

Person-Environment Fit and Organizational Performance: Polynomial Regression and Response Surface Analysis

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Abstract

In the past, the linear effect of person–environment fit on the organizational process and results covers up its complex relationship. Behavioral Reciprocal Determinism Theory holds that the reasons for the changes of individual attitudes and behaviors cannot be simply attributed to individual or environmental factors, but rather to the effect of their interaction. Based on matching theory, the cross-time point method is used to collect data, and 274 valid questionnaires are obtained. The effects of person–environment fit on work satisfaction and organizational performance are analyzed by polynomial regression and response surface analysis. Bootstrapping is applied to confirm the mediating roles of work satisfaction in the above relationship. The results show that (1) Needs-Supplies (NS) fit and Demands-abilities (DA) fit and work satisfaction have an inverted U-shaped curve relationship; (2) work satisfaction has U-shaped curve relationships with task, relationship, and innovation performances; and (3) work satisfaction mediates the influence of person-environment fit and organizational performance. These findings contribute to person–environment fit research and to human resource management practices.

Introduction

With the continuous adjustment of economic structure, the industrial economy in China has gradually turned into a service environment (Jehanze and Mohanty, 2018). On the one hand, product development and technology updates are accelerating under the new economic form. In addition, employees' needs and work concepts are constantly changing, which has a profound effect on enterprise human resource management. Organizational managers face problems such as high turnover rate as well as low productivity and loyalty, which affect the competitive advantage and organizational development (Zhang et al., 2012). On the other hand, the deep application of new generation information technologies, such as big data, cloud computing, and artificial intelligence, has brought many various new opportunities for enterprise management. Human resource management is more comprehensive and objective while being more humanized. The methods to improve employees' positive work experience and well-being through effective talent management, to enhance employees' sense of identity and loyalty to the organization, requires study as a significant issue in management innovation and improving organizational competitive advantage (Kauppila et al., 2021).

The person–environment fit is a core aspect in organizational behavior, especially in the field of human resource management. However, many controversies remain regarding the content of person–environment fit and its effect mechanism on organizational performance (Van Vianen, 2018). Organizational scholars have long recognized person–environment (PE) fit (i.e., the degree of compatibility between the characteristics of employees and those of the work environment) as a dynamic process of adjustment between employees and their work environment. Nevertheless, extant studies largely treat person–environment fit as 'static' by assessing only one point in time and then connecting to employee outcomes (Kim et al., 2018). As research methods improve and research perspectives change, the previous controversial views have gradually been discussed. For example, the content of person–environment fit was developed from the absorption-selection-assimilation model, then to demands–abilities (DA) fit, needs–supplies (NS) fit, next to complementary fit, consistent fit, and then to the current person–post fit, person–colleagues fit, and people–organization (Van Vianen, 2000). Specifically, process factors (leadership style, motivation, authorization, and communication) and results (such as turnover intention (Carless, 2011), employee satisfaction, organizational performance, organizational citizenship behavior) play a vital role between person–environment fit and organizational performance (Yu, 2014). This effect mechanism also extends from a linear to a curve relationship (Jiang et al., 2021).

Employee satisfaction has a pivotal positive influence on employee loyalty, work engagement, and job performance in actual practice. The antecedent factors of employee satisfaction are largely included in the scope of person–environment fit (Li et al., 2021; Obrenovic et al., 2020). We find a critical clue in investigating the influence factors of work satisfaction to identify the linear or curvilinear relationship between person–environment fit and organizational performance. Previous research of this effect mechanism have produced contradictory conclusions (Li et al., 2021). Several studies show that the person–environment fit is positively correlated with organizational performance (Tesi, 2021; Tina et al., 2021; Zeijen et al., 2021) while others suggest no significant relationship between the two (Cable and DeRue, 2002; Astakhova et al., 2017). If

employees' needs are highly satisfied, then improving the person–environment fit by increasing organizational supply may not promote performance. In addition, previous measurements of person–environment fit have various insurmountable problems in theory and methods, such as reliability reduction and confusion between individuals and environmental effects (Edwards et al., 2006). The polynomial regression with response surface analysis is a matching measurement and statistical analysis strategy developed to overcome the above shortcomings (Edwards et al., 1994). Although this method is widely investigated and applied in Western contexts, local scholars rarely use this method for research in related fields.

Based on person–environment fit theory, this study discusses how such fit predicts organizational performance through polynomial regression and response surface analysis. In summary, this study contributes to literature on person–environment fit theory in several important ways. First, we pay attention to NS and DA fits, which provide new perspectives to enrich the theory. In addition, this study further proves a nonlinear relationship between person–environment fit and work satisfaction, which enriches similar literature. Finally, work satisfaction is identified as a mediating role between person–environment fit and organizational performance. Furthermore, we emphasize the U-shape influence of employee satisfaction on organizational performance (task, relationship, innovation, and learning performance) to explore under which situation the work satisfaction positively predicts organizational performance. **Figure 1** shows the conceptual model, which we discuss in the next sections.

This paper is organized as follows. Theoretical background and hypotheses are presented in section two. Section three outlines the research methods, including the participants and procedures, measurement, and analytical strategy. Section four comprises the analysis and results, and finally presents the conclusions and implications.

Theoretical Background And Hypotheses

The concept of person–environment fit has long enjoyed high popularity in professional behavior and management literature (Chatman, 1989). For matching theory, relevant research includes the fit between person–job, person–subordinate, person–team, person–organization, and person–environment. Among these fields, the latter is a relatively broad concept, including that of NS, referring to the matching between environmental supply and employees' psychological needs (e.g., desires, values, and goals), and DA fit, referring to the compatibility between environmental needs and individual personality, knowledge, skills, and abilities (Kristof-Brown, 2000; Kristof, 2006; Rounds et al., 1987; O'reilly et al., 1991; Vecchione et al., 2016).

The person–environment fit is shown to have a positive effect on employees' mental health (Caplan, 1987; Dec and Ryan, 2008; Hogg, 2000), such as personal will (Chatman, 1989; Vansteenkiste et al., 2007; Shen et al., 2018), job satisfaction (Gregory et al., 2010), organizational commitment (Milliman et al., 2017), job performance and organizational citizenship behavior (Nye et al., 2012; Marstand et al., 2017), and interpersonal relationships (Hogg, 2000; Edwards and Cable, 2009). By contrast, mismatched relationships have a negative effect on unproductive work behavior (Nye et al., 2017; Van Iddekinge et al., 2011). At the same time, the matching between people and environment has a significant effect on the basic results (work attitude, such as satisfaction) (Judge et al., 2002; Steel et al., 2008) has no significant effect on behavior results (e.g., performance, turnover rate, and job choice) (Judge and Bono, 2001; Bakker et al., 2014).

Person-Environment Fit and Work Satisfaction

Person–environment fit is essentially a matter of matching person characteristics with environment traits, including personality, job, colleagues, organization, and other factors. Previous literature focuses on consistency and complementary fit (Edwards, 1996; Arthur et al., 2006; Slocombe and Bluedorn, 1999; Jun and Gentry, 2005; Kristof-Brown, et al., 2005). Consistency fit refers to that of values and goals between individuals and organizations, while complementary fit refers to the consistency of needs from each other between individuals and the organization, mainly involving the complementarity between individual needs and organization supply, as well as individual capabilities and organizational demand (Lang et al., 2007). Other existing studies also focus on the person–colleague (leaders) fit, which is closely related to

values and work style to a great extent. Limited to the content of this study, and following Shen et al. (2018), we use the complementary fit to represent person–environment fit, which includes NS and DA fit.

Person–environment fit is the match between personal and organizational characteristics, specifically the extent to which individual traits satisfy the organization's demand. These characteristics mainly include employees' knowledge, skills, and abilities. The person–environment fit contains two main aspects, namely, DA and NS fit. The former mainly refers to the consistency of employees' knowledge, skills, and abilities with job responsibilities and work contents while the latter refers to whether employees' material and spiritual needs are met by the organization through their work.

Previous findings on how person–environment fit affects employee behavior remain inexact or even contradictory. Several scholars suggest that person-environment fit is positively related to work satisfaction (Rounds et al., 1987; Kristof-Brown et al., 2005; Edwards, 2008; Edwards and Shipp, 2007; Marstand et al., 2017), while others argue that such relationship is not always positive (Atitsogbui et al., 2018). If employees' needs are highly satisfied, then improving the person–environment fit by increasing organizational supply does not necessarily benefit performance (Andela and Doef, 2018; Rauvola et al., 2020). Therefore, we believe that nonlinear models can better describe this relationship (Pee and Min, 2017). In the organizational environment, a high level of work satisfaction requires much personal work engagement. People who feel an imbalance between engagement and rewards may feel frustrated and stressed or even leave their jobs. This trend also shows the non-linear relationship between person–environment fit and work satisfaction. Generally, job and employees' personal characteristics fall under the category of person–job fit, that is, the work environment is contained in the person–organization fit, while relationship with colleagues is contained in the person–colleague fit. Therefore, as the level of person–environment fit increases, the level of employee satisfaction also increases (Atitsogbui and Amponsah-Tawiah, 2019). In other words, better NS and DA fit bring higher level of work satisfaction. However, as the degree of matching increases, employees work hard to acquire new knowledge, master new skills, and even change old cognition. Thus, work satisfaction eventually suffers. On the basis of the above analysis, we propose the following hypotheses:

Hypotheses H_{1a}: *Needs-Supplies (NS) fit has a significant positive linear effect and a negative curvilinear (inverted U-shape) effect on work satisfaction. Specifically, work satisfaction tends to increase as the gap between needs and supplies decreases.*

Hypotheses H_{1b}: *Demands-abilities (DA) fit has a significant positive linear effect and a negative curvilinear (inverted U-shape) effect on work satisfaction. Specifically, work satisfaction tends to increase as the gap between demand and ability decreases.*

The Mediating Role of Work Satisfaction in the Relationship Between Person-Environment Fit and Organizational Performance

Work satisfaction is the overall status regarding employee perceptions and expectations regarding their work environment, referring to psychological gap between their desired and actual results, which ultimately affects job outcomes (Bertrais et al., 2021). Work satisfaction is considered closely related to job burnout, turnover intention, and organizational citizenship behavior. Generally, as the gap between employee perceptions and expectations of their environment decreases, their job satisfaction increases (Gerich and Weber, 2020). When perceptions are lower than expectations, employees develop dissatisfaction, which manifests as loss, complaints, intention to leave, and even tardiness, absenteeism, and anti-productivity. When perceptions are equal to expectations, employees develop general satisfaction, which manifests as work on time. When perceptions exceed expectations, employees develop a sense of superiority and happiness, which manifest in high organizational commitment, loyalty, and citizenship behaviors. Hauff et al. (2015) studied the effect of ethnic culture on work satisfaction according to Hofstede's cultural dimension. Significant differences were observed in the effects of job characteristics on work satisfaction across countries. Afsar (2015) investigated how person–environment fit affects employees' innovative work behaviors and ultimately affects job performance, suggesting its positive relation on innovative work behavior and to job performance through innovation trust. Yu (2016) examined the above relationships by multiple

regression analysis and found that dimensions of person–environment fit significantly and positively predicted employees' work satisfaction. NS fit shows the strongest effect while DA fit shows the weakest effect. The types of fit can improve work satisfaction by promoting work–family balance. On the basis of the above analysis, we propose the following hypotheses:

Hypotheses H₂. *Work satisfaction has a positive curvilinear relationship (U-shaped) with organizational performance and its various dimensions (task, relationship, innovation, and learning). Specifically, the dimensions of organizational performance tend to increase as the work satisfaction increases.*

Hypotheses H₃. *Work satisfaction plays a mediating role in the effect of person–environment fit on various dimensions of organizational performance (task, relationship, innovation, and learning).*

Research Methods

Participants and Procedures

This study collected data by means of key investigation on employees in the marine characteristic industrial park of the blue economic zone. The types of enterprises mainly include fishery, manufacturing, services, and transportation. The data were collected uniformly by the park management committee, and the corresponding questionnaire validity items were set as the deletion standard. Data collection was carried out twice to avoid the homology error caused by single data source (common method variance). The first round investigated the person-environment fit and work satisfaction. After an interval of one month, the second round investigated organizational performance. Subsequently, the data of the two surveys were matched. A total of 400 questionnaires were distributed. After the deletion of unqualified responses, the sample size still met the requirements. A total of 274 valid questionnaires were collected and the recovery effective rate was 68.5%. To evaluate the influence of homologous variance on the results, the exploratory factor analysis was used on the measurement items. The variables were subjected to principal component analysis and variance maximum orthogonal rotation method. Subsequently, confirmatory factor analysis was conducted by structural equation model to evaluate the consistency of each item. The results showed that no single factor explains most of the variations, and the homology error was small.

Descriptive statistics show that, in terms of gender, male account for 54.4% and female for 45.6%; In terms of age, those under 25 accounted for 4.7%, 26-30 accounted for 17.2%, 31-40 accounted for 34.7%, 41-50 accounted for 27.7%, and more than 51 accounted for 15.7%; In terms of education level, 29.2% of them have college degree or below, 63.5% have bachelor degree, and 7.3% have graduate degree or above. In this study, gender, age and education were used as the control variables.

Measurement

All measures, adopted from previous research and examined appropriate properties, were translated from English to Chinese. Items were measured using Likert 5-point scale ranging from 1 to 5. For items of variable needs-supplies fit, demands-abilities fit and organizational performance, 1 means “strongly disagree” and 5 means “strongly agree”, and for items of work satisfaction, 1 means “strongly dissatisfied” and 5 points means “strongly satisfied” (Li and Lin, 2021; Briker et al., 2020; Naseer et al., 2021).

Needs-supplies (NS) fit. Needs-supplies fit was measured with the 3-item measure (Cable and De Rue, 2002). An examples of items is “The job supply and what I pursue at work can match very well”. The Cronbach's α of the scale was 0.843.

Demands-abilities (DA) fit. Demands-abilities fit was measured with 3-item according to Cable et al. (2002) An example scale item was “My ability and training can be well matched with job requirements”. The Cronbach's α of the scale was 0.826.

Work satisfaction. Price et al. (1986) scale was used to measure target employees' work satisfaction in their work places. Specifically, there are 5 items in this scale. For example, “How satisfied are you with your job.” “How satisfied are you with your colleagues”, etc. The Cronbach's α of the scale was 0.854.

Organizational performance. Organizational performance was divided into task performance, relationship performance, innovation performance, and learning performance (Janssen et al., 2004). Task performance was measured with 10 items (e.g., “You are competent for the tasks arranged by the organization”). The Cronbach’s α of the scale was 0.912. Relationship performance was measured with 14 items (e.g., “Even if the superiors are not present, you follow the instructions”). The Cronbach’s α of the scale was 0.938. Innovation performance was measured with 14 items (e.g., “You can propose new ideas to improve the current situation”). The Cronbach’s α of the scale was 0.921. Learning performance was measured with 14 items (e.g., “You pay much attention to gain experience through learning to improve work efficiency”). The Cronbach’s α of the scale was 0.913.

Analytical Strategy

The polynomial regression with response surface analysis were performed to test the relationship between person–environment fit and organizational performance. With its suitability to test the degree of association between mutual consistency or difference of two predictor and outcome variables, the polynomial regression has been widely valued and applied in recent years (Weidmann et al, 2017; Bar-Kalifa, 2017; Audenaert et al, 2018; Chen et al, 2019; Qiu et al, 2019; Paletta et al, 2021; Guo et al, 2021; Richard et al., 2021a; Richard et al., 2021b).

The following equation was formulated to test the effects of person–environment fit on organizational performance:

$$Z = b_0 + b_1X + b_2Y + b_3X^2 + b_4XY + b_5Y^2 + \varepsilon \quad (1)$$

where X and Y represent NS and DA fit respectively, and Z represents organizational performance.

As seen in Equation (1), the regression coefficients of X, Y, X^2 , XY, and Y^2 need to be obtained. Before analysis, we carried out a counter-check of the independent variables X and Y to reduce multicollinearity (Edwards and Parry, 1993; Edwards, 1994).

The response surface technique has three key metrics: fixed point, principal axis, and slope and curvature. The principal axis describes the direction of the response surface on the X–Y axis. The first and the second principal axes are perpendicular to each other and intersect at the fixed point. Accordingly, the shape of the response surface can be assessed. the curvature along the first principal axis is the largest while that along the second principal axis is the smallest for a convex surface, and is opposite for a concave surface.

$$Z = b_0 + (b_1 + b_2)X + (b_3 + b_4 + b_5)X^2 + \varepsilon \quad (2)$$

$$Z = b_0 + (b_1 - b_2)X + (b_3 - b_4 + b_5)X^2 + \varepsilon \quad (3)$$

Along the $X=Y$ line, the slope is (b_1+b_2) and the curvature is $(b_3+b_4+b_5)$; along the $X=-Y$ line, the slope is (b_1-b_2) and the curvature is $(b_3-b_4+b_5)$. When $(b_3+b_4+b_5)$ and $(b_3-b_4+b_5)$ are negative and statistically significant, a concave (U-shaped) surface forms along this line. Conversely, when they are positive and statistically significant, a convex (inverted U-shaped) surface is formed.

Results And Analysis

Reliability and Validity Analysis

The internal consistency reliability and combination reliability were tested. The internal consistency reliability was based on Cronbach’s α coefficient measurement, and the results show that the Cronbach’s α is greater than 0.7, and the criterion of Composite Reliability (CR) is greater than 0.7. The results are shown in **TABLE 1**. The validity analysis usually tests the

construction validity of measurement factors, including convergence validity and discriminant validity. The convergence validity uses the CR value and Average Variance Extracted (AVE) discrimination. The results show that the criteria of CR is greater than 0.7 and AVE is greater than 0.5. The discriminant validity compares the individual AVE value of the two constructs with the correlation coefficient between the two constructs. If the AVE value of the two constructs is greater than the square of the correlation coefficient of the two construct variables, it indicates that there is good discriminant validity between the constructs. The results show that the discriminant validity meets the requirements, that is, the value of correlation coefficient matrix is less than the square root of diagonal AVE.

TABLE 1. Correlation coefficient.

Confirmatory Factor Analysis and Common Method Bias Testing

Amos 22.0 structural equation was used to test the construction discrimination validity, as well as the fitting degree of the models was compared. As shown in **TABLE 2**, the fitting degree of the seven factor model is better than that of the other models (Chin=2128.835, df=968, Chin/df=2.199<3, CFI=0.879, NFI=0.800, RMSEA=0.066<0.08).

Referring to the treatment of Podsakoff et al. (2003) and Liang et al. (2007), this study used the ULMC (Unmeasured Latent Method Construct) method to test the effect of common bias, and the results showed that the mean of explanation level was 13.95, while the mean of ULMC was 0.29, and the ratio between the two was 47:1. Based on the above judgment, the effect of common method bias was not significant in this study.

TABLE 2. Results of CFA

Hypotheses Testing

Effects of Person–Environment Fit on Work Satisfaction

The variables of NS fit and DA must fit centralization to avoid multicollinearity. Then, the square and interactive terms must be calculated. Subsequently, the analysis method of quadratic polynomial regression equation is as follows. The first step is to place NS and DA fit into the regression equation to test their linear relationship with work satisfaction (model 1). Next, the square and interactive term of NS fit and DA fit are placed into Equation (1) to test the curve relationship and interaction effect (model 2). If the incremental meaning on statistical indicators R^2 is significant by comparing models 1 and 2, then further response surface analysis is needed. **TABLE 3** presents the results for the polynomial and hierarchical regression analyses in relation to the effects of NS and DA fit on work satisfaction. The results are significant, with NS fit having a greater effect on work satisfaction ($b_1=0.653$, $p<0.001$; $b_2=0.126$, $p<0.05$) than DA. According to the results, changes between models 1 and 2 have significant incremental meaning ($\Delta R^2 = 0.021$, $p<0.001$), and therefore further response surface analysis is required.

TABLE 3. Results of polynomial regression analyses

FIGURE 2, shows a concave as the response surface. The function of the fixed point is to estimate the best or worst matching conditions of the predicted variables. The best combination coordinate is the fixed point ($X_0=22.97$, $Y_0=13.10$). The first principal axis equation is $Y_1=-0.33+0.58X$ and the second is $Y_2=52.41-1.71X$. The following conclusions can be drawn from Table 2. First, the slope of the surface along the line of congruence ($X=Y$) is significantly positive with significant curvature ($a_2=-0.068$, $p<0.01$), indicating that work satisfaction increases as the gap between NS and DA fit decreases. Thus, H_{1a} and H_{1b} are supported.

Effects of Work Satisfaction on Organizational Performance

We test the effects of work satisfaction on organizational performance through models 1–8 and regression analysis was performed on organizational performance. **TABLE 4** shows the results. Models 1 and 2 show a significant positive

relationship between work satisfaction and task performance, specifically, a U-shaped curve relationship. Models 3 to 6 show the same effects of work satisfaction on relationship and innovation performance. However, Models 7 and 8 show a significant positive relationship but no U-shaped curve between work satisfaction and learning performance. Combining models 1, 3, 5, 7 and the above analysis, we can determine that the effect of employee work satisfaction on task, relationship, innovation, and learning performance are significantly positive. The largest effects are found on innovation followed by task performance, indicating that the most apparent work satisfaction is in terms of innovation and then task completion. According to models 2, 4, 6, and 8, we can determine that work satisfaction also has a curvilinear influence relationship on task, relationship, and innovation performance. The most apparent influence is on task performance and no curvilinear influence relationship on learning, indicating that as the work satisfaction increases, the organizational performance in task, relationship, and innovation also increases. Thus, H₂ is supported.

TABLE 4. Results of regression analysis

The Mediating Effect of Work Satisfaction

Bootstrapping (N=1000) was used to examine the mediating effect of work satisfaction. **TABLE 5** shows the results. According to the criteria, if the confidence interval does not include 0, then the mediating effect is significant. Table 4 shows that, except for model 7, NS fit only has a direct effect on learning performance while work satisfaction has a mediating effect between person–environment fit on organizational performance in other models. H₃ is thus supported.

TABLE 5. Results of the mediating effects

Conclusion And Discussion

Conclusion

This study examines the effects of person–environment fit (NS and DA) on work satisfaction and organizational performance using quadratic polynomial and response surface analysis method. The mediating role of work satisfaction on the relationship between person-environment fit and organizational performance is tested. Thus, this study extends the theoretical model of person-environment fit and reveals its inverted U-shaped relationship with work satisfaction. Meanwhile, a relationship model between work satisfaction and organizational performance is established and the U-shaped curve effects of work satisfaction on task, relationship, and innovation performance are further examined.

Theoretical and Practical Implications

This study presents several theoretical contributions to the person–environment fit literature. First, the effect of person–environment fit on work satisfaction is examined, thereby expanding the research on factors affecting work satisfaction. Second, the effect of work satisfaction on organizational performance is confirmed, adding research on the latter's influencing factors. Third, the mediating role of work satisfaction in the relationship of person–environment fit with organizational performance is investigated. Thus, the understanding of the relationship between person–environment fit and organizational performance and the theory of person-environment are likewise extended.

A diverse workforce is a very important foundation for ensuring the vitality of the organization. This study emphasizes the importance of person–environment fit to the management of employee work satisfaction and organizational performance, and provides practical management implications.

First, the person in charge of the organization must coordinate the overall effect of matching employees with the environment. The results indicate that the effects of NS and DA fit on work satisfaction and organizational performance are not simply linear, but affect each other or even have curve-influence relationships. Organization managers must grasp the

person–environment fit as a whole rather than consider single elements. The ultimate goals are to achieve the sustainable competitive advantage of employees and the organization, and to maximize the long-term value of both parties.

Second, scientific training and learning are necessary to improve the comprehensive ability of employees. Employees who feel that their organization exerts attempts to improve the management, are more satisfied with their work. Thus, the organizational performance also improves. Employees' learning, which can improve their knowledge, skills, and attributes, is based on organizational learning ability. Organizations must establish a list of employee abilities to better help the latter understand the relationship between role changes and career development or other new management initiatives. In this way, the organization can also assign appropriate roles to employees based on their abilities and skills. At the same time, encouraging employees to share knowledge with their peers can generate a flow of ideas, thereby forming a consensus library for development.

Third, managers must pay attention to enrich the content and methods of motivation to meet the diverse employee needs. Employees wish to perform their duties without concerns of damaging their personality, self-worth, and self-esteem; and thus tend to perform better in a work environment that is non-threatening and high in motivation, mutual assistance, and enjoyment. Therefore, to promote high work engagement, enterprises need to provide employees with opportunities to freely express opinions, emotions, and attitudes. A trust mechanism is necessary. In addition, organizations that allow participation in decision-making, grant work freedom, and provide a certain degree of independent decision-making power can arouse employee enthusiasm to contribute their talents, and increase the opportunities for employees to realize their self-worth.

Limitations and Future Research

Despite its contributions, this study has several limitations. First, the measures were all self-reported, which raises the possibility for common method bias. However, the evaluation of the person–organization fit and employee satisfaction may be subjective, and self-reports may be the best method to capture these feelings. Future research may solve this problem by classifying supervisors and colleagues according to their positions or departments to measure work input and innovation performance. Grouping regression can be carried out to provide more targeted meaning. Second, there are inconsistencies in the measurement of variables, such as person-environment fit, organizational performance and work satisfaction. Future research need to unify this measurement. Third, the response surface regression method is an indirect measurement strategy. Comparison of individuals and organizational attributes is the result of the cognitive evaluation of individual and environmental perceptions, which are subjective and ignores the self-evaluation of the matching between people and environment. In the future, more exploration and improvement are necessary in considering these factors and their effects on different industries.

Declarations

Ethics approval and consent to participate

The experimental protocol was established, according to the ethical guidelines of the Helsinki Declaration and was approved by the Human Ethics Committee of Shandong Normal University. Informed consent was obtained from individual participants.

Consent for publication

Not applicable

Availability of data and materials

All data generated or analyzed during this study are included in this published article [and its supplementary information files].

Competing interests

The authors declare that they have no competing interests.

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Authors' contributions

DJ designed the research, and collected the data, LN and YZ analyzed the data, and QL examined and critically contributed to and finally approved the manuscript.

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Tables

TABLE 1. Correlation coefficient.

Variables	Mean	SD	1	2	3	4	5	6	7	8	9	10
1 Gender	1.456	0.499	1									
2 Age	3.325	1.079	-.045	1								
3 Education	1.781	0.564	.109	-.057	1							
4 Needs-supplies	3.572	0.714	-.012	.094	.188**	.872						
5 Demands-abilities	3.697	0.681	-.045	.179**	.084	.694**	.862					
6 Work Satisfaction	3.452	0.704	-.068	.075	.160**	.653**	.586**	.797				
7 Task Performance	3.758	0.576	.022	.213**	.116	.694**	.577**	.613**	.748			
8 Relationship Performance	3.797	0.569	.071	.251**	.108	.691**	.524**	.605**	.674**	.748		
9 Innovation Performance	3.697	0.637	.043	.126*	.110	.615**	.509**	.642**	.622**	.672**	.804	
10 Learning Performance	3.855	0.617	.049	.236**	.056	.653**	.514**	.505**	.674**	.676**	.627**	.812

Pearson two tailed test. * $p < 0.05$, ** $p < 0.01$, The diagonal is the square root of the variable AVE.

TABLE 2. Results of CFA.

Model fit	CMIN/DF	CFI	NFI	RMSEA
^a One-factor	2.879	0.807	0.733	0.083
^b Two-factor	2.677	0.762	0.669	0.078
^c Three-factor	2.485	0.789	0.693	0.074
^d Four-factor	2.462	0.793	0.696	0.073
^e Five-factor	2.449	0.795	0.698	0.073
^f Six-factor	2.198	0.831	0.730	0.068
^g Seven-factor	2.199	0.879	0.800	0.066
^h ULMC	2.034	0.901	0.824	0.062

N = 274. RMSEA = Root Mean Square Error of Approximation, NS = Needs-supplies, DA = Demands-abilities, WS = Work Satisfaction, TP = Task Performance, RP = Relationship Performance, IP = Innovation Performance, LP = Learning Performance, ULMC = Unmeasured Latent Method Construct.

^a *One-factor = all variables merged.*

^b *Two-factor = NS+DA, WS+TP+RP+IP+LP.*

^c *Three-factor = NS+DA, WS, TP+RP+IP+LP.*

^d *Four-factor = NS+DA, WS, TP, RP+IP+LP.*

^e *Five-factor = NS+DA, WS, TP, RP, IP+LP.*

^f *Six-factor = NS+DA, WS, TP, RP, IP, LP.*

^g *Seven-factor = hypothesized model.*

^h *ULMC = Seven-factor+CMB.*

TABLE 3. Results of polynomial regression analyses.

	B	SE	B	SE
Constant	3.524 ^{***}	.153	3.558 ^{***}	.152
Gender	-.082	.056	-.081	.056
Age	-.006	.026	-.001	.026
Education	.038	.051	.050	.050
Needs-supplies(NS) fit, (b1)	.653 ^{***}	.055	.620 ^{***}	.057
Demands-abilities(DA) fit, (b2)	.126 ^{**}	.058	.124 ^{**}	.059
(NS fit) ² , (b3)			-.101	.067
NS fit × NS fit, (b4)			.307 ^{***}	.101
(DA fit) ² , (b5)			-.274 ^{***}	.079
ΔR^2		.539 ^{***}		.021 ^{***}
$a_1 = b_1 + b_2$.744 ^{***}	.290
$a_2 = b_3 + b_4 + b_5$			-0.068 [*]	.269
$a_3 = b_1 - b_2$.486 ^{***}	.367
$a_4 = b_3 - b_4 + b_5$			-.682	.348

N=274. Unstandardized regression coefficients are reported. * $p < 0.001$, ** $p < 0.05$, *** $p < 0.01$

TABLE 4. Results of regression analysis.

	Task performance		Relationship performance		Innovation performance		Learning performance	
	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6	Model 7	Model 8
Constant	1.603 ^{***}	3.105 ^{***}	1.544 ^{***}	2.490 ^{***}	1.360 ^{***}	2.349 ^{***}	1.833 ^{***}	2.474
Gender	.078	.073	.136 [*]	.133 [*]	.115	.111	.117	.115
Age	.092 ^{***}	.088 ^{***}	.112 ^{***}	.109 ^{***}	.048	.046	.115 ^{***}	.113 ^{***}
Education	.023	.018	.012	.009	.003	.000	-.025	-.027
Work satisfaction	.491 ^{***}	-.427	.481 ^{***}	-.097	.581 ^{***}	-.024	.439 ^{***}	.047
Work satisfaction ²		.136 ^{***}		.086 [*]		.090 [*]		.058
Adjusted R ²	.400 ^{***}	.426 ^{***}	.415 ^{***}	.424 [*]	.418 ^{***}	.426 [*]	.293 ^{***}	.295
F	46.500	41.487	49.341	41.161	50.064	41.520	29.316	23.849

N=274. Unstandardized regression coefficients are reported. * $p < 0.001$, ** $p < 0.05$, *** $p < 0.01$

TABLE 5. Results of the mediating effects.

	Task performance		Relationship performance		Innovation performance		Learning performance	
	Model 1'	Model 2'	Model 3'	Model 4'	Model 5'	Model 6'	Model 7'	Model 8'
Constant	2.826	2.759	2.754	2.530	2.732	2.403	3.387	3.059
Gender	.058	.078	.117	.136	.093	.114	.092	.116
Age	.080	.047	.100	.073	.035	.008	.100	.067
Education	-.014	.023	-.024	.012	-.038	.003	-.071	-.025
Needs-supplies (NS) fit	.420		.416		.472		.534	
	[.318, .523]		[.068, .270]		[.361, .582]		[.417, .650]	
Demands-abilities (DA) fit		.524		.447		.473		.555
		[.449, .599]		[.368, .526]		[.382, .563]		[.463, .648]
Work satisfaction	.176	.200	.169	.233	.227	.318	.038	.129
	[.318, .523]	[.127, .272]	[.316, .515]	[.157, .309]	[.115, .339]	[.231, .405]	[-.080, .155]	[.040, .218]

Figures

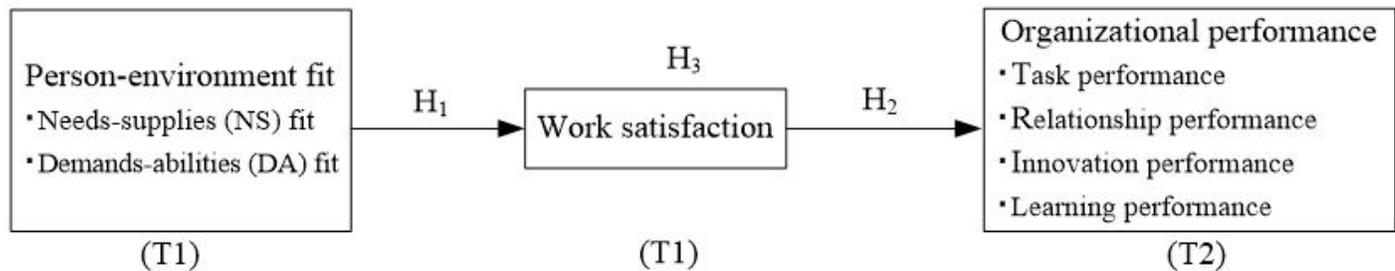


Figure 1

The research model

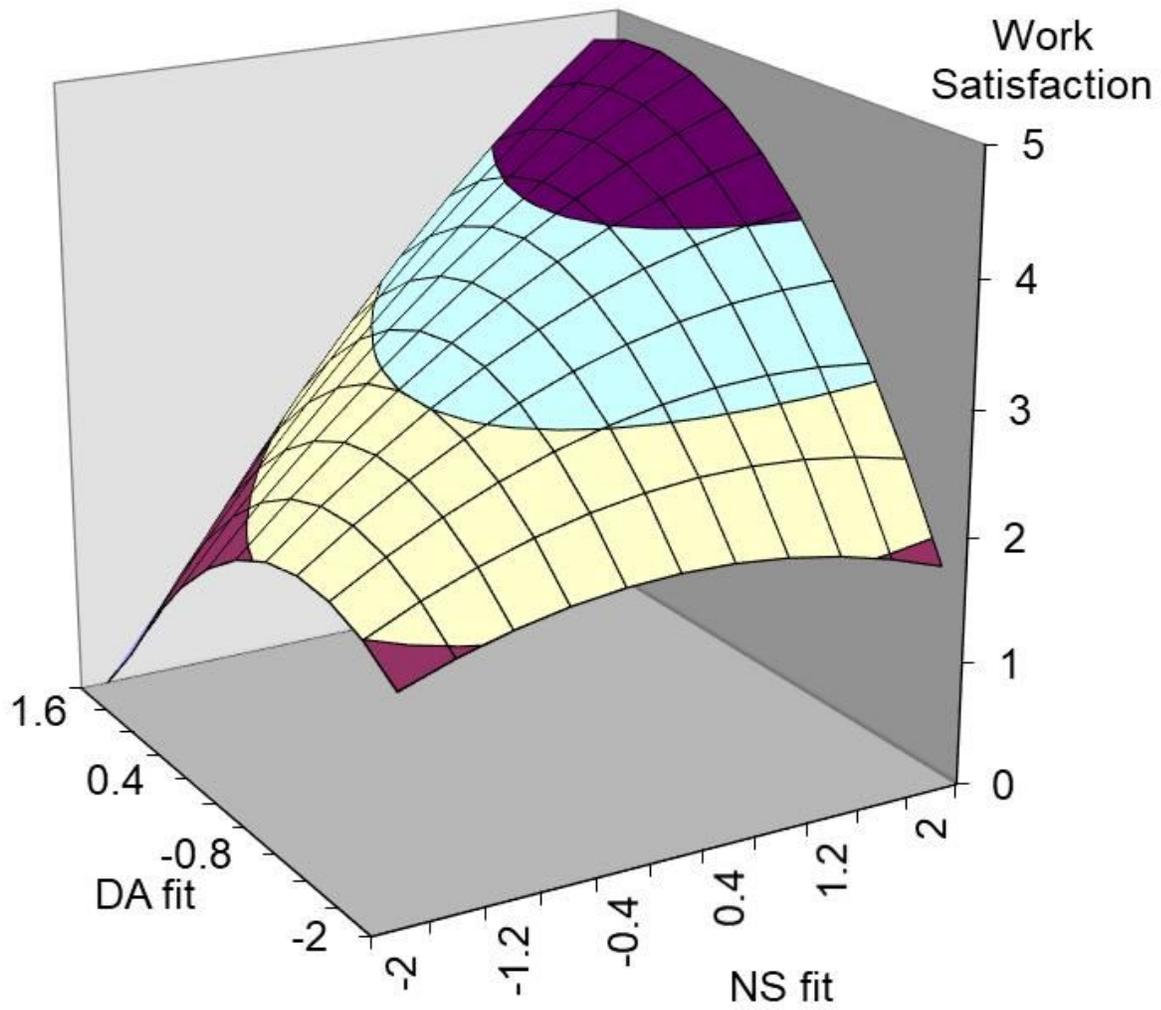


Figure 2

Response surface of the effect of person-environment fit on work satisfaction

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