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Crafting Jobs for Sustaining Careers during China's Manufacturing Digitalization

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Abstract: Accelerated digitalization coupled with ever-growing new job demands in China's manufacturing industry has led to serious concerns about rising work stress and the loss of the sustainability of careers among production workers. They are trapped within an organization due to the lack of career alternatives in the labor market; under such occupational stress, some proactive workers may engage in expansive job crafting (JC) behaviors to get more resources to meet their career goals and make better career plans. As a result, this paper aims to investigate how Chinese manufacturing workers perform JC behaviors to translate perceived work stress into more control over their careers in today's shrinking job market. Drawing on the job demands-resources (JD-R) theory, this study thus investigates how employee continuance commitment (CC), as a manifestation of work stress, influences career control that can reflect the sustainability of careers in such a turbulent time and how the three dimensions of employees' JC (i.e., increasing structural job resources, increasing social job resources, and increasing challenging job demands) mediate the CC-career control relationship, respectively. A time-lagged survey was carried out with a sample of 476 Chinese production workers. The results show that crafting jobs is instrumental in translating the degree of CC that embodies the level of work stress to the degree of career sustainability during the digital transformation of Chinese manufacturing. The article concludes with a discussion of the theoretical and practical implications. Limitations and their implications for future studies are also reviewed.

Keywords: career; sustainability; work stress; continuance commitment; digitalization; manufacturing

1. Introduction

Along with the rapid development of information and communication technologies (ICTs) and artificial intelligence (AI), China's manufacturing sector has undergone a radical transformation toward total digitalization and automation replacing human workers. Echoing the fast-growing digitalization phenomenon, many labor-intensive companies have closed down their factories in China and thereby shifted their production lines to other low-income, populous nations, such as Vietnam, Indonesia, and India. For example, from 2014 to 2018, the world's largest contract electronic manufacturer, Foxconn, laid off more than 100 million peasant workers in China [1]. As a matter of fact, Chinese production workers have been encountering severe employment challenges and work stress owing to the prevalence of ICTs and smart machines; apart from less-skilled occupations, more and more managerial and technical jobs are also disappearing. Given this, the motivation behind this research is to gain a better understanding of this newly emergent, digital-technology-driven phenomenon, as it has fundamentally changed the career landscape of Chinese manufacturing.

Without doubt, this recent wave of unemployment has led to considerable concerns about rising occupational anxiety among manufacturing workers, as they have perceived the lack of career alternatives in the labor market [2–4]. Moreover, resonating with the job demand-resource (JD-R)

theory [5], in the face of such tough circumstances of increasing new job demands, some proactive workers may take the initiative to strive for more job-related resources, namely to engage in job crafting (JC) behaviors [6,7], whereby they can re-design their jobs to achieve their career goals.

Given that the majority of China's manufacturing workers are from low-income families, being unemployed means the loss of a stable income, which may immediately result in living difficulties [1]. It is, thus, imperative to probe into the relevant issues in depth so as to help production workers sustain their careers and, thereby, reduce a family's economic burden caused by job loss. However, despite the vital importance of this, there is limited empirical evidence so far [2,3]. To fill the above-mentioned gap, the purpose of this paper is to employ the JD-R theory to investigate how Chinese manufacturing workers perform JC behaviors to translate perceived work stress into more control over their careers in today's shrinking job market.

It should be noted that the concept of continuance commitment (CC), which characterizes employees' perceived cost of leaving an organization (i.e., high-sacrifice component) and their perceived lack of job alternatives (i.e., low alternative component) [8,9], can address the calculative aspect of commitment, as employees may, regardless of their emotional detachment, still stay with an organization due to necessity rather than choice. Given that scholars have claimed that CC particularly reflects employees' job insecurity-related stress [10], we thus use this variable as a manifestation of employees' perception of work strains and job insecurity here.

2. Literature Review and Hypothesis Development

The conceptualization of continuance commitment (CC) consists of two sub-dimensions—the perceived cost of leaving an organization (i.e., high-sacrifice component) and the perceived lack of employment alternatives in the labor market (i.e., low alternative component) [11]. Individuals who feel high CC to their employer may tend to have low motivation, because staying in an organization may not be what they want but what they need. As mentioned above, employees' CC can be viewed as a prominent manifestation of their perception of job insecurity-related stress, as it embodies the calculative, opportunistic aspect of commitment [10,12,13]. Employees who feel resentful and hopeless about their career future in their organizations may still choose to stay with the organizations because leaving would be very costly when taking into account the significant organization-specific investments they have made, the limited career alternatives outside the organizations, or both [14]. As far as the Chinese manufacturing sector is concerned, the major employment problem for front-line production workers now lies in the growing career insecurity incurred by the increasing popularity of AI and smart machines substituting human workers. As a result, our study merely concentrates on the lack of employment component of CC, as it can more clearly characterize the occupational stress resulting from a shrinking number of jobs for human workers in our research setting, where a manufacturing transformation toward digitalization is happening.

Job crafting (JC) behavior refers to a non-conventional, bottom-up self-managed behavior where employees, instead of employers, take the initiative to re-shape the relational boundaries or task configurations of their jobs so as to make their jobs more meaningful [15]. Extending this definition, scholars have adopted the JD-R framework to more comprehensively characterize JC [16,17]. More specifically, they first distinguished job characteristics as job demands that require physical and psychological effort and job resources that facilitate the achievement of work objectives and can eliminate the costs of acquiring job demands. Based on this premise, JC can be seen as the changes workers proactively make to achieve a better fit between job demands and resources as per their own needs and abilities; job resources are deemed to enhance employees' work motivation, while job demands are thought to impair employees' well-being or to promote motivation when perceived as challenges [18]. Following this logic, they then categorized JC into four dimensions: (a) increasing structural resources, (b) increasing social resources, (c) increasing challenging demands, and (d) decreasing hinderance demands [16–18].

However, research has suggested that the construct validity of the first three dimensions of JC describing the “expansive” JC activities (i.e., increasing social and structural resources and increasing challenging demands) seems to be far better than the fourth dimension, addressing the reduction of the hindering activities (i.e., “decreasing hindrance job demands”) [7]. Relating to this point, quite a few scholars have also indicated that the first three dimensions of JC, namely the “expansive” JC behaviors, appear to be a much better fit for the motivational process of the JD-R theory than prevention-oriented JC behaviors [19–21]. This is because the expansive JC behaviors, to a certain extent, encourage employees to actively strive for work-related social and structural resources. Given that this research aims to discuss the importance of gaining critical job resources during China’s manufacturing digitalization, we thus follow the foregoing suggestion of focusing on the three dimension of “expansive” JC behaviors here.

The trend of digitalization has resulted in the emergence of new employment standards and new career development paths for manufacturing workers, as firms have to increment some critical job requirements, such as the knowledge of working with ICT-enabled platforms and the competence to operate automated and digital devices [1–3]. It is understandable why in recent years, manufacturing employees have been suffering from increasing work stress and psychological insecurity, especially when firms are often inclined to simultaneously decrease their dependence on human workers in the course of digitalization. In this vein, the landscape of manufacturing careers in China has become highly uncertain and volatile.

In light of the JD-R theory, when confronted with the severe career/job insecurities caused by intensifying digitalization, China’s manufacturing employees who perceive scarce options in career mobility outside an organization may tend to rely on the conduct of the expansive JC behaviors to obtain as many job resources as possible for their own interest. Whereas for workers who cannot bear the cost of leaving their employers, it may be a good idea to proactively change their work atmosphere and modify their jobs to become more challenging and resourceful. Following this logic, we thus assume that manufacturing workers with high CC may be more likely to perform JC behaviors:

Hypothesis 1 (H1): *manufacturing employees’ CC is positively related to (a) increasing structural job resources, (b) increasing social job resources, and (c) increasing challenging job demands.*

The notion of career sustainability is still quite ambiguous as its conceptualization is very context specific and may differ along with changes of time and space [2]. Hence, no concrete measurement has been found hitherto [3]. Career control is generally understood as a psychologically desirable career-related outcome that characterizes the competency of individuals to act on their own working and learning processes to achieve the sustainability of their careers [22]. Taking to heart our research background of a manufacturing industry with an ever-increasing unemployment rate, we think it is especially appropriate to use career control as an indicator that characterizes the sustainability of careers among manufacturing workers.

A review of literature has examined the positive impact of employees’ commitment toward organizations upon their career-related outcomes, such as career satisfaction, career control, and career development [9,23,24], because committed employees are often devoted to their work and get more job-related resources. Following this line of thought, based on the JD-R framework [5] we further argue that, facing the ever-rising complexity of job demands during China’s manufacturing digitalization, production workers with high CC have a sense of fear due to career development stagnation in such a turbulent, highly uncertain environment. Hence, we further contend that these workers may tend to secure the progress they have made in their current careers and become very eager to get more critical job resources to better control their future careers. Thus, we posit:

Hypothesis 2 (H2): *manufacturing employees’ CC is positively related to career control.*

It is suggested that organizations may promote employees' career satisfaction by encouraging them to engage in the expansive JC activities, as these can help employees expand their work autonomy and, thus, enhance their psychological well-being [2,3,21,25,26]. Scholars have also proposed that undertaking the expansive JC behaviors may be beneficial to employees in terms of building up a positive emotional status at work through employees exerting stronger control over their career plans and goals [17,27]. Following this logic, we posit:

Hypothesis 3 (H3): *manufacturing employees' expansive JC behaviors, namely (a) increasing structural job resources, (b) increasing social job resources, and (c) increasing challenging job demands are positively related to their career control.*

Overall, our H1 assumes the positive relationship between CC and the expansive JC behaviors, H2 posits the positive effect of CC on career control, and H3 proposes a positive association between the expansive JC behaviors and career control. Extending this line of thought, it is plausible to further predict that the expansive JC behaviors may also act as a crucial catalyst to translate manufacturing employees' CC into career control. As a matter of fact, JC has been identified to intervene in employees' attitude-behavior continuum [28]. Hence, we hypothesize:

Hypothesis 4 (H4): *manufacturing employees' expansive JC behaviors, namely (a) increasing structural job resources, (b) increasing social job resources, and (c) increasing challenging job demands, mediate the relationship between CC and career control.*

3. Methods

3.1. Data Collection

Considering our research purpose, we selected four large pharmaceutical factories in the Wuzhou city of Guangxi province in China, because Wuzhou has been an important manufacturing hub in the Western China, where a lot of local manufacturing firms have undertaken, and are undertaking, industrial transformation toward comprehensive digitalization. To control for extraneous influence, only full-time employees were invited to participate in the survey. Before the formal survey in 2019, our research team went to visit the key persons of the four sample firms in person and conducted a pilot test on a sample of 60 workers from one of the four manufacturing organizations. By doing so, the clarity and accuracy of our questionnaire were ensured.

After the pilot test, we modified some inappropriate wording according to the feedback from the participants and several manufacturing experts. The formal survey was conducted with confidentiality and anonymity. To decrease the likelihood of common method variance (CMV), we followed a time-lag research design [29]. The staff in the human resource (HR) departments of four sample companies helped us to distribute questionnaires at two separate time points. At time 1, participants were asked to complete the questionnaires on demographics, the independent variable (CC), and the mediator (the expansive JC). At time 2 (i.e., after three months), the same participants were requested to complete the questionnaire on the outcome variable (career control). At time 1, a total of 602 questionnaires were distributed to the participants and 524 were returned. Owing to strong support from the HR staff, 476 of the 524 participants completed the time 2 questionnaires yielding a response rate of 90%. The final sample consisted of 289 males and 187 females, with an average age of 37 years ($SD = 8.26$) and an average tenure of 11 years ($SD = 8.66$).

3.2. Measures

The data were analyzed with the statistical software SPSS 22.0 and Amos 24.0 (IBM, New York, USA). We used structural equation modeling to examine the hypothesized mediation model; the participants were asked to answer on a 6-point Likert scale (1 = strongly disagree to 6 = strongly agree),

because it has been examined that Chinese employees in general prefer to give a mediocre response, such as choosing the midpoint of the scale [3].

CC was measured with three items referring to Chin et al. [30,31]. Sample items included: “I feel that I have too few options to consider leaving this organization” (Cronbach’s $\alpha = 0.925$).

The expansive JC behaviors were assessed based on Tims et al.’s (2016) [17] four-dimension scale. As noted, we chose three expansive dimensions of the four dimensions: “Increasing structural job resources” (three items; Cronbach’s $\alpha = 0.99$), “increasing social job resources” (three items; Cronbach’s $\alpha = 0.97$), and “increasing job demands” (three items; Cronbach’s $\alpha = 0.975$).

Career control was measured with Akkermans and Tims’s (2017) [32] scale including 5 items. Sample items included: “I can make clear career plans” (Cronbach’s $\alpha = 0.97$).

Control Variables: Referring to prior studies [8,10,13] (e.g., Meyer et al., 2010 [8]; De Clercq et al., 2019 [10]; Han et al., 2019 [13]), gender (0 = female; 1 = male), job position (0 = non-manager; 1 = manager), age, and organizational tenure were controlled for in this current paper.

4. Results

4.1. Correlational Analysis

Means, standard deviations, correlations, and the square roots of AVE (Average Variance Extracted) of all the variables used are presented in Table 1. CC was positively associated with increasing structural job resources ($r = 0.518$, $p < 0.01$), increasing social job resources ($r = 0.597$, $p < 0.001$), and increasing challenging job demands ($r = 0.591$, $p < 0.01$), while all the three dimensions of JC above were highly correlated with career control ($r = 0.685$, $r = 0.681$, and $r = 0.678$, $p < 0.01$). The interconstruct correlations were smaller than the values of the square roots of AVE in all cases. These results provided preliminary evidence for our hypotheses.

Table 1. Descriptive statistics.

Variable	1	2	3	4	5	6	7	8	9
Gender	–								
Job position	0.02	–							
Age	0.084	0.510 **	–						
Tenure	–0.008	0.656 **	0.762 **	–					
CC	–0.001	0.064	0.075	0.018	0.785				
Increasing structural job resources	0.027	0.071	0.019	–0.01	0.518 **	0.987			
Increasing social job resources	–0.01	0.069	0.038	–0.01	0.597 **	0.629 **	0.963		
Increasing challenging job demands	0.035	0.083	0.05	–0.008	0.591 **	0.611 **	0.589 **	0.964	
Career control	0.013	0.074	0.057	0.012	0.591 **	0.685 **	0.681 **	0.678 **	0.956
Mean	0.61	0.21	36.72	10.87	4.17	4.67	4.49	4.53	4.38
S.D.	0.489	0.406	8.261	8.658	0.873	1.449	1.407	1.331	1.146

Note: N = 476, ** $p < 0.01$.

We assessed the discriminant validity of our measurements using a series of confirmatory factor analyses (CFAs) with AMOS 24.0. The proposed five-factor model fit the data well ($\chi^2/df = 2.298$, RMR = 0.030, IFI = 0.990, TLI = 0.987, CFI = 0.990, NFI = 0.983). In terms of the four alternative models, the goodness of their model fit was shown as follows: the four-factor model combining CC and increasing structural job resources ($\chi^2/df = 8.315$, RMR = 0.156, IFI = 0.943, TLI = 0.927, CFI = 0.943, NFI = 0.936), the three-factor model combining CC, increasing structural job resources, and increasing social job resources ($\chi^2/df = 26.740$, RMR = 0.267, IFI = 0.792, TLI = 0.743, CFI = 0.792, NFI = 0.786), the two-factor model combining CC, increasing structural job resources, increasing social job resources, and increasing challenging job demands ($\chi^2/df = 45.809$, RMR = 0.314, IFI = 0.630, TLI = 0.553, CFI = 0.629, NFI = 0.625), and the one-factor model combining CC and the three dimensions of job crafting ($\chi^2/df = 58.421$, RMR = 0.187, IFI = 0.520, TLI = 0.427, CFI = 0.5, NFI = 0.516). It was obvious that compared

with the four alternatives, our proposed five-factor model had a much better fit with our data. We, thus, concluded that the measures adopted in this research exhibit adequate discriminant validity.

4.2. Hypotheses Testing

We performed SEM to test our hypotheses. Following the procedure suggested by MacKinnon et al. [33], we first built three SEM models with all four control variables added, in which the full mediation model A (CC→three dimensions of JC→career control) was regarded as our baseline model. Then we compared this baseline model A with a partial mediation model B (adding the direct relationship from CC to career control) and the non-mediation model C (CC and JC directly relate to career control). As shown in Table 2, Model B ($\chi^2/df = 2.600 < 3$, NFI = 0.981 > 0.95, RFI = 0.974 > 0.95, TLI = 0.984 > 0.95, CFI = 0.988 > 0.95, and GFI = 0.945 > 0.9) fits with the data far better relative to Model A ($\chi^2/df = 3.803$) and Model C ($\chi^2/df = 11.521$). As a result, the partial mediation model B was the most suitable one for further verifying our hypotheses (please see the standardized path estimates of Model B in Figure 1).

Table 2. Results of structural equation modeling.

Model	χ^2/df	NFI	RFI	TLI	CFI	GFI
Model A. Full mediation model	3.803	0.970	0.962	0.972	0.978	0.907
Model B. Partial mediation model	2.600	0.981	0.974	0.984	0.988	0.945
Model C. Non-mediation model	11.521	0.907	0.886	0.895	0.914	0.754

Note: N = 476.

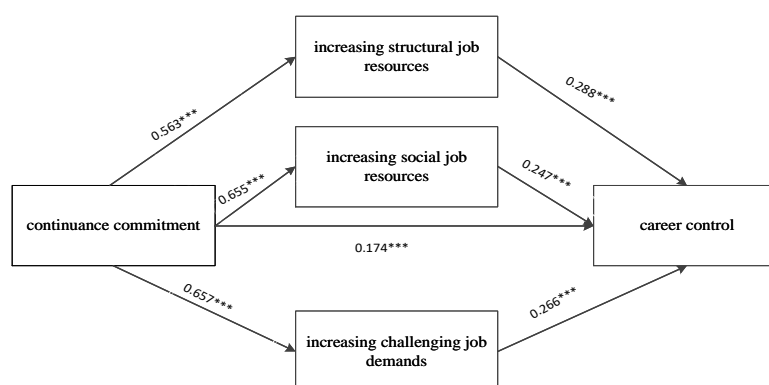


Figure 1. Diagram and the standardized estimates of model B. (***) $p < 0.01$

As displayed in Figure 1, the results show that CC was positively related to all three dimensions of job crafting respectively (i.e., $\beta = 0.563$, $\beta = 0.655$, $\beta = 0.657$; $p < 0.001$), which fully supported Hypotheses 1. CC was positively related to career control ($\beta = 0.174$, $p < 0.001$), which verified Hypotheses 2. All three dimensions of job crafting were positively associated with career control ($\beta = 0.288$, $\beta = 0.247$, $\beta = 0.266$; $p < 0.001$). As a result, Hypotheses 3 was supported.

MacKinnon et al. [33] suggested that the bootstrapping technique is deemed particularly effective and appropriate for verifying mediation or indirect relationships, because it does not consider the data set to be normally distributed. The mediations or indirect effects are considered to be significant if the bias-corrected (BC) 95% confidence interval (CI) for 5000 bootstrap samples does not include zero [33]. Hence, for our Hypothesis 4, we referred to Hayes and Preacher's [34] suggestion to employ a bootstrapping analysis technique on the final model (i.e., model B) to further examine the indirect effects. Our results confirmed that all three mediating effects of the expansive JC behaviors on the CC-career control relationship are significant (i.e., boot indirect effect = 0.195, 95% CI = 0.138-0.251; boot indirect effect = 0.209, 95%CI = 0.147 to 0.271; boot indirect effect = 0.212, 95%CI = 0.146-0.276). Hence, Hypotheses 4 was also verified.

5. Discussion

Overall, our findings provide full support to all four hypotheses. According to the results, manufacturing employees' CC is positively related to their expansive JC behaviors and career control, while the relationships between CC and career control are mediated by the expansive JC behaviors. More specifically, the three dimensions of the expansive JC behaviors, namely the increasing of structural job resources, social job resources, and challenging job demands, can translate the degree of workers' CC to their career control, respectively.

As indicated, the accelerated digitalization coupled with ever growing new job demands in China's manufacturing industry has led to serious concerns about rising CC and the loss of sustainability of careers among productions workers. Due to the lack of career alternatives in the labor market, these workers may be trapped within an organization and some proactive ones could even engage in job crafting behaviors for more resources. In this vein, how employees' CC affects their job crafting behaviors and career control has been, and will continue to be, a hot topic in the relevant domains. Viewed from this angle and drawing on the JD-R theory, this current research indeed offers some valuable theoretical and practical implications.

First and foremost, to our knowledge, our paper seems to be the first empirical study with valuable first-hand evidence to unpack the psychological process of how employees' CC affects their career control via the conduct of the expansive JC behaviors. To a certain extent, our research answers the recent calls of scholars to gain a deeper, more comprehensive understanding of the impact of individuals' proactive behaviors upon career outcomes during uncertain economic times [2,35]. It also implies that the traditional top-down job design tactics may not be sufficient for meeting the changing work demands in today's fast-changing and hyper-competitive business milieu. Younger generations of workers may be apt to take the initiative to re-design their jobs and self-manage their careers for ever-perplexing job demands and, thereby, achieve the sustainability of careers [3,36].

Second, our results add to the existing body of knowledge regarding the JC theory. Whereas prior research mostly focused on investigating the positive association between affective commitment and JC behaviors [12,26], this paper, which highlights the motivational role of CC instead of affective commitment in promoting the expansive JC behaviors, thus enriches the understanding of relevant issues in the context of high unemployment caused by the prevalence of AI and ICTs [3,37]. Viewed from this angle, this research also makes a theoretical contribution about adopting a cross-disciplinary perspective to incorporate the JC theory into the career domain.

Third, in terms of practical implications, our findings deliver fresh insights into modern management practice, particularly with respect to career and human resource management in the manufacturing sector, as the expansive JC behaviors by Chinese production workers can be used as an effective catalyst for organizations to translate their commitment to career sustainability during manufacturing transformation toward digitalization.

6. Limitations and Future Research

Despite some meaningful findings, this current study is still subject to several limitations that lead to fruitful avenues for future research. First and foremost, even though time-lagged data were used, the interference of CMV could not be completely excluded. Future research should take into account the time elapsed between independent, mediating, and outcome variables, whereby we could draw deeper insights in this regard. Second, whereas our sample was mainly composed of production line workers with low levels of education and from a rather impoverished city of China, the results may not be generalized to other populations of workers or other industries. Future research is encouraged to be conducted with more variety of job positions and industries or in other countries whose economic growth also heavily relies on the manufacturing industry. Third, in this current study, we merely detected the impact of expansive dimensions of JC on CC-career outcome relationships. Nevertheless, the JC dimension of decreasing hindrance demands may also play a vital role in affecting career

sustainability, as employees are often keen to craft their work contexts in accordance with changes in their demands. Future research could explore the influence of this dimension in more detail.

7. Conclusion

In conclusion, built upon the JD-R theory, this present study provides fresh ideas and valuable first-hand empirical evidence that reveal the interrelatedness of employee CC, job crafting, and career control. While e-commerce and digitalization are becoming pervasive and more important in most industries, it is of great significance to delve into how AI and ICTs affect the attitudes and behaviors of human workers. Viewed from this angle, we thus argue that this research indeed offers important understanding of how individual employees with high CC are motivated to proactively strive for more job resources to cope with constantly changing job demands and, thereby, to better sustain their careers in the new digital era.

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