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<https://doi.org/10.1057/s41599-024-04080-4>

OPEN

Development of the core occupational adaptabilities through the learning-orientated interaction of employees' proactivity and organizational support

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Core occupational adaptability (COA) is a crucial occupational competency and workplace competitiveness for employees. This study identified significant antecedent variables that impact COA and constructed a structural equation model to test the relationships among these variables. A questionnaire survey was administered to 519 employees from Chinese manufacturing enterprises to validate the model. The results revealed that perceived organizational support (POS), proactive personality (PP), and career-related continuous learning (CCL) positively predicted an employee's COA. PP and POS indirectly predicted COA through the mediating role of CCL, respectively. Moreover, employees' age moderated the direct effect between PP and COA positively, while employees' positions positively moderated the direct effect between POS and COA. This study demonstrated that CCL is critical in enhancing employee initiative, providing organizational support, promoting vocational learning, and improving overall COA levels among employees.

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Introduction

Worsened economic environment and occupational adaptability. The world economy has recently deteriorated and gradually declined due to ongoing regional wars, trade protectionism, and barriers between major economies (Zhang et al. 2023a, b). Enterprises are ensnared in increasingly challenging and unfavorable market conditions (Chistruga and Chirtoagă 2021; Zhang and Xu 2024). Manufacturing industries face production reductions or halt due to the shrinking market and decreasing demand. Consequently, they must grapple with their survival predicament through layoffs and wage cuts (Liu 2024; Yokoyama and Obara 2017). On the other hand, employees also harbor concerns regarding their career prospects as many of them endure layoffs and unemployment (Wang 2021).

The current industrial and commercial environment manifests the following features: (1) Market competition is increasingly fierce, with companies and employees sharing a common fate (Johnstone and Wilkinson 2018). The advantages of products and services are becoming more reliant on employees' highly specialized knowledge and skills (Sharma and Bhat 2020), necessitating vital innovation for both enterprises and employees (Jiang et al. 2023; Ni et al. 2021; Shkurti and Mustafa 2024); (2) The competitive, high-pressure, fast-paced market environment places significant stress on employees and businesses, resulting in a shallow sense of well-being among employees (Dima et al. 2021; Rosa 2010). Coping with such pressure requires employees to have high emotional management skills. (3) Customer fluidity and variable demands have become distinctive features of the new consumer market (Ramasundaram et al. 2023), ushering in an era of customer-centric production and service that demands organizations to meet customers needs while optimizing their experience effectively. Market competitiveness can only be enhanced by continuously improving product quality, service quality, and customer experience satisfaction levels and maintaining strong customer relationships for organizations to thrive (Calza et al. 2023). Consequently, the economic and commercial environment characteristics impose higher demands on employees' occupational abilities to adapt to various situations.

Adaptability, a concept that has been defined and explored for over 20 years (Loughlin and Priyadarshini 2021), has regained attention (Chen et al. 2020a, 2020b; Van der Horst and Klehe 2019). The widely accepted construct *career adaptability* (CA) (Savickas 1997; Savickas and Porfeli 2012), which is mainly based on career development theory (Walker-Donnelly et al. 2019) and career construction theory (Savickas 1997), was defined as psychological resources. However, it cannot reflect individual differences in professional competency or the specific ability to solve practical professional problems. Additionally, when enterprises face the crisis of survival and development, they need employees who possess actual professional abilities to help them develop rather than relying solely on ethereal psychological resources such as care, control, curiosity, and confidence to make individual career plans (AlKhemeiri et al. 2020; Alsabbah and Ibrahim 2014).

Given the limitations of the concept of CA, researchers have previously proposed another complementary concept, namely *occupational adaptability* (OA). OA was defined as the problem-solving abilities that enable employees to effectively address common professional challenges in their current roles, such as work tasks, occupational stresses, complex professional relationships, changes in occupations or positions, or compliance with corporate cultures. The purpose of OA is to explain individual differences in workplace abilities related to these professional themes (Wang 2014; Wang et al. 2016). However, while the OA construct aligns more closely with the connotation of adaptive ability in the workplace, it requires further development and

refinement to suit current occupational challenges better and be more culturally and industry-adaptable. Firstly, OA is a construct deeply rooted in Chinese enterprise culture. For instance, one dimension of organizational coordination ability within the OA construct reflects an individual's adherence to collectivist cultural norms in Chinese organizations. Secondly, although the OA construct primarily applies to productive enterprises, its applicability to service-oriented enterprises must also be considered. Therefore, there is a need for further development of more fundamental and general constructs that can adapt to different cultural backgrounds and industrial fields based on the foundation provided by OA constructs.

The connotation and construct of core occupational adaptability. To effectively address the primary challenges faced by organizations and individuals under the exacerbated economic circumstances described above, employees should possess fundamental and crucial competencies named *core occupational adaptability* (COA), referring to the capacity to navigate occupational challenges across diverse cultural contexts and industry domains, while proactively resolving work-related issues. In this study, COA is introduced as an enhanced iteration of the original concept of OA, reflecting alterations in enterprise environmental characteristics. The essence of COA exhibits the following attributes:

- It encompasses the core aspects of occupational competence and competitiveness about work rather than focusing on the occupational setting, such as career transitions, corporate culture, and management.
- It signifies the ability to employ a problem-solving approach when enterprises and employees confront challenges.
- It can be acquired and enhanced through systematic training, showcasing a broad spectrum of cultural adaptability and industrial applicability.

The theoretical foundation of COA is derived from the original concept of OA and the career capital theory, which posits that in a volatile economic and career development environment, human, social, and psychological capital play pivotal roles in enhancing an individual's competitiveness in their career progression and addressing workplace challenges (Xu et al. 2022, 2023). These three forms of capital respectively encompass the employee's (1) knowledge, skills, and experience, (2) social networks, and (3) motivation towards their field of expertise (Xu et al. 2022, 2023; Zhou et al. 2018). Consequently, these internal linkages establish connections between COA and career capital:

- Improved professional knowledge and skills can enhance an employee's human capital.
- The optimization of interpersonal relationships in the workplace and the prioritization of customer experiences can enhance one's social capital.
- The capacity to effectively manage occupational stress can enhance an individual's psychological capital.

According to career capital theory, these three abilities play a pivotal role in enhancing employees' occupational competitiveness and addressing job challenges, thus constituting the fundamental components of OA. Taking into consideration the points mentioned above, COA encompasses three factors as delineated below:

- The *knowledge enhancement ability* demonstrates adaptability to the evolving demands of work tasks. In addressing enterprises' development challenges, employees' learning

and innovation abilities are more demanding than ever before. Enterprises promptly adjust their product or service content and strategy to market demand changes (Hajda and Nikolov 2022), requiring employees to adapt to evolving professional knowledge and skills requirements continuously.

- The *emotional regulation ability* empowers individuals to adapt to work-related pressure and stress, which can arise from unpredictable market conditions, a precarious employment landscape, increasingly personalized customer demands, as well as the potential risks of layoffs and unemployment (Cao et al. 2021; He 2023; Li et al. 2021; Méndez-Rivero et al. 2022; Shin et al. 2021). Consequently, employees must adjust their mindset accordingly and possess adequate psychological resilience to safeguard their mental well-being (Zhang et al. 2021; Zhang et al. 2023a, b).
- *Customer management ability* to adapt to diversified and personalized customer needs based on OA's expansion of workplace communication ability. A shrinking market leads to a surplus of products, giving customers more choices while enterprises face fiercer competition than before. Customer management ability, crucial for the survival and development of current enterprises and employees (Calza et al. 2023), improves products and services through customer experience and relationship management to enhance market competitiveness.

The comparisons of constructs between COA and OA are presented in Table 1. COA and OA are competencies that enable employees to address primary occupational challenges effectively. However, COA represents the fundamental and critical ability directly associated with common occupational themes for all employees and daily professional work areas. It encompasses knowledge enhancement, emotional regulation, and customer management abilities, excluding organizational coordination and career transformation abilities. Two of these three dimensions are consistent with the OA construct, while customer management ability evolved from the workplace communication ability in OA.

The concept of COA exhibits cultural universality, as employees in any country must confront the challenges arising from turbulence and uncertainty in the global economy by enhancing their knowledge and skills, regulating their emotions, and meeting customer needs. This universality is rooted in fundamental human abilities and workplace dynamics that transcend cultural boundaries. For instance, the universal recognition of the importance of knowledge enhancement for career advancement and organizational competitiveness highlights its significance.

Similarly, emotional regulation is crucial in maintaining productivity and fostering positive workplace interactions across all professional environments. Furthermore, effective customer management is a universal business principle since customer satisfaction directly impacts an organization's success irrespective of geographic location.

The construction of COA is based on an individual's personality traits related to competency or ability, distinguishing it from adaptability concepts focused on performance, such as adaptive performance (Gorostiaga et al. 2022; Park 2019) and workplace adaptability (Chen 2022; Loughlin and Priyadarshini 2021). Regarding personality orientation, COA emphasizes the critical adaptive abilities contributing to individual differences in occupational development. In contrast, adaptability in a performance-oriented context encompasses various behavioral responses leading to outcome differences, including managing emergencies or crises, coping with work stressors, dealing with uncertain and unpredictable work situations effectively, solving problems creatively, and learning new work tasks and technologies while adhering to procedures (Pulakos et al. 2000). Furthermore, COA distinguishes itself from other concepts reflecting specific aspects of occupational adaptation, such as interpersonal adaptability (Oliver and Lievens 2014) or job adaptability (Chen et al. 2022; Liu et al. 2019a, b).

In conclusion, COA is a fundamental problem-solving ability in professional life that applies to different cultural backgrounds and industrial fields. Employees with COA can provide continuous innovative development possibilities for the organization and their professional activities in an ever-changing economic environment. This study will explore the antecedent variables or predictive factors and their paths to developing employees' COA.

Theoretical review and hypothesis development

The crucial antecedent variables that influence COA. Adaptability to environmental changes has significantly influenced individual career development and organizational performance (Chan 2014; Kunasegaran et al. 2016; Stoltz 2015). At the individual level, possessing high levels of CA can enhance individuals' self-efficacy in job-seeking (Gercek 2023). Individuals with strong CA are better equipped to adjust their expectations and goals at work, exhibit greater confidence and problem-solving abilities when faced with job difficulties and challenges, and experience higher levels of professional satisfaction (Shu and Ye 2019). Furthermore, CA contributes to improved individual job performance (Tran et al. 2022) and the alignment between

Table 1 Comparison of connotations and dimensions between OA and COA.		
Connotations	Dimensions	Themes
OA	Problem-solving abilities with which employees can effectively solve the current common professional problems, including two factors relating to occupational work and environment.	
	Knowledge enhancement ability	Knowledge and skills required by changes in tasks
	Emotional regulation ability	Psychological problems caused by work pressures
	Workplace communication ability	Communicating with colleagues, supervisors, and customers
	Organizational coordination ability	Corporate culture and management
COA	Career transformation ability	A change in occupation or position
	Knowledge enhancement ability	Knowledge and skills required by changes in tasks
	Emotional regulation ability	Psychological problems caused by work pressures
	Customer management ability	Customer demand as the centre of production and service

individuals and their work environment, thereby enhancing overall career satisfaction (Yen et al. 2023). Moreover, it fosters employees' career happiness while promoting innovative behaviors (Sheng and Deng 2021; Nguyen et al. 2021).

At the organizational level, innovating and creating becomes a pivotal factor for enterprises to overcome challenges, transform crises into opportunities, and pursue development (Hao et al. 2023; Zemlyak et al. 2023). Employees with a high level of CA can contribute to enhanced efficiency and quality, increased adaptability and flexibility, and fostering innovation and change within the organization. Consequently, this improves the sustainable competitive advantages of organizations (Guan 2018). Moreover, employees with a high CA can reduce recruitment and training costs for organizations while minimizing turnover rates and mitigating staff replacement expenses. Thus, it helps reduce enterprises' human resource expenditures (Zhou 2017).

The review revealed that the influencing factors of CA primarily revolved around two key aspects (Chen et al. 2020a, b). Firstly, demographic variables and personality traits, such as the Big Five personality traits and proactive personality, were identified as significant contributors to CA (Hirschi 2009). Secondly, environmental factors, including social support, were crucial in shaping CA. It is important to note that although COA and CA differ in theoretical perspectives and constructs, they share the same essence: adaptability in the workplace. Consequently, research findings on CA's main influencing factors are also relevant to COA. In this study, social support was examined explicitly within an organizational context. COA represents a fixed reflection mode resulting from individual-environment interactions; therefore, this study considered proactive personality and organization support as person-environment interactive factors affecting COA. Moreover, adaptability is itself a result of learning, so another critical factor, continuous learning, aiming to improve employees' COA and organizational innovation ability, would also be explored in their developing mechanism for COA.

Career-related continuous learning and COA. Innovation plays a pivotal role in an enterprise's response to emerging environmental challenges, novel opportunities, and shifts in market demand (Anderson et al. 2014). The ability of enterprises to innovate relies on the continuous learning process of their employees (Lemmetty and Billet 2023). Learning within the workplace typically entails an ongoing journey towards career development for employees, known as *career-related continuous learning* (CCL), encompassing updating professional knowledge and skills through active participation in diverse training activities, observation and emulation of predecessors, continual reflection on workplace experiences, proactive engagement with vocational mentors, and utilization of various social training platforms and internet resources (Dong et al. 2016). By continuously mastering professional expertise and job-specific competencies, individuals can effectively tackle work-related challenges while enhancing their adaptability to uncertain professional environments (Wang 2014).

In many theories and practices of "organizational learning" and "learning organizations," the CCL of employees, along with organizational learning culture and HR management strategy support, can enhance various aspects of employees' and organizations' competence (Rowold and Kauffeld 2008). For instance, strengthening international and innovation-oriented training can help improve employees' adaptability to development (Żur and Wałęga 2023). Significant positive correlations have been found between organizational learning and employees' workplace and career adaptability (Masih et al. 2013), pro-commitment to learning, and adaptability to technological change

(Fitri et al. 2020). A well-designed online learning community can enhance individual communication capacity and significantly improve learning outcomes of job-related skills and adaptability (Cao and Yu 2023). Therefore, this study proposes hypothesis 1: The CCL of employees can positively predict their COA.

Proactive personality and COA. Active personality, also known as *proactive personality* (PP), refers to a relatively stable personality or behavioral tendency for individuals to act to influence their surroundings actively (Chen et al. 2021). Proactive individuals are more likely to modify the work environment according to their characteristics and preferences (Bateman and Crant 1993) and engage in job redesign (Lerthirunvibul et al. 2023) to enhance their fit with the environment and improve their OA (Liao 2023). When work incorporates high levels of core job characteristics such as diversity, autonomy, and feedback, proactive individuals are more likely to align with their organizations and jobs (Din et al. 2023), which ultimately impacts job performance and career success (as measured by job satisfaction) (Bajaba et al. 2021; Lin 2020; Wang and Li 2021).

Individuals with PP are more inclined to be prepared for employment-related changes based on their interests (Jiang 2017). When faced with difficulties, they are more likely to adopt positive coping styles and proactively seek solutions to professional problems (Chen et al. 2021). They exhibit more significant exploratory and inclusive tendencies, adaptability in uncertain environments, and tend to accumulate more essential CA (Zhang and Chen 2021). Individuals with PP demonstrate an increased willingness to assist others and exhibit higher levels of learning engagement and performance (Chai et al. 2022; Wang et al. 2019; Xu et al. 2020), indicating a positive correlation between PP and employees' CA (Jiang 2017; Yang et al. 2021). Therefore, we can predict that PP positively influences employees' COA.

PP can affect the generation of positive emotions. Research shows that the extraversion of highly proactive individuals may drive their positive emotional experience (Verduyn and Brans 2012). Highly proactive individuals' adaptive behaviors are more likely to bring pleasant emotional experiences (Bao et al. 2022). Employees with more PP will reduce their negative emotions at work and enhance their emotional regulation ability (Loi et al. 2016).

Individuals with PP adjust their working style according to customers' needs to ensure customer satisfaction and establish good customer relationships (Choi and Hwang 2019). Additionally, individuals with PP tend to proactively find solutions during the service process instead of waiting for problems to arise, indicating their willingness to communicate with customers. Employees' possession of PP and ability to communicate effectively can minimize customers' negative perceptions of service quality (Liu et al. 2021). Therefore, possessing PP can enhance employees' customer management ability.

According to the social cognitive career theory (Lent and Brown 2019), PP can be regarded as a motivational resource for learning (Hua et al. 2020). The higher individuals' level of PP, the stronger their motivation for learning and academic expectations (Gao et al. 2024; Vignoli and Depolo 2019; Wu et al. 2020). Previous studies have demonstrated a positive association between individual PP and various learning activities (Sun et al. 2014), including self-directed learning (Lee 2020), reflective learning (Yang et al. 2022), and online learning (Chai 2022; Liao 2019; Martin et al. 2021). Therefore, PP has the potential to enhance CCL and emotional regulation ability. Meanwhile, considering the critical role of CCL in improving COA, CCL plays a mediating role in the relationship between PP and COA.

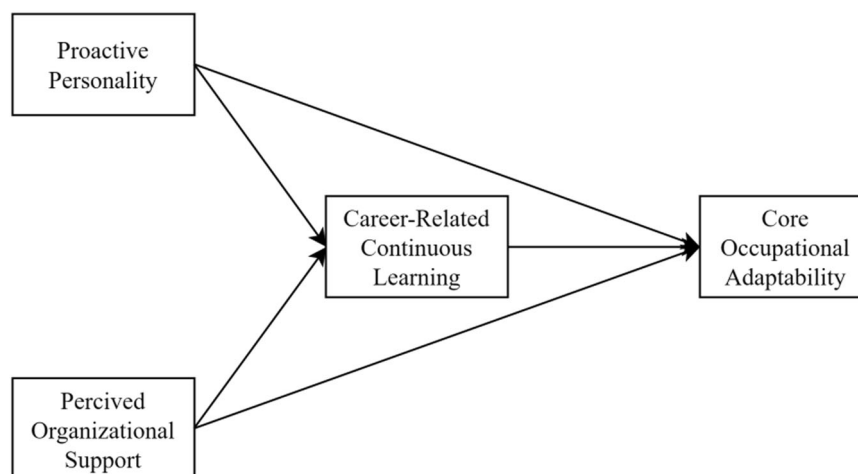


Fig. 1 Theoretical model.

Based on the above studies, hypothesis 2 of this study is proposed: PP is significantly correlated with CCL and COA, while CCL is also directly associated with COA. Therefore, CCL plays a mediating role between PP and COA.

Perceived organizational support and COA. Organizational support encompasses the comprehensive assistance provided by members of an organization, including social-emotional and job-related support or factors related to both work and interpersonal relationships (Muse and Stamper 2007). *Perceived organizational support* (POS) refers to employees' psychological and emotional responses regarding how much the organization values their contributions and cares about their well-being (Eisenberger et al. 1986). Employees' CA is influenced by the supportive organizational environment and the dynamic interaction between individuals and their surroundings. When an organization's benefits and environment meet employees' needs, it can enhance adaptability (Chang et al. 2023).

Research findings have demonstrated that the presence of POS significantly influences employees' CA (Park et al. 2020), facilitating their preparedness for future challenges, bolstering their self-confidence, and empowering them to surmount obstacles (Qin 2024). Ultimately, this fosters improved adaptability and success in their professional trajectories (Imran and Aldaas 2020) or leads to favorable career outcomes (Ocampo et al. 2018), such as heightened intrinsic motivation, increased work engagement, enhanced job status, proactive learning initiatives, and eventual acquisition of additional vocational skills (Hur et al. 2019).

Moreover, by meeting employees' social and emotional needs and fostering their career curiosity and exploration, POS enhances individuals' psychological resources for effectively adapting to workplace challenges and difficulties (Rasheed et al. 2020; Shi and Gordon 2020), facilitating self-transformation and promoting career development (Dane 2024; Huang 2021). Furthermore, POS mitigates job burnout among employees (Claponea and Iorga 2023) and improves their mental well-being and work performance, thereby advancing their career progression (Umar and Hassan 2019).

In addition, providing resources and training by POS enables employees to fully realize their potential, thereby fostering a more significant concern for service quality among employees (Affum-Osei et al. 2019). Consequently, this facilitates more effective customer interactions and the delivery of superior services, ultimately enhancing both customer satisfaction and loyalty (Polly 2022).

Positive correlations were also identified between POS and employee learning (Mylona and Mihail 2019). POS can enhance the quality of individual learning (Taroreh et al. 2023), which, in turn, is positively associated with organizational learning (Tu et al. 2022). Organizations must foster a conducive learning environment and provide HR training to support employees' learning and career development. Research indicates that continuous management support from leaders contributes to establishing and cultivating an organizational learning culture (Al-Tarawneh and Al-Adaileh 2021), subsequently influencing employees' job involvement (Saraf et al. 2022). Moreover, supportive job characteristics such as skill diversity, autonomy, meaningfulness, and cognitive complexity significantly enhance employees' future-oriented learning capability (Jeske and Lippke 2021).

To sum up, hypothesis 3 proposes that POS positively correlates with employees' CCL and COA, while CCL positively correlates with COA. Therefore, CCL plays a mediation role between POS and COA.

Current study. This study explores the antecedent variables and their interactions to provide a reference for developing employees' COA. A hypothesis model is constructed to examine the effects of PP, POS, and CCL on COA and the mediating roles of CCL. Figure 1 illustrates the model addressing the following questions: How do PP, POS, and CCL influence employees' COA? How do they interact?

Methods

Participants. Six hundred employees from different enterprises, including production enterprises and service companies in Chongqing, Jiangsu, and Zhejiang, voluntarily agreed to participate in the paper questionnaire survey. Twenty-eight questionnaires were excluded due to a lack of other report scale data. Finally, a sample of 519 valid participants was obtained (mean age = 30.32, $SD = 8.27$, range = 18–56). Among them, 260 were male, and 259 were female. The education level of the participants ranged from primary school to postgraduates, among whom the education level above high school was the highest ($N = 463$, 89.21%). The participants' vocations covered a wide range as production operators ($N = 81$, 15.61%), administrative staff ($N = 100$, 19.27%), sales service staff ($N = 106$, 20.42%), and technical service staff ($N = 95$, 18.30%), department managers or supervisors ($N = 57$, 10.98%), administrative staff ($N = 13$, 2.50%), and senior managers ($N = 10$, 1.93%) or others ($N = 57$, 10.98%).

Table 2 Descriptive statistics and correlated coefficients.								
	M	SD	1	2	3	4	5	6
1. PP	25.27	5.21						
2. POS	30.36	9.40	0.51**					
3. CCL	54.53	9.67	0.42**	0.43**				
4. COA	62.50	9.46	0.33**	0.32**	0.41**			
5. CMA	21.27	3.85	0.29**	0.27**	0.35**	0.83**		
6. KEA	20.28	3.73	0.24**	0.29**	0.30**	0.80**	0.53**	
7. ERA	20.95	4.10	0.26**	0.22**	0.35**	0.80**	0.48**	0.44**

Note. ** $p < 0.01$, PP proactive personality, POS perceived organizational support, CCL career-related continuous learning, COA core occupational adaptability, CMA customer management ability, KEA knowledge enhancement ability, ERA emotional regulation ability.

Measures

Proactive personality scale (PPS). A revised and tested Chinese version (Shang and Gan 2009) originated from a uni-dimensional English scale (Claes et al. 2005) of 9 items was used in this study. Each item is scored on a 5-point Likert scale from 1 (“Totally inconsistent”) to 5 (“Fully consistent”). Cronbach’s coefficient α of the scale in this study was 0.83.

Perceived organizational support scale (POSS). A simplified uni-dimensional nine items of the Chinese version (Fields 2004) of the *Perceived Organizational Support Scale* developed by Eisenberger et al. (1986) was used. Each item is rated on a 7-point scale from 1 (“Totally inconsistent”) to 7 (“Fully consistent”). Cronbach’s coefficient α of the scale in this study was 0.90.

Career-related continuous learning scale (CCLS). It is a 16-item scale developed according to the definition of CCL (Dong et al. 2016) with four dimensions: learning consciousness (4 items), learning behavior (4 items), learning application (4 items), and learning effect (4 items), scoring on a 5-point Likert scale. Cronbach’s coefficient α s of the subscales in this study were 0.78, 0.78, 0.81, and 0.77, of the total was 0.89. CFA indicated an excellent construct validity, $\chi^2/df = 4.90$, GFI = 0.90, RMSEA = 0.08, NFI = 0.86, IFI = 0.89, TLI = 0.86, CFI = 0.89.

Core occupational adaptability scale (COAS, Other-report form). It is revised from a self-report form of the *Occupational Adaptability Scale for the employees* (Wang 2014), including three dimensions: the ability of knowledge enhancement (e.g., How much professional knowledge he/she has compared to the job requirement?), the ability of emotional regulation (e.g., How does he/she behave when working under heavy pressure?) and the ability of customer management (e.g., How is his/her communication ability with clients/customers?). In this study, the other-report scale was adopted. That is, the second person “you” of all items in the original scale was changed to the third person “he/she.” The items in the dimension of workplace communication of the original scale were modified to add the content of customer management ability. The specific items can be found in the supplementary material. Each dimension has four items scored on a 7-point Likert scale ranging from 1, “inferior,” to 7, “excellent.” Cronbach’s coefficient α s for the subscales were 0.84, 0.78, and 0.82, and the total was 0.87. Fitting indexes of CFA were $\chi^2/df = 2.85$, GFI = 0.92, RMSEA = 0.06, NFI = 0.88, IFI = 0.92, TLI = 0.90, CFI = 0.92.

Procedures and data analysis. During the formal testing in this study, all employees were asked to fill out all self-report scales, including PPS, POSS, and CCLS, which were put on the first page of the questionnaire. Then, coworkers or superiors were asked to independently complete the other-report form of COAS on the

back page, ensuring the measure’s objectivity and accuracy and avoiding possible rater bias. All item content and expressions were the same in the self-report and other-report scales except that the second person, “you,” is used in the former, whereas the third person, “he/she,” is used in the latter.

In addition, convenient sampling and cluster sampling methods were used to contact small and medium-sized enterprises in Jiangsu, Zhejiang, and Chongqing to survey employees in production and service departments. The employees interviewed were asked to complete the self-report scales on the front page first. His workmate or supervisor completed the other-report scale on the back page in the final. After the questionnaire was collected, the data was computed for statistical analysis. IBM SPSS 25.0 was used for descriptive statistics and correlation analysis; IBM AMOS 25.0 was used for the SEM test.

Results

Descriptive statistics, correlation coefficients, and demographic differences. The descriptive statistical results, such as average and standard deviation, correlation coefficients of the variables, and the demographic difference of COA, were summarized in Table 2. The results showed that all variables were significantly positively correlated. An independent sample *T*-test was also used to investigate employee differences in PP, POS, CCL, and COA. It showed that there were no other demographic differences in the above variables except positions, the PP ($t = -4.7$, $p < 0.01$), POS ($t = 7.75$, $p < 0.01$), CCL ($t = 2.21$, $p < 0.01$) and COA ($t = 5.43$, $p < 0.01$) of employees in management positions were significantly higher than those in production positions. So, positions may moderate the direct relationship between the above variables.

Antecedent variables model test. The structural equation model (SEM) of the antecedent variables of COA was tested using AMOS. The fitting indexes of the model were $\chi^2/df = 2.63$, GFI = 0.98, RMSEA = 0.06, NFI = 0.97, IFI = 0.98, TLI = 0.96, CFI = 0.98, indicating a good model fitting.

Bootstrapping was used to estimate the direct and indirect effects through 5000 repeated samplings. The results of non-standardized regression coefficients, standard errors, and 95% confidence intervals are shown in Fig. 2 and Table 3. Hypothesis 1 was confirmed. The SEM test indicated that PP and POS positively affected COA ($B = 0.14$, $SE = 0.07$, $p < 0.01$; $B = 0.07$, $SE = 0.03$, $p < 0.01$). CCL had a significant positive direct effect on COA ($B = 0.42$, $SE = 0.08$, $p < 0.001$). PP and POS also positively affected CCL ($B = 0.27$, $SE = 0.05$, $p < 0.001$; $B = 0.15$, $SE = 0.03$, $p < 0.001$). Besides, the results of the mediating effects test with bootstrapping (sampling 5000 times) showed that PP and POS had significant indirect effects on COA through the mediating role of CCL ($B = 0.12$, $SE = 0.03$, $p < 0.01$; $B = 0.06$, $SE = 0.102$, $p < 0.01$). Therefore, hypotheses 2–3 were confirmed.

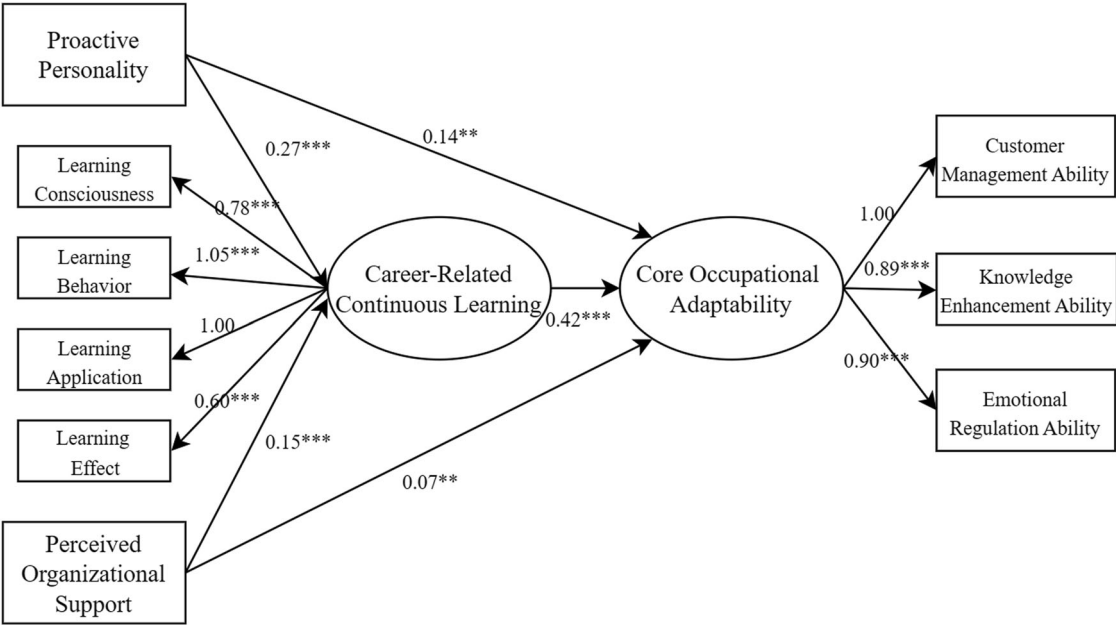


Fig. 2 Structural equation model test.

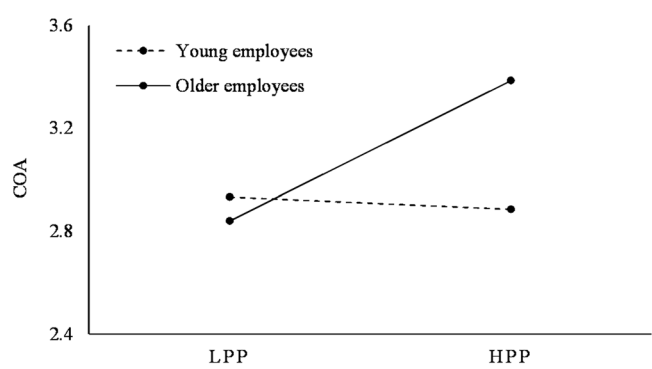


Fig. 3 Moderating effect of age.

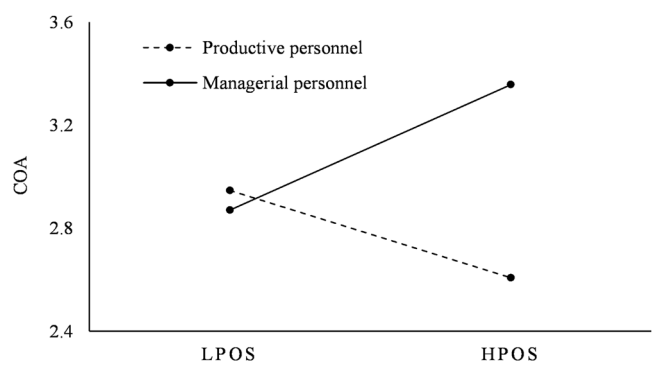


Fig. 4 Moderating effect of positions.

Moderating effects between antecedent variables and COA. The moderating effect of the direct effects between PP, POS, CCL, and COA in the model was tested with the variable of *positions* and *age*. The results show that positions can moderate the direct effects of POS on COA (see Figs. 3, 4). With the increase of POS, the level of COA of management staff will also increase ($\beta = 0.21$, $t = 3.39$, $p < 0.001$); however, for employees in production positions, the increase in POS reduced the COA of employees ($\beta = 0.01$, $t = 0.20$, $p = 0.84$). Age can also moderate the direct

Table 3 Structural equation model result.

		<i>B</i>	<i>SE</i>	Percentile 95% CI	
				Lower	Upper
Direct effects	PP → COA	0.14**	0.07	0.01	0.28
	POS → COA	0.07**	0.03	0.01	0.14
	PP → CCL	0.27***	0.05	0.18	0.37
	POS → CCL	0.15***	0.03	0.09	0.19
	CCL → COA	0.42***	0.08	0.26	0.59
Indirect effects	PP → CCL → COA	0.12**	0.03	0.06	0.18
	POS → CCL → COA	0.06**	0.02	0.03	0.10

Note. ** $p < 0.01$, *** $p < 0.001$, PP proactive personality, POS perceived organizational support, CCL career-related continuous learning, COA core occupational adaptability.

effect of PP on COA. With the increase in employee PP, older employees' COA levels increased faster than younger employees ($\beta = 0.20$, $t = 3.76$, $p < 0.001$).

Discussions

The antecedent variables and paths of developing COA. The study investigated the synergistic effects of personality traits and organizational environmental characteristics on COA by examining the direct impact of PP and POS on COA and the indirect effects mediated by CCL. The results demonstrated that PP, POS, and CCL were crucial antecedent variables for COA. Moreover, CCL played a pivotal mediating role in the influencing mechanism of COA. These findings are consistent with prior research indicating that cognitive ability and learning goal orientation are predictors of COA (Guan et al. 2017; Rudolph et al. 2017). Importantly, fostering learning behaviors such as vocational training guided by employees' cognitive abilities and goal orientations can effectively address various challenges associated with COA. Additionally, CCL enhances employees' COA and the quality of human capital, ultimately leading to improved employee performance (Saffar and Obeidat 2020).

The study revealed significant associations between PP and COA. Firstly, PP was found to impact COA, directly aligning with

previous research findings. Moreover, it was observed that employees' age moderates the influence of PP on COA. Specifically, a noteworthy positive correlation exists between PP and COA for older workers. As levels of PP increase among older employees, their COA also demonstrates an upward trend. However, no significant correlation was identified between PP and the levels of COA in younger employees, suggesting that age differentiates employees' learning ability, learning experience, and learning efficacy. Older individuals exhibit more excellent initiative towards learning along with more precise goals and straightforward strategies, leading to enhanced outcomes and increased adaptability towards occupational challenges.

On the other hand, PP indirectly influences COA through CCL. It can stimulate employees' motivation to learn, maintain a positive learning state, achieve effective learning outcomes, and enhance their professional quality and abilities. Ultimately, this enables them to handle workplace challenges and problems effectively. According to the principle of ecosystem, human development is a process of interacting with the environment. Changes in the environment can constrain passive personalities and negatively shape individuals influenced by their surroundings; however, individuals with high levels of PP characteristics are not negatively affected but actively explore knowledge and skills to change their environment. As a result, they accumulate more career experience to cope with various problems in the career development process and demonstrate better adaptability.

The study also revealed the associations between POS and COA. Firstly, a supportive organizational environment characterized by democratic leadership, positive colleague relationships, and job autonomy facilitates employees' adaptation to professional challenges and difficulties. Moreover, employees' positions moderated the relationship between POS and COA. Specifically, a stronger positive correlation exists between managers' POS and their COA due to variations in the availability of organizational support resources based on position. Managerial personnel have greater access to these resources than ordinary production and service workers, resulting in higher career capital and COA levels.

Indirectly, an employee's COA is enhanced through the mediating effect of CCL under the condition that organizations can provide the necessary help and support for employees' learning process, such as employee training programs, learning resources supply, flexible time, mentoring, and feedback. According to the theory of social exchange between organizations and their members, only when organizations provide sufficient support to employees can they acquire more career capital to enhance organizational performance. POS is crucial in stimulating employees' motivation and engagement in learning activities (Liu 2019b), ultimately improving their COA and organizational performance (Umar and Hassan 2019).

Research contributions and practical implications. We formulated a novel conceptualization of COA based on prior research, which holds significant theoretical innovation potential within occupational psychology. Building upon this innovative concept of COA, our study further constructed and validated a comprehensive model elucidating the critical factors and pathways that influence COA. The findings highlight the pivotal role played by CCL in fostering employees' development of COA, thereby unveiling adaptation as an outcome of learning while substantiating the essential attributes of COA: developability and learnability. These empirical insights shed light on the interactive process between individuals and organizations that underlies the cultivation of employees' COA, offering a scientific foundation and practical strategies for effective enterprise human resource management.

The study revealed that employees' age moderates the relationship between employee initiative and COA, highlighting the importance of time and experience accumulation for employees to adapt to their occupations effectively. Furthermore, it demonstrated that personnel positions moderate the relationship between POS and COA, emphasizing the need for organizations to consider how positions may impact equity and the availability of career development resources. These findings underscore the intricate interplay among PP, POS, and COA. When investigating factors influencing employee occupational development, it is crucial not to overlook potential interference from variables such as seniority and positions on individual developmental status.

This study supplemented and expanded the career capital theory, emphasizing that employees' human, social, and psychological capital enhances their occupational competitiveness and adaptability (Xu et al. 2023). Expressly, CCL, POS, and PP represent human, social, and psychological capital; thus, they can significantly improve employees' COA. Moreover, it is found that POS and PP influence COA through the mediating role of CCL. These findings highlight the importance of social and psychological capital in fostering employee COA by facilitating human capital development. These results are consistent with prior research indicating that these three types of capital enhance employee adaptability through interdependence and mutual influence.

The findings of this study offer a scientific foundation and practical strategies for the self-management of employees' career development as well as HR training in enterprises. In terms of individual employees, their personality traits and learning endeavors can augment their COA. They must integrate their proactive attitude with CCL to render the learning process more purposeful and effective. Employees should seize all available opportunities and resources to enhance the knowledge and skills required in the workplace, improve customer experience and relationships, and effectively cope with occupational pressures, bolstering their COA and professional competitiveness. For organizations, this study provides a theoretical underpinning for employees' COA development training by enhancing an employee-centered organizational support system along with a vocational learning mechanism to fortify overall adaptability and performance.

First, the organization should provide personalized and practical support to enhance employees' COA improvement, entailing redesigning and offering differentiated career development assistance tailored to individuals of different ages and positions, ensuring that benefits are not disproportionately skewed towards managers. Organizations can achieve this by conducting regular needs assessments, implementing personalized career development plans, providing diverse training and learning opportunities, establishing mentoring programs, offering flexible work arrangements, introducing incentive and recognition mechanisms, and promoting wellness programs.

Second, organizations should enhance their provision of stimulating and targeted career development opportunities to employees by implementing diverse training programs and online learning platforms, fostering self-directed learning and knowledge sharing, utilizing learning management systems to monitor employees' progress and assess outcomes, and establishing collaborations with universities and industry associations. These strategies ensure employees continuously acquire up-to-date knowledge and skills, ultimately enhancing their COA and overall productivity.

Finally, enterprises must proactively foster and sustain employees' work initiative and enthusiasm by cultivating a culture of utmost respect and unwavering support. The

organization must establish an equitable, transparent, and adaptable atmosphere to achieve this. Furthermore, in response to evolving business landscapes, the enterprise should undertake organizational redesign initiatives to eliminate bureaucratic hurdles and departmental barriers that impede employee initiative. The organization will enhance flexibility and practicality while creating conducive conditions for improving employees.

Research limitations and prospects. Although the research hypothesis and model construction are grounded on robust theoretical foundations, and the model's design is concise and compelling, using a cross-sectional design in this study precludes cross-hysteresis analysis. Consequently, the dynamic process of the model cannot be observed and analyzed longitudinally, thereby impeding solid methodological support for establishing a causal association between the antecedent variables PP and POS, the mediation variable CCL, and the outcome variable COA. Therefore, future studies should employ a longitudinal design to investigate additional factors.

It is essential to acknowledge that the concept and framework of COA possess inherent cultural universality. Careers worldwide share common themes and require similar adaptability, such as knowledge enhancement, emotional regulation, and customer management, all of which transcend cultural differences. However, it should be noted that the sample for this study is comprised solely of employees from Chinese companies. To some extent, its cultural universality has yet to be fully verified. Therefore, future research should aim to validate COA models in various cultural and organizational contexts to ensure their broader applicability and effectiveness.

Conclusion

Employees' PP, POS, and CCL could positively predict their COA. PP and POS indirectly predicted COA, respectively, through the mediating role of CCL. Employees' age positively moderated the direct effect between PP and COA. Employees' positions positively moderated the direct effect between POS and COA. This study showed that CCL is critical to improving employees' COA. By enhancing employee initiative and providing organizational support, enterprises promote employee vocational learning and improve employee COA. The results contribute to exploring the COA development mechanism and deepening the employee career capital theory.

Data availability

The data is available in the supplementary material of this article.

Received: 30 November 2023; Accepted: 29 October 2024;

Published online: 15 November 2024

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Acknowledgements

This study was funded by General Project of Social Science Foundation of Jiangsu Province (22GLB011) and Key Project of Philosophy and Social Sciences in Jiangsu Province (2021SJZDA149).

Author contributions

Yifu Wang: conceptualization, data curation, formal analysis, writing-original draft, writing-revision & editing; Qian Xu: formal analysis, writing-original draft, writing-revision & editing; Peihao Yin: data analysis, charting and tabulating; Juan Zhang: writing-revision & editing; Lihua Zhang: writing-revision & editing.

Competing interests

The authors declare no competing interests.

Ethical approval

This study was conducted according to the Declaration of Helsinki. The protocol was approved by Ethics Committee of Huaiyin Normal University (Number: HNU-ESS-2022050101).

Informed consent

Informed consent was obtained from all participants included in the present study.

Additional information

Supplementary information The online version contains supplementary material available at <https://doi.org/10.1057/s41599-024-04080-4>.

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