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# **Exploring the impact of older knowledge workers' career capital on career success: with self-efficacy and job crafting as mediators and perceived organisational support as a moderator**

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**Abstract:** With the continuous intensification of population ageing in China, how to leverage the role of older knowledge workers in the workplace has become an urgent issue in China's human resource development and management. Therefore, this study focuses on older knowledge workers in China's private colleges and universities as the main research subjects. Through the research methods of 1,077 valid questionnaire surveys and empirical estimation, it was found that career capital (including human capital, social capital, and decision-making capital) significantly promotes successful workplace ageing, with each dimension having a positive effect on workplace success. Career capital is significantly positively correlated with self-efficacy. Self-efficacy and job crafting mediate the relationship between career capital and successful workplace ageing. However, perceived organisational support negatively moderates the relationships between human capital and self-efficacy, as well as between career capital and job crafting. This study proposes coping strategies such as hierarchical management of career capital, collaborative activation of self-efficacy and job crafting, dynamic adaptation of organisational support strategies, and precise policy implementation based on age segmentation.

**Keywords:** career capital of older knowledge workers; workplace success; self-efficacy; job crafting; perceived organisational support.

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## 1 Introduction

According to the data from the National Bureau of Statistics of China, by the end of 2023, China's ageing rate had reached 15.38%, with the population aged 65 and above reaching 217 million. China has become one of the countries with the largest elderly population and the fastest ageing rate in the world. As society grapples with intensifying demographic challenges such as ageing and declining birth rates, coupled with the widespread adoption of flexible retirement policies, the proportion of older workers within enterprises has witnessed a continuous uptrend. Consequently, the development and management of human resources among older employees have emerged as critical imperatives (Nuseir et al., 2024). Knowledge workers, in particular, constitute the cornerstone of technological innovation, serving as a direct manifestation of a firm's innovative prowess and an indispensable component of its innovation-driven resource pool (Yu et al., 2021). Therefore, fostering the development and utilisation of older knowledge workers stands as an inevitable and strategic move under the framework of proactive ageing policies. A review of the existing literature reveals a predominant focus on the knowledge worker population as a whole (Bunjak, 2021; Deng et al., 2023; Tang, 2025; Wang et al., 2023a; Xiong et al., 2023). However, there remains a notable gap in systematically exploring how the unique career capital accumulation patterns of older employees (aged 41 and above), such as accumulated experience and extensive

professional networks, translate into career success. Moreover, the mediating roles of self-efficacy and job crafting in this context are not fully elucidated, with the age-specific boundary conditions for the mediating effect of self-efficacy yet to be validated. Furthermore, the cognitive and relational dimensions of self-remodelling among older employees are seldom incorporated into self-remodelling scales (Cai et al., 2024; James, 2022; Kous et al., 2023; Sergey et al., 2024; Sharon, 2019; Wang et al., 2024; Zheng et al., 2022). Additionally, existing measures of career success tend to emphasise objective indicators such as promotion rates, neglecting the unique success criteria valued by older employees (Wang et al., 2023b; Yoon, 2019; Zhao et al., 2021). This limitation hinders our ability to identify effective pathways for promoting career success among older knowledge workers based on current research findings.

Although the gradual increase in the proportion of older knowledge workers is not a phenomenon unique to China, given the scale, speed, and complexity of China's population ageing, along with its potential to provide 'major-country solutions' to the global community, and considering that Shaanxi Province embodies both the general characteristics of ageing across the nation and the unique features of the western region – with 22.4% of its population aged 60 and above and 15.7% aged 65 and above by the end of 2024 – its data, policy practices, and historical evolution can serve as a typical case study for research on ageing in China. Moreover, research data for Shaanxi is more readily accessible compared to other regions. Hence, this study selects relevant samples from Shaanxi Province, China, focusing especially on older employees (aged 41 and above) (Crampton and Hodge, 2007; Wang et al., 2018). From the perspective of career capital, it delves into the mediating effects of self-efficacy and job crafting, as well as the moderating effect of perceived organisational support, aiming to uncover the activation pathways of career capital, the influence mechanisms of self-efficacy and job crafting, and the adaptive patterns of organisational support strategies for older knowledge workers. By doing so, it seeks to address the myriad challenges associated with unlocking the value of older knowledge workers (Cui et al., 2023; Kowal, 2025; Kaur and Solomon, 2025). Furthermore, this study analyses the differences in career capital characteristics and psychological needs across various age segments of employees. It constructs an integrated model encompassing 'hierarchical management of career capital, synergistic activation of self-efficacy, and dynamic adaptation of organisational support'. This model provides a theoretical foundation and practical framework for enterprises to optimise their human resource allocation and enhance the level of successful ageing in the workplace among older employees, thereby contributing to the efficient development of human resources and sustainable social development in the context of population ageing.

## **2 Theoretical foundations and research hypotheses**

### *2.1 Theoretical foundations*

This study is grounded in the life course theory (LCT), conservation of resource theory (COR) and role theory (RT). The LCT focuses on the specific mechanisms by which individuals strive to balance age-related gains and losses throughout their life course (Lin, 2003), with the selection, optimisation and compensation theory (SOC) and the socioemotional selectivity theory (SST) as representative frameworks. The SOC theory posits that older adults achieve positive ageing by selecting suitable activity domains,

optimising resource allocation and utilisation, and adopting compensatory strategies to offset losses (Baltes and Baltes, 1990). The SST, a lifelong social motivation theory centred on time perception, emphasises that age differences in goals and preferences are explained by perceived time horizons rather than chronological age (Li et al., 2009). In this study, the LCT provides a theoretical foundation for the notion that individuals can maintain adaptability between themselves and their environment through control strategies, thereby effectively achieving successful workplace ageing (Kooij, 2015; Kooij et al., 2020). The COR theory suggests that individuals work to preserve their existing resources, leverage them for value creation, and continually seek additional resources, integrating motivation and stress processes (Qu et al., 2014). It serves not only as a theoretical framework for explaining stress coping but also as a comprehensive perspective for understanding human resource management behaviours, providing significant theoretical guidance for organisational management and individual development. In this study, the COR theory facilitates the analysis of how older employees achieve workplace adaptation through resource conservation (e.g., reducing energy expenditure) and resource acquisition (e.g., learning new technologies). Furthermore, it can be integrated with the SST and the SOC theory to construct an ‘individual-environment’ interaction model, emphasising the crucial role of organisational support (e.g., flexible work arrangements, mentorship programs) in resource replenishment. Role theory examines the roles and behavioural patterns in individual interactions, with Stryker (2000) noting that an individual’s role identity reflects their position within a specific social organisation. When this identity is recognised and accepted by others, individuals tend to identify with and maintain it as a crucial aspect of self-presentation. Role theory highlights that individuals’ self-identity processes are profoundly influenced by socially constructed roles closely tied to them. In this study, RT elucidates how older knowledge workers accumulate career capital through role adjustment; it reveals that when perceived organisational support is enhanced, employees can more effectively allocate resources to cope with role conflicts, and provides a basis for the design of organisational support systems. In summary, within this study, the LCT provides a life-course perspective to explain the career capital accumulation mechanisms of older knowledge workers, the COR theory elucidates psychological and behavioural mechanisms to offer core explanations for mediating mechanisms (self-efficacy and job crafting), and RT anchors the social interaction context to provide theoretical support for the moderating mechanism (perceived organisational support).

## 2.2 *Research hypotheses*

Based on the life course theory, conservation of resources theory and role theory, this study explores the impact of older knowledge workers’ career capital on successful workplace ageing and constructs a pathway with self-efficacy and job crafting as mediators and perceived organisational support as a moderator.

### 2.2.1 *Impact of older knowledge workers’ career capital on successful workplace ageing*

Career capital encompasses human capital, social capital, and decision-making capital (Kaisu and Vesa, 2021; Xu et al., 2022; Zhao, 2021), serving as a prerequisite for

successful workplace ageing. Gong et al. (2020) found that older knowledge workers possess strong self-actualisation aspirations and professional skills, enhancing their appeal to employers. Li and Hu (2024) explored the antecedent conditions and diverse driving pathways for late-career successful workplace ageing in China, identifying active choice, optimisation and compensation, psychological capital investment, and job design as necessary conditions. Regarding human capital, Cloutier (2013) emphasised the importance of 'lifelong learning' in adapting to technological changes, while Zheng (2018) considered professional skills and experience key resources for successful workplace ageing. In terms of social capital, Feldman and Vogel (2014) confirmed its role, along with career experience, in supporting workplace adaptation, and Lü et al. (2019) noted its ability to stimulate innovation. For decision-making capital, Zacher and Frese (2011) highlighted the significance of decision-making experience and strategies, Wang (2017) pointed out its assistance in career path adjustments, and Liu et al. (2020) confirmed its role in extending career longevity. Based on these findings, the following hypotheses are proposed:

- H1 Older knowledge workers' career capital will positively influence successful workplace ageing.
- H1a Older knowledge workers' human capital will positively influence successful workplace ageing.
- H1b Older knowledge workers' social capital will positively influence successful workplace ageing.
- H1c Older knowledge workers' decision-making capital will positively influence successful workplace ageing.

### *2.2.2 Impact of older knowledge workers' career capital on self-efficacy*

Career capital represents the accumulated outcomes of an individual's professional experiences (Zhao, 2021), encompassing growth in knowledge, motivation, self-concept, and maturity in experience, ability, and adaptability. It includes human capital, social capital, and psychological capital, which enhance personal psychological positivity and career competitiveness (Qian et al., 2023), facilitating a shift from passivity to proactivity and strengthening control over life and workplace environments (Tribble and McNall, 2008). Kooij et al. (2014) confirmed a close association between older workers' self-efficacy and career capital, enhancing work performance and career satisfaction. Zacher et al. (2017) further indicated that career capital strengthens older workers' work abilities and confidence in addressing workplace challenges. Therefore, the following hypotheses are proposed:

- H2 Older knowledge workers' career capital will positively influence self-efficacy.
- H2a Older knowledge workers' human capital will positively influence self-efficacy.
- H2b Older knowledge workers' social capital will positively influence self-efficacy.
- H2c Older knowledge workers' decision-making capital will positively influence self-efficacy.

### 2.2.3 *Impact of self-efficacy on successful workplace ageing*

Bandura (1997) noted the critical role of self-efficacy at all career stages, particularly for individuals in late career stages, where high self-efficacy aids in better coping with challenges and stress. Stajkovic and Luthans (1998) found a significant positive correlation between self-efficacy and work performance, with high self-efficacy individuals performing better on complex tasks, crucial for late-career employees handling more intricate tasks. Zaniboni et al. (2013) showed that older workers with high self-efficacy exhibit stronger adaptability and lower burnout in the face of task diversity. Truxillo et al. (2015) emphasised that enhancing older workers' self-efficacy is key to maintaining their work performance and career success. Rudolph et al. (2018) highlighted the importance of self-efficacy in older workers' leadership effectiveness when discussing leadership behaviours across generations, noting that older leaders with high self-efficacy excel at motivating teams and addressing complex management challenges. Therefore, the following hypothesis is proposed:

H3 Self-efficacy will positively influence successful workplace ageing.

### 2.2.4 *Mediating effect of self-efficacy*

Stajkovic and Luthans (1998) indicated that higher self-efficacy among older workers enhances work performance and workplace adaptability, facilitating successful workplace ageing. Career capital can indirectly improve work performance and workplace success by boosting self-efficacy. Feldman and Vogel (2014) showed a close link between subjective workplace success and career capital, especially for older workers, where career capital enhances perceived workplace success by strengthening self-efficacy. Zacher and Frese (2011) proposed that self-efficacy is a key driver for older workers to implement SOC strategies to maintain workplace competitiveness, with career capital aiding strategy implementation by enhancing self-efficacy. Wang and Shi (2013) argued that employees with high self-efficacy face career challenges more positively and adapt more effectively, with self-efficacy serving as a vital psychological resource for older workers to maintain workplace competitiveness. Based on these findings, the following hypotheses are proposed:

H4 Self-efficacy mediates the relationship between older knowledge workers' career capital and successful workplace ageing.

H4a Self-efficacy mediates the relationship between older knowledge workers' human capital and successful workplace ageing.

H4b Self-efficacy mediates the relationship between older knowledge workers' social capital and successful workplace ageing.

H4c Self-efficacy mediates the relationship between older knowledge workers' decision-making capital and successful workplace ageing.

### 2.2.5 *Impact of older knowledge workers' career capital on job crafting*

Kooij et al. (2019) noted that career capital accumulation significantly enhances employees' proactive adjustment abilities regarding work content and relationships. Human capital (e.g., skills, knowledge, and experience) enables employees to flexibly

adjust work tasks and roles; social capital (e.g., professional networks and support systems) helps employees access resources and support for better job crafting; psychological capital (e.g., self-efficacy and resilience) strengthens employees' willingness and ability to actively change their work environment. Wang et al. (2020) found that older knowledge workers' career capital (especially social and psychological capital) significantly positively influences job crafting, particularly when addressing late-career challenges. Feldman and Beehr (2022) discovered that older knowledge workers' career capital serves as a crucial resource for job crafting, with management support (e.g., training and career development opportunities) further promoting career capital accumulation and job crafting. Based on these findings, the following hypotheses are proposed:

H5 Older knowledge workers' career capital will positively influence job crafting.

H5a Older knowledge workers' human capital will positively influence job crafting.

H5b Older knowledge workers' social capital will positively influence job crafting.

H5c Older knowledge workers' decision-making capital will positively influence job crafting.

### *2.2.6 Impact of job crafting on successful workplace ageing*

Tims and Bakker (2010) validated the positive impact of job crafting on work satisfaction, work engagement, and work performance, emphasising that older workers can maintain high work motivation and career adaptability through job crafting. Truxillo et al. (2015) noted that older knowledge workers are more inclined to optimise work content through job crafting to better meet career development needs, highlighting its role in helping them maintain career vitality and extend their careers. Wei et al. (2019) found that older workers adjust work tasks, work environments, and relationships with colleagues to maintain high work satisfaction and well-being, with job crafting effectively enhancing their sense of work meaning and happiness, especially when facing workplace ageing. Based on these findings, the following hypothesis is proposed:

H6 Job crafting will positively influence successful workplace ageing.

### *2.2.7 Mediating effect of job crafting*

Wrzesniewski and Dutton (2001) proposed that employees can proactively adjust work tasks, work relationships, and work perceptions to enhance work satisfaction and meaning. Wang et al. (2021) found that experienced older workers compensate for technological shortcomings by solving complex problems, managing teams, and making strategic decisions, with extensive social networks aiding in resource acquisition and support, thereby enhancing workplace adaptability. Older workers can maximise the application of their career capital through job crafting, redefine work roles and responsibilities, and improve work satisfaction, engagement, and performance. Career capital and job crafting complement each other, with job crafting helping older workers more flexibly utilise career capital to enhance career satisfaction and success. Therefore, the following hypothesis is proposed:

- H7 Job crafting mediates the relationship between older knowledge workers' career capital and successful workplace ageing.
- H7a Job crafting mediates the relationship between older knowledge workers' human capital and successful workplace ageing.
- H7b Job crafting mediates the relationship between older knowledge workers' social capital and successful workplace ageing.
- H7c Job crafting mediates the relationship between older knowledge workers' decision-making capital and successful workplace ageing.

### *2.2.8 Moderating effect of perceived organisational support in how career capital influences self-efficacy*

Rhoades and Eisenberger (2002) confirmed through meta-analysis that perceived organisational support is a significant precursor to self-efficacy, with organisations enhancing employee confidence and self-esteem through work support and value recognition, thereby boosting self-efficacy. Cheung and Wu (2013) found that perceived organisational support directly positively influences successful workplace ageing by strengthening older workers' organisational identification and belonging. Ge (2015), using employees from high-tech enterprises as samples, explored the relationships among psychological capital, perceived organisational support, and career success, indicating that perceived organisational support positively affects employee psychological capital and career success, suggesting a potential positive effect on career capital and empirically validating the hypothesised relationships among variables, demonstrating that perceived organisational support positively influences employee career success and is indirectly positively associated with career capital. Based on these findings, the following hypotheses are proposed:

- H8 Perceived organisational support positively moderates the relationship between older knowledge workers' career capital and self-efficacy.
- H8a Perceived organisational support positively moderates the relationship between older knowledge workers' human capital and self-efficacy.
- H8b Perceived organisational support positively moderates the relationship between older knowledge workers' social capital and self-efficacy.
- H8c Perceived organisational support positively moderates the relationship between older knowledge workers' decision-making capital and self-efficacy.

### *2.2.9 Moderating effect of perceived organisational support in how career capital influences job crafting*

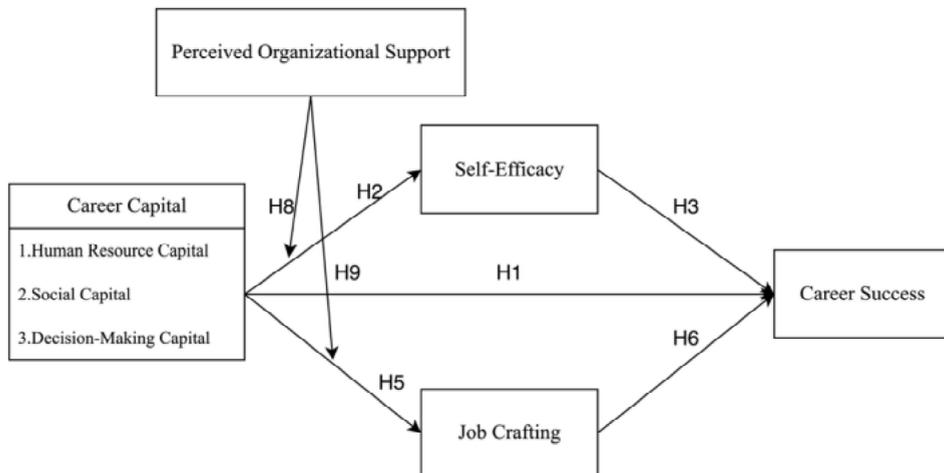
Research has found that perceived organisational support stimulates employee initiative and creativity, prompting more active participation in job crafting. When employees feel supported and trusted by the organisation, they are more likely to proactively seek changes and optimisations in work tasks, relationships, and environments (Tims et al., 2012). Organisations can enhance employees perceived organisational support and promote job crafting behaviours by providing training, resources, feedback, and career development opportunities (Wrzesniewski and Dutton, 2001). Susan (2023) noted that the

combination of career capital and perceived organisational support significantly predicts employee career success, especially in highly competitive work environments. Based on these findings, the following hypotheses are proposed:

- H9 Perceived organisational support positively moderates the relationship between older knowledge workers' career capital and job crafting.
- H9a Perceived organisational support positively moderates the relationship between older knowledge workers' human capital and job crafting.
- H9b Perceived organisational support positively moderates the relationship between older knowledge workers' social capital and job crafting.
- H9c Perceived organisational support positively moderates the relationship between older knowledge workers' decision-making capital and job crafting.

In summary, the research hypotheses of this paper are illustrated in Figure 1.

**Figure 1** Research framework



### 3 Research methodology and design

#### 3.1 Operational definitions of variables

Through a review and analysis of relevant domestic and international literature (Deesha, 2021; Scholz et al., 2002; Shen and Benson, 2016; Tang, 2021; Wang et al., 2019), this study divides career capital into three research dimensions: human capital, social capital, and decision-making capital. The specific operational definitions and item sources for each dimension of career capital, as well as for self-efficacy, job crafting, and perceived organisational support, are as follows:

Human capital refers to an individual's talents and skills. Specifically, it encompasses the knowledge, technical skills, problem-solving abilities, and communication skills with superiors that older knowledge workers accumulate in their professional fields, akin to

'knowing how' (reflected in items 5–8 of part 1 of the questionnaire). Social capital denotes individuals working together with a spirit of support and collaboration. It involves the effective resources and relationships that older knowledge workers establish with internal and external stakeholders of the organisation, akin to 'knowing who' (reflected in items 9–13 of part 1 of the questionnaire). Decision-making capital refers to an individual's ability to make effective decisions. It involves older knowledge workers having a clear understanding of their roles, developmental positioning, needs, and motivations in the workplace, akin to 'knowing why' (reflected in items 1–4 of part 1 of the questionnaire). Self-efficacy refers to the confidence level of older knowledge workers in their ability to utilise their knowledge, experience, and skills to complete work tasks during the later stages of their careers. It represents their belief in their ability to achieve expected results and succeed, such as the feeling of 'I can do it' (reflected in items 1–10 of part 2 of the questionnaire). Job crafting refers to older knowledge workers maximising the application of their career capital by spontaneously and proactively altering their work tasks and roles to better match their abilities, needs, and preferences. Unlike top-down organisational requirements for employee professional behaviour, it is a spontaneous, individually distinct bottom-up behaviour (reflected in items 1–9 of part 3 of the questionnaire). Perceived organisational support refers to older knowledge workers' overall perception and belief regarding how the organisation views their contributions and cares for their welfare. In short, it is the support that older knowledge workers feel from the organisation (reflected in items 1–7 of part 4 of the questionnaire). Successful workplace ageing refers to older knowledge workers' ability to continue working as they age, particularly in the later stages of their careers, while sustainably maintaining physical and mental health. They continue to demonstrate high levels of work ability, motivation, and performance. In short, it refers to the post-career growth and development of older knowledge workers (reflected in items 1–13 of part 5 of the questionnaire).

### *3.2 Data collection*

Given that private colleges and universities in China are managed by boards of directors composed of private enterprises or groups that provide funding, possessing the characteristics and features of industrial and commercial enterprises, and that the traits of older knowledge workers in private colleges and universities are more pronounced, this study selected 20 private colleges and universities in China as the research objects. The data for this study were sourced from the information databases of the Higher Education Association and the Private School Management Division of the Shaanxi Provincial Department of Education, as well as from archival records, third-party rating agencies, and online questionnaires. Given that the survey personnel possess a thorough familiarity with private higher education institutions and have a comprehensive understanding of the survey population, and in order to conserve human and material resources, this study primarily employed purposive sampling for data acquisition, with data collection conducted through the distribution and collection of electronic questionnaires via Wenjuanxing (<https://www.wjx.cn/>) (a Chinese online questionnaire platform). Before distributing the formal questionnaire, this study conducted a pre-test with over 100 older knowledge workers from five private colleges in Shaanxi Province. Ambiguous or unclear wording in the items was revised to improve question quality and ensure the completeness, clarity, and appropriate reliability and validity of the questionnaire. During

the formal questionnaire distribution process, a total of 1,400 questionnaires were distributed, with 1,354 questionnaires returned, yielding a response rate of 96.71%. After excluding employees under 41 years old, 1,125 questionnaires met the criteria, with 1,077 valid questionnaires, resulting in an effective response rate of 95.73%. The questionnaire included sections on research instructions, research content, and basic information about the respondents. The research questionnaire referenced relevant studies and designed 52 observed variables for eight latent variables (human capital, social capital, decision-making capital, career capital, career success, self-efficacy, job crafting, and perceived organisational support), all measured using a 5-point Likert scale with equidistant values for ordinal variables. Among the 1,077 valid questionnaires, 542 respondents were male, accounting for 50.3%; 541 respondents were aged 41–50, accounting for 50.2%; 355 respondents held a bachelor's degree, accounting for 33%, 436 held a master's degree, accounting for 40.5%, and 192 held a doctorate, accounting for 17.8%; in terms of professional and technical positions, 67.32% of respondents held a title of associate professor or higher; in terms of work experience, those with over 30 years of experience accounted for the highest proportion at 39.00%, indicating a relatively rich accumulation of work experience; monthly income was mainly concentrated in the 8,001–11,000 yuan range, accounting for 35.56%. The respondents had a relatively high average level of education and professional and technical skills, meeting the data requirements of this study.

## **4 Data analysis**

### *4.1 Descriptive statistics and correlation analysis*

To gain a better understanding of the characteristics of the data and explore the relationships among various variables, this study employed Stata to conduct descriptive statistical analysis and correlation tests on the indicators (Tables 1 and 2). The descriptive statistical analysis revealed that, across the sample data ( $N = 1,077$ ), the mean values of all core variables (decision-making capital, human capital, social capital, etc.) were 0, with standard deviations ranging from 1.563 to 2.580. This indicates that the data as a whole exhibited a neutral distribution, with moderate differences among individuals. The medians were close to the means (e.g., the median for decision-making capital was 0.118), reflecting good symmetry in the data. The skewness (–1.599 to 0.762) and kurtosis (–0.983 to 6.906) indicated that some variables were left-skewed or had a leptokurtic distribution, necessitating attention to the impact of extreme values. The range of values was significant (e.g., the range for decision-making capital was 8.912), demonstrating volatility in the data. The results of the correlation analysis showed that there were generally significant positive correlations among the core variables ( $p < 0.001$ ). Decision-making capital was highly correlated with human capital ( $r = 0.801$ ) and social capital ( $r = 0.743$ ). Strong correlations were also observed between combinations such as self-efficacy and job crafting ( $r = 0.818$ ), reflecting the synergistic effects between individual resources and psychological traits. Moderate correlations were concentrated in dimensions such as perceived organisational support and work adaptation ( $r = 0.599$ ), as well as interpersonal harmony and internal and external rewards ( $r = 0.485$ ), indicating a positive interaction between the organisational environment and

individual benefits. All correlation coefficients passed significance tests, confirming the robustness of the linear relationships among the variables.

#### *4.2 Common method bias test*

Given that multiple scales in this study were completed by the same group of respondents, there is a potential issue of common method variance. Therefore, this paper has conducted a common method bias test. This study employed the latent error variable control method using Amos for the common method bias test (Table 3). The results indicated that no significant common method bias was detected in the data. This suggests that the research findings are minimally affected by systematic measurement errors, and the relationships between variables exhibit a high level of credibility.

#### *4.3 Reliability and validity test*

To verify the reliability and validity of the selected variables, this study utilised SPSS 27.0 and Amos 24.0 to conduct reliability and validity tests on the questionnaire (Awan et al., 2022). The reliability test, performed using Cronbach's  $\alpha$ , revealed that the  $\alpha$  coefficients for all variables were greater than 0.8, indicating satisfactory internal consistency. Additionally, the minimum composite reliability (CR) value was 0.886, exceeding the recommended threshold of 0.7, further confirming the high consistency of the scale. In terms of validity testing, the minimum Kaiser-Meyer-Olkin (KMO) value for the scale items was 0.742, with all KMO values exceeding 0.7, suggesting good structural validity for the scales used in this study. The average variance extracted (AVE) for each variable ranged from 0.537 to 0.722, with all AVE values exceeding 0.5. Furthermore, the AVE for each factor was greater than the squared value of the maximum correlation coefficient between that factor and any other factor, indicating good convergent and discriminant validity for the scales in this study.

#### *4.4 Collinearity test*

The study conducted KMO and Bartlett's test of sphericity on the latent variables. The results showed that most KMO values were above 0.8, all exceeding the benchmark value of 0.7, indicating good suitability for factor analysis. Additionally, the significance level ( $p$ ) of Bartlett's test of sphericity was less than 0.01, confirming significant correlations among the variables and their suitability for factor analysis (Wang et al., 2023c).

#### *4.5 Confirmatory factor analysis*

To ensure the effectiveness of data fitting, this study employed Amos software to conduct confirmatory factor analysis on nine variables, including decision-making capital, and tested nine-factor, two seven-factor, and five-factor models. The results revealed that the nine-factor model had a chi-square value of 4,739.894, an RMSEA value of 0.051, a CFI value of 0.927, and an NFI value of 0.922. All parameter values met high fitting standards and were superior to those of other factor models, indicating that the nine-factor model provided the best fit for the data (Table 4).

**Table 1** Descriptive statistical analysis

<i>Variable</i>	<i>Observations</i>	<i>Mean</i>	<i>Standard deviation</i>	<i>Maximum</i>	<i>Minimum</i>	<i>Median</i>	<i>Skewness</i>	<i>Kurtosis</i>
Decision-making capital	1,077	0	1.74	-7.119	1.793	0.118	-1.599	6.906
Human capital	1,077	0	1.747	-7.849	1.576	0.396	-1.812	7.907
Social capital	1,077	0	1.946	-7.792	2.211	-0.29	-1.278	5.661
Self-efficacy	1,077	0	2.58	-10.339	3.657	0.158	-0.806	4.123
Job crafting	1,077	0	2.407	-9.685	3.606	0.284	-0.704	4.158
Perceived organisational support	1,077	0	2.291	-6.884	3.467	0.497	-0.469	2.974
Work adaptation	1,077	0	2.085	-9.338	2.422	-0.037	-1.362	6.283
Interpersonal harmony	1,077	0	1.563	-6.11	1.752	-0.214	-1.057	4.629
Intrinsic and extrinsic rewards	1,077	0	1.663	-5.804	2.363	0.321	-0.626	3.222

**Table 2** Correlation analysis

<i>Variable</i>	<i>Decision-making capital</i>	<i>Human capital</i>	<i>Social capital</i>	<i>Self-efficacy</i>	<i>Job crafting</i>	<i>Perceived organisational support</i>	<i>Work adaptation</i>	<i>Interpersonal harmony</i>	<i>Intrinsic and extrinsic rewards</i>
Decision-making capital	1								
Human capital	0.801***	1							
Social capital	0.743***	0.806***	1						
Self-efficacy	0.594***	0.614***	0.668***	1					
Job crafting	0.557***	0.573***	0.649***	0.818***	1				
Perceived organisational support	0.456***	0.451***	0.553***	0.645***	0.693***	1			
Work adaptation	0.629***	0.667***	0.635***	0.747***	0.736***	0.580***	1		
Interpersonal harmony	0.548***	0.590***	0.603***	0.643***	0.668***	0.599***	0.692***	1	
Intrinsic and extrinsic rewards	0.468***	0.485***	0.550***	0.656***	0.678***	0.707***	0.629***	0.639***	1
Mean	0	0	0	0	0	0	0	0	0
Std. dev.	1.74	1.747	1.946	2.58	2.407	2.291	2.085	1.563	1.663

Notes: T statistics are in parentheses. Significance is indicated by asterisks \*\*\*p < 0.01, \*\*p < 0.05 and \*p < 0.1, respectively.

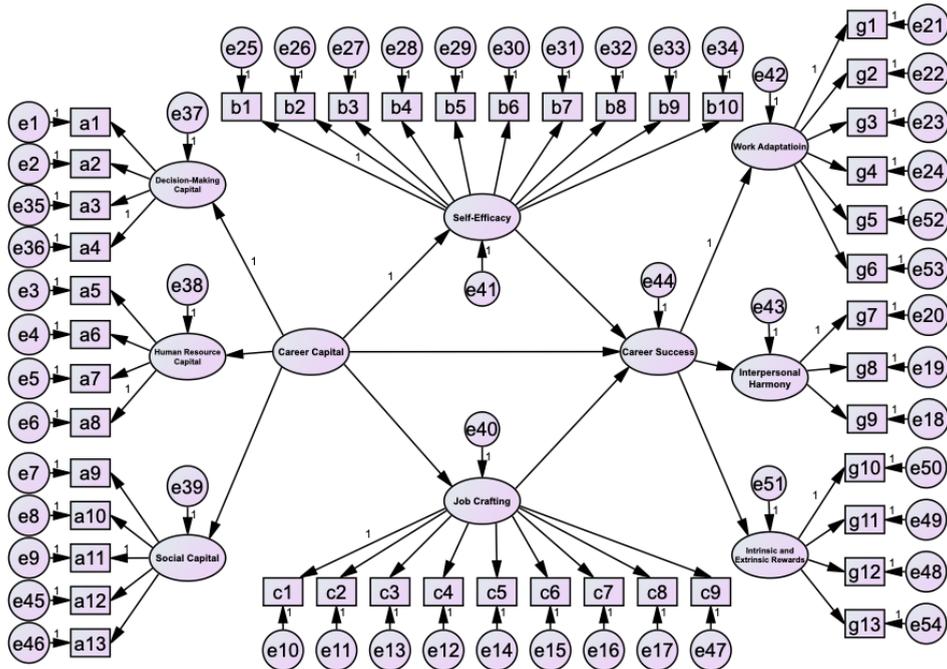
**Table 3** Common method bias

Model	CMIN	DF	CMIN/DF	RMSEA	CFI	TLI	IFI
Model without common method bias	3,841.489	1,183	3.239	0.046	0.945	0.938	0.945
Model with common method bias	4,037.417	1,237	3.264	0.046	0.942	0.938	0.942

**Table 4** Confirmatory factor analysis

Model	$\chi^2$	df	RMSEA	SRMR	CFI	TLI
Nine-factor model (ZB1, ZB2, ZB3, B, C, D, E1, E2, E3)	4,739.894	1,238	0.051	0.037	0.927	0.922
Seven-factor model a (ZB1, ZB2, ZB3, B, C, D, E1 + E2 + E3)	6,013.672	1,203	0.061	0.043	0.899	0.893
Seven-factor model b (ZB1 + ZB2 + ZB3, B, C, D, E1, E2, E3)	5,599.718	1,253	0.057	0.04	0.91	0.905
Five-factor model (ZB1 + ZB2 + ZB3, B, C, D, E1 + E2 + E3)	7,170.654	1,264	0.066	0.047	0.878	0.872

**Figure 2** Structural equation model (see online version for colours)



4.6 *Empirical estimation*

4.6.1 *Main effect estimation*

This study utilised Stata to estimate the structural equation model depicted in Figure 2 (see Table 5). According to the findings in Table 7, career capital exerts a positive impact on self-efficacy, with an unstandardised path loading coefficient of 1 and a standardised loading coefficient of 0.817, thereby validating Hypothesis 1 (H1). Similarly, career capital has a positive effect on job crafting, with an unstandardised path loading coefficient of 0.952 and a standardised loading coefficient of 0.773 (<0.02), confirming Hypothesis 2 (H2). Furthermore, career capital positively influences successful workplace ageing, with an unstandardised path loading coefficient of 0.321 and a standardised loading coefficient of 0.318 (<0.03). Self-efficacy also demonstrates a positive impact on successful workplace ageing, with an unstandardised path loading coefficient of 0.237 and a standardised loading coefficient of 0.288 (<0.04). Likewise, job crafting positively affects successful workplace ageing, with an unstandardised path loading coefficient of 0.35 and a standardised loading coefficient of 0.427 (<0.05). Consequently, both self-efficacy and job crafting play mediating roles in the relationship between career capital and successful workplace ageing among older knowledge workers, thereby validating Hypothesis 3 (H3).

**Table 5** Parameter estimation results of structural equation model

<i>Path</i>	<i>Unstandardised path</i>	<i>Standardised path</i>	<i>C.R.</i>	<i>P</i>
Self-efficacy ← Career capital	1	0.817		
Job crafting ← Career capital	0.952	0.773	19.391	***
Workplace success ← Career capital	0.321	0.318	6.783	***
Workplace success ← Self-efficacy	0.237	0.288	8.074	***
Workplace success ← Job crafting	0.35	0.427	11.726	***
Decision-making capital ← Career capital	1	0.861		
Human capital ← Career capital	1.139	0.935	29.559	***
Social capital ← Career capital	1.212	0.928	29.502	***
Work adaptation ← Workplace success	1	0.902		
Interpersonal harmony ← Workplace success	1.024	0.843	22.707	***
Intrinsic and extrinsic rewards ← Workplace success	0.977	0.816	20.256	***
a4 ← Decision-making capital	1	0.811		
a3 ← Decision-making capital	1.129	0.848	34.284	***
a2 ← Decision-making capital	0.982	0.78	30.106	***
a1 ← Decision-making capital	0.998	0.789	30.683	***
a8 ← Human capital	1	0.839		
a7 ← Human capital	0.931	0.8	31.243	***
a6 ← Human capital	1.009	0.848	34.217	***
a5 ← Human capital	0.99	0.821	32.495	***

Note: T statistics are in parentheses. Significance is indicated by asterisks \*\*\* ( $p < 0.01$ ), \*\* ( $p < 0.05$ ) and \* ( $p < 0.1$ ), respectively.

**Table 5** Parameter estimation results of structural equation model (continued)

<i>Path</i>	<i>Unstandardised path</i>	<i>Standardised path</i>	<i>C.R.</i>	<i>P</i>
a11 ← Social capital	1	0.839		
a10 ← Social capital	1.024	0.859	35.475	***
a9 ← Social capital	0.966	0.819	32.877	***
b4 ← Self-efficacy	1.139	0.845	34.944	***
b5 ← Self-efficacy	1.124	0.821	33.317	***
b6 ← Self-efficacy	0.991	0.801	32.041	***
b7 ← Self-efficacy	1.067	0.858	35.815	***
c5 ← Job crafting	0.925	0.813	22.886	***
c4 ← Job crafting	1.032	0.779	22.125	***
c3 ← Job crafting	1.001	0.727	20.93	***
g1 ← Work adaptation	1	0.792		
g2 ← Work adaptation	1.07	0.774	28.028	***
g3 ← Work adaptation	1.109	0.835	30.971	***
g4 ← Work adaptation	1.024	0.846	31.544	***
g7 ← Interpersonal harmony	1	0.805		
g8 ← Interpersonal harmony	1.075	0.893	33.258	***
g9 ← Interpersonal harmony	1.036	0.846	31.245	***
c2 ← Job crafting	1.021	0.778	22.109	***
c1 ← Job crafting	1	0.645		
c6 ← Job crafting	0.966	0.784	22.24	***
c7 ← Job crafting	0.974	0.809	22.804	***
c8 ← Job crafting	0.903	0.805	22.703	***
b3 ← Self-efficacy	1.02	0.8	31.984	***
b2 ← Self-efficacy	1.072	0.725	27.69	***
b1 ← Self-efficacy	1	0.789		
b8 ← Self-efficacy	1.09	0.832	34.041	***
b9 ← Self-efficacy	1.02	0.836	34.342	***
b10 ← Self-efficacy	1.136	0.796	31.734	***
a12 ← Social capital	0.919	0.817	32.758	***
a13 ← Social capital	0.971	0.839	34.165	***
c9 ← Job crafting	0.915	0.806	22.725	***
g10 ← Intrinsic and extrinsic rewards	1	0.732		
g11 ← Intrinsic and extrinsic rewards	1.054	0.793	24.62	***
g12 ← Intrinsic and extrinsic rewards	1.118	0.801	24.853	***
g5 ← Work adaptation	1.02	0.83	30.709	***
g6 ← Work adaptation	0.995	0.823	30.395	***
g13 ← Intrinsic and extrinsic rewards	1.054	0.737	22.921	***

Note: T statistics are in parentheses. Significance is indicated by asterisks \*\*\* ( $p < 0.01$ ), \*\* ( $p < 0.05$ ) and \* ( $p < 0.1$ ), respectively.

**Table 6** Moderating effect test

<i>Hypothesis</i>	<i>Path</i>	<i>Standardised coefficient</i>	<i>Standard error</i>	<i>P-value</i>	<i>Verified</i>	<i>R<sup>2</sup></i>
H8	Decision-making capital → M (perceived organisational support) → Self-efficacy	-0.007	0.022		No	0.94
H8a	Career capital → M (perceived organisational support) → Job crafting	-0.549	0.022	*	Yes	0.532
H8b	Human capital → M (perceived organisational support) → Job crafting	-0.04	0.023		No	0.548
H8c	Social capital → M (perceived organisational support) → Job crafting	-0.025	0.021		No	0.556
H9	Decision-making capital → M (perceived organisational support) → Job crafting	-0.06	0.022	***	Yes	0.946
H9a	Decision-making capital → M (perceived organisational support) → Self-efficacy	-0.097	0.021	***	Yes	0.562
H9b	Career capital → M (perceived organisational support) → Job crafting	-0.097	0.022	***	Yes	0.573
H9c	Human capital → M (perceived organisational support) → Job crafting	-0.055	0.211	**	Yes	0.585

#### 4.6.2 Moderating effect analysis

As shown in Table 6, the moderating effect of perceived organisational support (POS) on the relationship between career capital and self-efficacy is not significant ( $p > 0.1$ ). This indicates that POS does not play a significant moderating role in the model of ‘career capital – self-efficacy – successful workplace ageing’ among older knowledge workers. However, the indirect effect of human capital on self-efficacy through POS is significantly negative (standardised coefficient =  $-0.549$ ,  $p < 0.05$ ), with an  $R^2$  of 0.532, supporting this sub-hypothesis. Meanwhile, the indirect effects along the paths of H8b and H8c are not significant, and thus these hypotheses are not validated. In contrast, POS significantly moderates the relationship between career capital and job crafting ( $p < 0.1$ ). POS plays a significant moderating role in the model of ‘career capital – job crafting – successful workplace ageing’ among older knowledge workers. Specifically, POS inhibits the positive effect of career capital on job crafting. Among its sub-paths, H9a, H9b, and H9c all demonstrate significant negative effects, with standardised coefficients of  $-0.097$ ,  $-0.097$  and  $-0.055$ , respectively (all  $p < 0.05$ ). This suggests that human capital, social capital, and decision-making capital can all exert negative influences on employees’ job crafting through POS. From this, it can be seen that the moderating effect of POS does not align with the research hypotheses. Exploring the reasons for these findings, it may stem from the underlying mechanisms of older employees’ workplace behaviours – the dynamic interplay between external support and individual agency.

According to the resource replacement theory, in environments with high levels of organisational support, structured job designs may substitute for employees' needs for autonomous job crafting, and institutionalised training may weaken the motivation for human capital transformation. Moreover, a strong sense of support may lead older employees to 'avoid responsibilities', raising the threshold for activating social capital. Additionally, older employees tend to have higher expectations for organisational support, and strong support may trigger a 'goal-locking effect', causing them to become complacent with the status quo rather than actively seeking breakthroughs. The significant negative moderation of POS on the relationship between human capital and self-efficacy (coefficient =  $-0.549$ ,  $p < 0.05$ ) may also be attributed to the increasing cost of skill renewal with age, where external support inadvertently weakens individual intrinsic motivation.

#### 4.6.3 Mediating effect analysis

This study employed the PROCESS plugin in SPSS and utilised the bootstrap method (with a sample size of 5,000) to examine the moderated mediation effect model. The detailed results are presented in Table 7. Regarding overall analysis of mediating effects, Table 9 illustrates the mediating effects of perceived organisational support (POS) on two distinct mediation pathways: career capital  $\rightarrow$  self-efficacy  $\rightarrow$  workplace success, and career capital  $\rightarrow$  job crafting  $\rightarrow$  workplace success. For each pathway, the table provides the effect values (Effect) at low ( $-1$  SD) and high ( $+1$  SD) levels of POS, along with the between-group difference values. As for analysis of the career capital  $\rightarrow$  self-efficacy  $\rightarrow$  workplace success pathway, when POS was at a low level, the positive effect of career capital on workplace success through self-efficacy was 0.245, with a confidence interval of [0.208, 0.285], indicating statistical significance. When POS was at a high level, this positive effect decreased to 0.224, with a confidence interval of [0.159, 0.292]. Although still significant, the effect size diminished. The between-group difference value revealed that, compared to low POS, high POS weakened the positive effect of career capital on workplace success by 0.021 ( $0.245 - 0.224$ ), and this difference was statistically significant (confidence interval: [0.186, 0.286], excluding 0). As for analysis of the career capital  $\rightarrow$  job crafting  $\rightarrow$  workplace success pathway, under low POS conditions, the positive effect of career capital on workplace success through job crafting was 0.217, with a confidence interval of [0.183, 0.251], indicating statistical significance. Under high POS conditions, this positive effect significantly decreased to 0.157, with a confidence interval of [0.099, 0.227]. The between-group difference value showed that, compared to low POS, high POS weakened the positive effect of career capital on workplace success by 0.060 ( $0.217 - 0.157$ ), and this difference was statistically significant (confidence interval: [0.142, 0.235], excluding 0). The detailed data in Table 9 indicate that when the tendency towards perceived organisational support is strong, the positive effects of career capital on workplace success, whether through the mediating pathway of self-efficacy or job crafting, are weaker compared to when the tendency towards POS is weak.

**Table 7** Mediating effect test

	<i>Path</i>	<i>Effect level</i>	<i>Effect</i>	<i>BootSE</i>	<i>BootILCI</i>	<i>BootULCI</i>
Perceived organisational support	Career capital → Self-efficacy → Workplace success	Low level (-1 + SD)	0.245	0.02	0.208	0.285
		High level (1 + SD)	0.224	0.034	0.159	0.292
		Inter-group difference value	0.234	0.026	0.186	0.286
	Career capital → Job crafting → Workplace success	Low level (-1 + SD)	0.217	0.018	0.183	0.251
		High level (1 + SD)	0.157	0.034	0.099	0.227
		Inter-group difference value	0.184	0.024	0.142	0.235

#### 4.6.4 Robustness checks and heterogeneity analysis

This study conducted robustness checks by winsorising the sample of employees with lower educational attainment (below junior college level). The results were consistent with the hypotheses, confirming the robustness of the findings. The sample was further divided into three age groups: 41–50 years old (541 samples, 50.2%), 51–60 years old (224 samples, 20.8%), and 61 years and above (312 samples, 29%). All groups successfully passed the reliability and validity tests, and underwent a series of empirical estimations including the nine-factor model, cross-sectional regression discontinuity (CRD) test model, as well as analyses of moderating and mediating effects. Due to space constraints, only the results of the CRD test model and the moderating effect estimations are presented in Tables 8 and 9, respectively, to reflect the heterogeneity across different age groups. The results showed that career capital significantly positively influenced self-efficacy, job crafting, and workplace success across all age groups. Self-efficacy and job crafting also had significant positive impacts on workplace success. Among the three age groups, the 51–60 age group exhibited the strongest promoting effect of career capital on successful workplace ageing, followed by the 41–50 age group, and then the 61 and above age group. The promoting effects of career capital on self-efficacy and job crafting were most pronounced in the 51–60 age group, followed by the 61 and above age group, and weakest in the 41–50 age group. Conversely, the promoting effects of self-efficacy and job crafting on successful workplace ageing were strongest in the 41–50 age group, followed by the 61 and above age group, and weakest in the 51–60 age group. Regarding the moderating role of perceived organisational support, only the 61 and above age group showed a significantly positive moderating effect of POS on the relationship between career capital and self-efficacy, while the other age groups did not. For job crafting, the 41–50 age group exhibited a significantly positive moderating effect of POS, the 51–60 age group showed a significantly negative effect, and the 61 and above age group did not show a significant effect.

**Table 8** CRD test model by age group

	<i>41–50 age group vs. 51–60 age group</i>	<i>51–60 age group vs. 61 and above age group</i>	<i>41–50 age group vs. 61 and above age group</i>
Self-efficacy ← Career capital	1	1	1
Job crafting ← Career capital	-0.513	0.745	0.312
Workplace success ← Career capital	2.421	-0.794	1.499
Workplace success ← Self-efficacy	-1.14	0.279	-0.86
Workplace success ← Job crafting	-2.822	-0.248	-3.438
Decision-making capital ← Career capital	1	1	1
Human capital ← Career capital	-1.59	-0.139	-1.73
Social capital ← Career capital	-2.303	-0.299	-2.469
Work adaptation ← Workplace success	1	1	1
Interpersonal harmony ← Workplace success	0.188	-0.659	-0.598
Intrinsic and extrinsic rewards ← Workplace success	-3.19	2.867	0.176

**Table 9** Moderating effect by age group

	<i>41–50</i>		<i>51–60</i>		<i>61 and above</i>	
	<i>Self-efficacy</i>	<i>Job crafting</i>	<i>Self-efficacy</i>	<i>Job crafting</i>	<i>Self-efficacy</i>	<i>Job crafting</i>
Career capital	0.648***	0.459***	0.729***	0.535***	0.976***	0.731***
Perceived organisational support	0.53***	0.603***	0.421***	0.444***	0.263***	0.353***
Career capital * Perceived organisational support	-0.008	0.036**	-0.043	-0.056**	0.046**	0.016
R <sup>2</sup>	0.598	0.641	0.613	0.61	0.502	0.478

## 5 Conclusions and implications

### 5.1 Conclusions

This study integrated the career capital of older knowledge workers with successful workplace ageing to form a research framework. Through a questionnaire survey conducted among the study's subjects, structural equation modelling was employed to explore the primary effects of career capital on the post-career development of older knowledge workers, while also examining the moderating role of perceived organisational support and verifying the mediating effects of self-efficacy and job

crafting. The findings revealed that career capital, including its dimensions of human capital, social capital, and decision-making capital, significantly promoted successful workplace ageing. The dimensions of social capital and decision-making capital within career capital notably enhanced self-efficacy. Self-efficacy mediated the relationship between ‘older knowledge workers’ career capital, encompassing social and decision-making capital dimensions, and successful workplace ageing’. Similarly, the dimensions of social capital and decision-making capital within career capital significantly fostered job crafting, which, in turn, had a significant mediating effect on the relationship between ‘older knowledge workers’ career capital, including social and decision-making capital dimensions, and successful workplace ageing’. Perceived organisational support did not exhibit a significant moderating effect in the model of ‘older knowledge workers’ career capital – self-efficacy – successful workplace ageing’. However, it demonstrated a significant negative moderating effect in the model of ‘older knowledge workers’ human capital – self-efficacy – successful workplace ageing’. Furthermore, perceived organisational support had a significant negative moderating effect in the model of ‘older knowledge workers’ career capital, including human, social, and decision-making capital dimensions – job crafting – successful workplace ageing’. In summary, among the research hypotheses, H2a, H4a, H5a, H7a, H8, H8b, and H8c did not pass the significance test, while H9, H9a, H9b, and H9c, although significant, yielded results inconsistent with the hypothesised directions. Additionally, the study uncovered heterogeneity among different age groups.

## 5.2 *Implications*

Based on the aforementioned research conclusions, the following insights can be drawn: first, the multi-dimensional effects of career capital exhibit differences. Second, the transmission roles of self-efficacy and job crafting vary. Third, perceived organisational support possesses a ‘double-edged sword’ effect. Fourth, there are significant intergenerational differences in the needs of older knowledge workers. In response to these characteristics, enterprises should adopt the following strategies in the human resource development and management of older knowledge workers.

### 5.2.1 *Hierarchical management of career capital*

Career capital necessitates hierarchical management to activate the value of older knowledge workers. For the human capital dimension, traditional ‘cramming’ training methods should be avoided, and instead, embedded approaches such as bidirectional mentoring and ‘learning by doing’ should be adopted, integrating skill enhancement with task execution while controlling training intensity. In terms of the social capital dimension, cross-departmental collaboration and industry exchanges should be encouraged, and cross-generational platforms should be established to reduce procedural controls and empower autonomous relationship maintenance. For the decision-making capital dimension, flexible work arrangements and the establishment of advisory committees should be implemented, along with elastic delegation of authority. This strategy ensures alignment between individuals and organisations, facilitating the reuse of experience, intergenerational complementarity, and a balance of autonomy to drive successful workplace ageing.

### *5.2.2 Synergistic activation of self-efficacy and job crafting*

The continuation of the professional value of older knowledge workers requires the synergistic activation of self-efficacy and psychological reshaping capabilities through differentiated intervention strategies. For individuals with social capital advantages, their capabilities can be publicly recognised through awards and by assigning them roles as cross-departmental resource coordinators to enhance self-efficacy. For those with decision-making capital advantages, allowing them to lead small projects and organise scheme comparisons can awaken their sense of psychological control. Interventions based on existential psychology, such as creating 'career footprint maps' and facilitating cross-generational career story exchanges, can promote the re-production of professional meaning. This strategy achieves synergistic gains in self-efficacy and psychological reshaping, driving sustainable transformation of workplace value.

### *5.2.3 Dynamic adaptation of organisational support strategies*

Organisational support strategies should adopt a 'negative modulation avoidance, positive modulation activation' approach. For human capital support, sensitivity assessments and threshold management should be established to prevent excessive intervention. For social capital and decision-making capital support, 'support checklists' and invisible empowerment (such as blind review systems for decision suggestions) should be implemented. Age-specific adaptations should include providing structured support for those aged 61 and above, exchanging support for autonomy for the 41–50 age group, and adopting goal-oriented management for the 51–60 age group. This strategy employs a closed-loop of 'sensitivity threshold control – intergenerational demand adaptation – dynamic feedback calibration' to overcome the 'double-edged sword' effect of organisational support, balancing support with autonomy to activate the impetus for psychological reshaping.

### *5.2.4 Precision policies based on age segmentation*

Precision policies should be tailored to the characteristics of older knowledge workers across different age groups. For the 41–50 age group, characterised by crucial psychological capital but insufficient career capital, autonomy enhancement plans such as flexible work designs should be implemented to balance innovation with stability, leveraging their high adaptability to drive job crafting and alleviate transition anxiety. The 51–60 age group, in their 'golden period' of career capital, should focus on unleashing their social and decision-making capital advantages through goal-oriented management, minimising intervention, and providing support only in high-risk scenarios to avoid undermining autonomous efficacy. For those aged 61 and above, who exhibit increased dependency and declining career capital utility, friendly supports such as simplified processes should be offered, and age-complementary tasks should be structured to compensate for capability shortfalls through institutionalised support, thereby maintaining self-efficacy. These strategies target the core needs at each stage, achieving precision management.

## Declarations

All authors declare that they have no conflicts of interest.

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