vietnam, show significant differences in aspects such as Uncertainty Avoidance. However, our research methodology presents a valuable blueprint for future work. Third, our study utilizes Clarke's (2018) five dimensions of PE. While our study delineates the relationships between capital, individual attributes, behaviors, and LMC with PE, it does not explicitly model the interactions among these constructs. Future research might explore these complex interactions in depth to provide a more nuanced understanding of their collective impact on PE. In addition, future studies could employ other models (Donald et al., 2019, 2023; Tomlinson, 2017) to compare and contrast the findings. Individuals with a PCO continuously adjust and change their career paths based on their own values and goals, rather than relying on traditional organizational career paths. Future studies could use career building skills to measure individual behaviors alongside objective labor market indicators such as Unemployment Rate (Ahmad et al., 2023), Employment-to-Population Ratio (Verick, 2023), and Labor Force Participation Rate (Ibourk & Elouaourti, 2023) to measure labor market conditions.

## Conclusion

This study employed an innovative combination of PLS-SEM, NCA, and IPMA to explore the sufficient, necessary, and critical factors of PE. Our findings underscore the central role of HC and LMC and the importance of recognizing the distinct and complementary roles of BOSC and BRSC. The research elucidates the synergistic relationship between CSMB and PCO and highlights the need for a harmonious integration of adaptive mindset and proactive actions in career development. The insights are instrumental for students, educators, and policymakers in formulating more holistic and informed strategies for PE.

Our theoretical contribution lies in examining the influence of capital, behavior, attribute, and context on PE using both sufficient and necessity logics. To the best of our knowledge, it is the first piece of work to do so. Our findings contribute to the PE literature in three ways. First, the study emphasizes that both human capital (HC) and labor market condition (LMC) are integral, with HC being an essential personal asset and LMC representing influential external factors in determining PE. Second, the study highlights the dual role of bonding social capital (BOSC) as both essential and instrumental in achieving PE, while bridging social capital (BRSC) acts as a gatekeeper, necessary for accessing opportunities and resources through extended networks. Third, the findings reveal the interdependence

between career self-management behavior (CSMB), which involves proactive actions and is sufficient and critical for PE, and protean career orientation (PCO), which is an essential foundation as it represents adaptability and personal values alignment, together forming a synergistic relationship in career development.

In a world where the nature of work is constantly evolving (Hirschi, 2018), this research is timely. It provides valuable insights that can help individuals navigate their career paths, educational institutions prepare their students for the job market, and policymakers design effective workforce development strategies. This is not just a concern for understanding what makes graduate employable today, but about how to prepare them for the future.

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**Data availability** Access to the dataset is not possible due to ethical approval restrictions.

## Declarations

**Ethics approval** Ethics approval was obtained from the School of Philosophy and Sociology, Lanzhou University.

**Consent to participate** Informed consent was obtained before participation in the study.

**Competing interests** The authors declare no competing interests.

## References

- Ahmad, M., Khan, Y. A., Jiang, C., Kazmi, S. J. H., & Abbas, S. Z. (2023). The impact of COVID-19 on unemployment rate: An intelligent based unemployment rate prediction in selected countries of Europe. *International Journal of Finance & Economics*, 28(1), 528–543.
- Álvarez-González, P., López-Miguens, M. J., & Caballero, G. (2017). Perceived employability in university students: Developing an integrated model. *Career Development International*, 22(3), 280–299.
- Anderson, V., & Tomlinson, M. (2021). Signaling standout graduate employability: The employer perspective. *Human Resource Management Journal*, 31(3), 675–693.
- Aral, S. (2016). The future of weak ties. *American Journal of Sociology*, 121(6), 1931–1939.
- Arthur, M. B. (2014). The boundaryless career at 20: Where do we stand, and where can we go? *Career Development International*, 19(6), 627–640.
- Ayooobzadeh, M. (2022). Freelance job search during times of uncertainty: Protean career orientation, career competencies and job search. *Personnel Review*, 51(1), 40–56.
- Bandalos, D. L., & Finney, S. J. (2001). Item parceling issues in structural equation modeling. *New Developments and Techniques in Structural Equation Modeling* (pp. 289–316). Psychology Press.
- Baruch, Y., & Peiperl, M. (2000). Career management practices: An empirical survey and implications. *Human Resource Management*, 39(4), 347–366.
- Batistic, S., & Tymon, A. (2017). Networking behaviour, graduate employability: A social capital perspective. *Education + Training*, 59(4), 374–388.
- Becker, G. S. (1962). Investment in human capital: A theoretical analysis. *Journal of Political Economy*, 70(5), 9–49.
- Benati, K., & Fischer, J. (2021). Beyond human capital: Student preparation for graduate life. *Education + Training*, 63(1), 151–163.
- Bennett, D. (2019). Graduate employability and higher education: Past, present and future. *HERDSA Review of Higher Education*, 5, 31–61.
- Bennett, D., & Ananthram, S. (2022). Development, validation and deployment of the EmployABILITY scale. *Studies in Higher Education*, 47(7), 1311–1325.

- Bennett, D., Bawa, S., Ananthram, S., & Pitman, T. (2022). Is there a gender difference in STEM students' perceived employability? *Education + Training*, 64(6), 754–773.
- Betz, N., & Hackett, G. (1983). The relationship of mathematics self-efficacy expectations to the selection of science-based college majors. *Journal of Vocational Behavior*, 23(3), 329–345.
- Briscoe, J. P., & Hall, D. T. (2006). The interplay of boundaryless and protean careers: Combinations and implications. *Journal of Vocational Behavior*, 69(1), 4–18.
- Brislin, R. (1970). Back-translation for cross-cultural research. *Journal of Cross-Cultural Psychology*, 1(3), 185–216.
- Brown, S. D., & Lent, R. W. (2023). Social cognitive career theory. In W. B. Walsh, L. Y. Flores, P. J. Hartung, & F. T. L. Leong (Eds.), *Career psychology: Models, concepts, and counseling for meaningful employment* (pp. 37–57). American Psychological Association.
- Brown, P., Hesketh, A., & Williams, S. (2003). Employability in a knowledge-driven economy. *Journal of Education and Work*, 16(2), 107–126.
- Brown, P., Lauder, H., & Ashton, D. (2011). *The global auction: The broken promises of education, jobs, and incomes*. Oxford University Press.
- Caballero, G., Álvarez-González, P., & López-Miguens, M. J. (2022). Which are the predictors of perceived employability? An approach based on three studies. *Assessment & Evaluation in Higher Education*, 47(6), 878–895.
- Claridge, T. (2020). Current definitions of social capital: Academic definitions in 2019. *Social Capital Research and Training*. City: Roslyn (NZ).
- Clarke, M. (2018). Rethinking graduate employability: The role of capital, individual attributes and context. *Studies in Higher Education*, 43(11), 1923–1937.
- Cortellazzo, L., Bonesso, S., Gerli, F., & Batista-Fogueat, J. M. (2020). Protean career orientation: Behavioral antecedents and employability outcomes. *Journal of Vocational Behavior*, 116(Part A).
- De Cuyper, N., Mäkikangas, A., Kinnunen, U., Mauno, S., & Witte, H. D. (2012). Cross-lagged associations between perceived external employability, job insecurity, and exhaustion: Testing gain and loss spirals according to the conservation of resources theory. *Journal of Organizational Behavior*, 33(6), 770–788.
- Donald, W. E., Baruch, Y., & Ashleigh, M. J. (2023). Construction and operationalisation of an employability capital growth model (ECGM) via a systematic literature review (2016–2022). *Studies in Higher Education*, 1–15.
- Donald, W., Baruch, Y., & Ashleigh, M. (2017). Boundaryless and protean career orientation: A multitude of pathways to graduate employability. In M. Tomlinson & L. Holmes (Eds.), *Graduate employability in context: Theory, research and debate* (pp. 129–150). Palgrave Macmillan UK.
- Donald, W. E., Baruch, Y., & Ashleigh, M. (2019). The undergraduate self-perception of employability: Human capital, careers advice, and career ownership. *Studies in Higher Education*, 44(4), 599–614.
- Donald, W. E., Baruch, Y., & Ashleigh, M. J. (2024). Construction and operationalisation of an employability capital growth model (ECGM) via a systematic literature review (2016–2022). *Studies in Higher Education*, 49(1), 1–15.
- Dul, J. (2016). Necessary condition analysis (NCA) logic and methodology of “necessary but not sufficient” causality. *Organizational Research Methods*, 19(1), 10–52.
- Dul, J., Van der Laan, E., & Kuik, R. (2020). A statistical significance test for necessary condition analysis. *Organizational Research Methods*, 23(2), 385–395.
- English, P., de Villiers Scheepers, M. J., Fleischman, D., Burgess, J., & Crimmins, G. (2021). Developing professional networks: the missing link to graduate employability. *Education + Training*, 63(4), 647–661.
- Ghosh, R. (2021). Protean career orientation and career shock due to the pandemic: HRD's role in supporting intersectional identity work. *Human Resource Development International*, 24(3), 241–243.
- Guilbert, L., Bernaud, J. L., Gouvenet, B., & Rossier, J. (2016). Employability: Review and research prospects. *International Journal for Educational and Vocational Guidance*, 16(1), 69–89.
- Guo, P., Saab, N., Post, L. S., & Admiraal, W. (2020). A review of project-based learning in higher education: Student outcomes and measures. *International Journal of Educational Research*, 102, 101586.
- Guo, Q., & Sun, W. (2014). Economic returns to English proficiency for college graduates in mainland China. *China Economic Review*, 30, 290–300.
- Guo, Q., & Sun, W. (2019). Re-examining economic returns to communist party membership in mainland China. *Journal of the Asia Pacific Economy*, 24(1), 24–41.
- Hair, J. F., Risher, J. J., Sarstedt, M., & Ringle, C. M. (2019). When to use and how to report the results of PLS-SEM. *European Business Review*, 31(1), 2–24.
- Hirschi, A. (2018). The Fourth Industrial Revolution: Issues and implications for career research and practice. *The Career Development Quarterly*, 66(3), 192–204.

- Hofstede, G., Hofstede, G. J., & Minkov, M. (2010). *Cultures and organizations: Software of the mind*. McGraw Hill.
- Hu, X., He, Y., Ma, D., Zhao, S., Xiong, H., & Wan, G. (2021). Mediating model of college students' proactive personality and career adaptability. *The Career Development Quarterly*, 69(3), 216–230.
- Huang, J. (2015). Could poor family cultivate outstanding children? *Youth Studies*, 5, 1–10.
- Ibourk, A., & Elouaouri, Z. (2023). Revitalizing women's labor force participation in North Africa: An exploration of novel empowerment pathways. *International Economic Journal*, 1–23.
- Jackson, D., & Tomlinson, M. (2020). Investigating the relationship between career planning, proactivity and employability perceptions among higher education students in uncertain labour market conditions. *Higher Education*, 80, 435–455.
- Jackson, D., & Wilton, N. (2017). Perceived employability among undergraduates and the importance of career self-management, work experience and individual characteristics. *Higher Education Research & Development*, 36(4), 747–762.
- Johnson, I. Y., & Muse, W. B. (2017). Choice of academic major at a public research university: The role of gender and self-efficacy. *Research in Higher Education*, 58(4), 365–394.
- King, Z. (2004). Career self-management: Its nature, causes and consequences. *Journal of Vocational Behavior*, 65(1), 112–133.
- Kock, N. (2015). Common method bias in PLS-SEM: A full collinearity assessment approach. *International Journal of e-Collaboration*, 11(4), 1–10.
- Lent, R. W., Brown, S. D., & Hackett, G. (1994). Toward a unifying social cognitive theory of career and academic interest, choice, and performance. *Journal of Vocational Behavior*, 45(1), 79–122.
- Leonard, M. (2004). Bonding and bridging social capital: Reflections from Belfast. *Sociology*, 38(5), 927–944.
- Li, X. Q. (2020). Are all “friends” beneficial? The use of Facebook and WeChat and the social capital of college students in Macau. *Sage Open*, 10(4).
- Liengaard, B. D., Sharma, P. N., Hult, G. T. M., Jensen, M. B., Sarstedt, M., Hair, J. F., & Ringle, C. M. (2021). Prediction: coveted, yet forsaken? Introducing a cross-validated predictive ability test in partial least squares path modeling. *Decision Sciences*, 52(2), 362–392.
- Liu, T., Walley, K., Pugh, G., & Adkins, P. (2020). Entrepreneurship education in China: Evidence from a preliminary scoping study of enterprising tendency in Chinese university students. *Journal of Entrepreneurship in Emerging Economies*, 12(2), 305–326.
- Ma, Y., & Chen, S. C. (2022). Understanding the determinants and consequences of perceived employability in graduate labor market in China. *International Journal for Educational & Vocational Guidance*, 1–20.
- Ma, Y., & Bennett, D. (2021). The relationship between higher education students' perceived employability, academic engagement and stress among students in China. *Education + Training*, 63(5), 744–762.
- Mok, K. H., & Neubauer, D. (2016). Higher education governance in crisis: A critical reflection on the massification of higher education, graduate employment and social mobility. *Journal of Education and Work*, 29(1), 1–12.
- Morrison, A. R. (2014). “You have to be well spoken”: Students' views on employability with the graduate labour market. *Journal of Education & Work*, 27(2), 179–189.
- Ni, S. W., & Ishii, K. (2023). The relationship between consumer behavior and subjective well-being in Chinese teahouses and cafes: A social capital perspective. *Journal of Leisure Research*, 54(4), 429–452.
- Nimmi, P. M., Zakkariya, K. A., & Rahul, P. R. (2021). Channelling employability perceptions through lifelong learning: An empirical investigation. *Education + Training*, 63(5), 763–776.
- Okolie, U. C., Nwajiuba, C. A., Binuomote, M. O., Ehiobuche, C., Igu, N. C. N., & Ajoke, O. S. (2020). Career training with mentoring programs in higher education: Facilitating career development and employability of graduates. *Education + Training*, 62(3), 214–234.
- Peters, M. A., & Besley, T. (2019). China's double first-class university strategy: 双一流 (shuangyiliu). In M. A. Peters (Ed.), *The Chinese dream: Educating the future: An educational philosophy and theory Chinese educational philosophy reader* (pp. 63–69). Routledge.
- Piore, M. J. (2019). The dual labor market: Theory and implications. *Social Stratification* (pp. 435–438). Routledge.
- Pitan, O. S., & Muller, C. (2019). University reputation and undergraduates' self-perceived employability: Mediating influence of experiential learning activities. *Higher Education Research & Development*, 38(6), 1269–1284.
- Pitas, N., & Ehmer, C. (2020). Social capital in the response to COVID-19. *American Journal of Health Promotion*, 34(8), 942–944.

- Putnam, R. D. (1995). Bowling alone: America's declining social capital. *Journal of Democracy*, 6(1), 65–78.
- Ramírez, M. A., Ciriza, E. A., Gil, C. R., & Cabestre, F. J. R. (2017). Satisfaction with external internships: Do students acquire the professional skills necessary to improve their employability? *International Journal of Human Capital & Information Technology Professionals*, 8(1), 42–50.
- Richter, N. F., Schubring, S., Hauff, S., Ringle, C. M., & Sarstedt, M. (2020). When predictors of outcomes are necessary: Guidelines for the combined use of PLS-SEM and NCA. *Industrial Management & Data Systems*, 120(12), 2243–2267.
- Ringle, C. M., Wende, S., and Becker, J.-M. (2022). "SmartPLS 4". City: SmartPLS GmbH: Oststeinbek.
- Ringle, C. M., & Sarstedt, M. (2016). Gain more insight from your PLS-SEM results: The importance-performance map analysis. *Industrial Management & Data Systems*, 116(9), 1865–1886.
- Ringle, C. M., Sarstedt, M., Sinkovics, N., & Sinkovics, R. R. (2023). A perspective on using partial least squares structural equation modelling in data articles. *Data in Brief*, 48, 109074.
- Santos, G. G., Ferreira, A. P., & Pinho, J. C. (2019). Career attitudes and employability: Analysis of mediation via career strategies. *Employee Relations*, 42(2), 417–436.
- Sharma, P. N., Liengaard, B. D., Hair, J. F., Sarstedt, M., & Ringle, C. M. (2023). Predictive model assessment and selection in composite-based modeling using PLS-SEM: Extensions and guidelines for using CVPAT. *European Journal of Marketing*, 57(6), 1662–1677.
- Shmueli, G., Ray, S., Estrada, J. M. V., & Chatla, S. B. (2016). The elephant in the room: Predictive performance of PLS models. *Journal of Business Research*, 69(10), 4552–4564.
- Shmueli, G., Sarstedt, M., Hair, J. F., Cheah, J. H., Ting, H., Vaithilingam, S., & Ringle, C. M. (2019). Predictive model assessment in PLS-SEM: Guidelines for using PLSpredict. *European Journal of Marketing*, 53(11), 2322–2347.
- Silva, P., Lopes, B., Costa, M., Seabra, D., Melo, A., Brito, E., & Dias, G. P. (2016). Stairway to employment? Internships in higher education. *Higher Education*, 72(6), 703–721.
- Sturges, J., Guest, D., & Davey, K. M. (2000). Who's in charge? Graduates' attitudes to and experiences of career management and their relationship with organizational commitment. *European Journal of Work and Organizational Psychology*, 9(3), 351–370.
- Sun, W., & Guo, Q. (2015). It pays to be a leader: Economic returns to student leadership experiences for college graduates in mainland China. In *40th annual conference of the Association for Education Finance and Policy*. Washington, DC.
- Tomlinson, M. (2017). Forms of graduate capital and their relationship to graduate employability. *Education + Training*, 59(4), 338–352.
- Vanhercke, D., De Cuyper, N., Peeters, E., & De Witte, H. (2014). Defining perceived employability: A psychological approach. *Personnel Review*, 43(4), 592–605.
- Verick, S. S. (2023). The challenge of youth employment: New findings and approaches. *The Indian Journal of Labour Economics*, 1–17.
- Williams, D. (2006). On and off the net: Scales for social capital in an online era. *Journal of Computer-Mediated Communication*, 11(2), 593–628.
- Yang, Y., Zeng, D., & Yang, F. (2022). Internet use and subjective well-being of the elderly: An analysis of the mediating effect based on social capital. *International Journal of Environmental Research and Public Health*, 19(19).
- Zainuddin, S. Z. B., Pillai, S., Dumanig, F. P., & Phillip, A. (2019). English language and graduate employability. *Education + Training*, 61(1), 79–93.
- Zhang, Y., Wang, Q., Zhang, Y., Xu, C., & Xu, Z. (2023). Protean career orientation and proactive career behaviors during school-to-work transition: Mechanism exploration and coaching intervention. *Journal of Career Development*, 50(3), 547–562.
- Zhou, R., & Kaplanidou, K. (2023). The outcomes of social capital among event runners: Quality of life considerations. *International Journal of Sports Marketing & Sponsorship*, 24(5), 913–927.

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