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Relationship between Organizational Improvisation and Organizational Creativity under Multiple Regression Analysis

Weixian XUE¹, Shuyu SUN²

Abstract

With the development of technology, the external competitive environment is increasingly dynamic and complicated. If enterprises want to continue to develop, it is necessary to improve their own innovation capabilities continuously, which is crucial for enterprises to gain competitive advantage and improve performance. In order to answer the organizational improvisation and under what organizational conditions to drive organizational creativity, this paper makes assumptions about the relationship among organizational creativity, improvisation ability, organizational modularity and time pressure based on the existing theoretical review, and this paper establishes a four-part relationship model. Starting from the theory of organizational creation, this paper examines the impact of organizational improvisation on organizational creativity, how learning context (experience learning) and modular context (organizational modularity) affect the relationship between organizational improvisation and organizational creativity. This paper selects 313 enterprise data as the object to conduct questionnaire survey, uses multiple regression analysis method, and adds the intermediary variable improvisation ability and adjustment variable time pressure. This paper empirically tests the effects of two variables in organizational creativity and strategic change through a large sample survey, using multiple regression models for empirical testing. The results of the study indicate that organizational improvisation is positively affecting organizational creativity. Empirical learning positively regulates the relationship between organizational improvisation and organizational creativity, while organizational modularity negatively regulates the relationship between organizational improvisation and organizational creativity.

Keywords: Organizational creativity, multiple regression analysis method, empirical learning, organizational modularity.

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Introduction

In the new economic era, enterprises will continue to face changes in the internal and external environment, which requires always preparing to change the strategy to coordinate the adaptation relationship between the enterprise and the environment. Therefore, the implementation of strategic changes is a necessary condition to ensure that enterprises have a competitive advantage (Abbas, & Raja, 2015; Carvalho *et al.*, 2018). At present, exploring the complex mechanism of strategic change within the organization from micro-mechanisms and variables has become an important topic in the field of strategic management research. From the external environmental factors, we cannot deeply understand the complex process of strategic change (Camps *et al.*, 2016). Especially in a turbulent environment, it is especially important to organize creative learning. It also needs to bring along a lot of new ideas and new ideas about products and services. The strategic change is a process of creation of the organization. Creativity can generate novel and valuable ideas. It is not only the premise and foundation of innovation, but also the driving force and source of enhancing the competitive advantage of enterprises. It is also an important guarantee for promoting strategic change. In recent years, the concept of organizational improvisation is seen as an important way to understand how innovation should start in the context of fierce market competition and the continually striving for faster cycles and more innovative solutions (Easterby, Crossan, & Nicolini, 2000; Abrantes *et al.*, 2018). Therefore, organizational improvisation is widely used in the field of organizational research and innovation, which has attracted the attention of a large number of scholars. Organizational improvisation is defined as a special kind of short-term, real-time learning, which usually takes place when the organization encounters unexpected situations, uses the information received by the “present”, integrates the original organizational experience and knowledge, and adopts a novel, fast, coherent behavior (Asiri *et al.*, 2016). Then, how does this kind of “on-the-spot” organization improvise and in what context can promote the formation of organizational creativity.

In fact, Chinese enterprises face the dual disadvantages of market and technology. In a rapidly changing environment, it is an important means to help SMEs achieve innovation catch-up and value enhancement by organizing improvisation to cultivate organizational creativity and continuing to create new knowledge (Zhao, Li, & Liu, 2016; Baron, Franklin, & Hmieleski, 2016). However, there are shortcomings in the existing research. On the one hand, the scholars who organize the research genre ignore the knowledge creation as the attribute of organizational ability, and lack attention to the influencing factors of organizational creativity construction (Giustiniano, Lombardi, & Cavaliere, 2016; Belschak, Den Hartog, & Kalshoven, 2015). On the other hand, scholars of the existing organization improvisation pay more attention to the connotation and process of improvisation, and whether the organization improvisation is useful in the organizational context and whether it

has discussed further. First, in view of how organizational improvisation promotes organizational creativity, this paper defines organizational creativity as an organizational capability for enterprises to integrate and exchange information to generate new knowledge according to organizational creation theory, and considers that it is crucial for the development of new products (Giustiniano, Lombardi, & Cavaliere, 2016). The capacity building literature emphasizes the importance of learning to the impact of competence, especially in the field of innovation, and the knowledge generated by organizational learning and learning is an important cause of organizational innovation (Darroch & Mcnaughton; 2002; Caniels, & Rietzschel, 2015). Starting from the emerging organizational improvisation theory (Parida, Wincent, & Kohtamaki, 2013) believe that capacity development may come from the impromptu, novel, rapid, and consistent actions of the organization in the face of unforeseen circumstances. This view is consistent with organizational improvisation (Miner, Bassoff, & Moorman, 2014), emphasizing that learning can be based on previous plans, by integrating existing paths and skills to solve emergencies in real time (Miner, Bassoff, & Moorman, 2014). It can be seen that organizational improvisation can effectively enhance organizational creativity, and the importance of such learning is increasingly prominent in modern and complex environments. Secondly, the core issue of promoting organizational creativity in the context of organizational improvisation, as emphasized by the theory of organizational creativity (Giustiniano, Lombardi, & Cavaliere, 2016; Thurlings, Evers, & Vermeulen, 2015; Troilo, De Luca, & Atuahene-Gima, 2014), fostering organizational creativity requires the protection of context and organizational context. In terms of learning situations, according to the path dependence perspective, scholars believe that ability emerges from a series of path-dependent learning experiences, that is, organizations invest resources strategically, take learning actions and develop organizational-specific paths and capabilities (Valaei, Rezaei, & Ismail, 2017; Yang & Zhu, 2016). Based on this logic combined with the definition of empirical learning, we believe that empirical learning can find the most suitable organizational behavior in organizational improvisation by systematically changing behaviors and conditions, and repeatedly observing behavioral outcomes based on changing conditions, which helps to enhance the organizational creativity by organizing the path (Fortwengel, Schußler, & Sydow, 2017).

The external environment is becoming more and more dynamic, the speed of technology update is accelerating, and more and more creativity is highly valued by business leaders. In this uncertain environment, companies must also change their operations in a timely manner to coordinate the interaction between the company and the environment, and maintain the competitive drive through strategic adjustments. With the gradual deepening of academic research on organizational creativity, the use of organizational creativity to promote strategic change has become a topic of concern. In order to enhance their competitive advantage and seek their own development, companies need to continuously

improve their organizational creativity, generate more novel and valuable ideas. However, there is no consensus in the academic and business circles on how organizational creativity can promote strategic change. This paper studies the complex relationship between organizational creativity and strategic change by introducing the impetuous ability of mediator variables and adjusting the variables, and initially this paper explores the role of organizational creativity in enterprises, which helps to improve the enterprises' difficulty of the puzzle, and the profound role of creativity in development in actual operation (Valaei, Rezaei, & Ismail, 2017). At the same time, it helps companies to respond to fleeting opportunities quickly and effectively under the new situation of increasing uncertainty, competitors accelerating strategic change and business model innovation. Therefore, this paper will explore the role of empirical learning in the context of the relationship between organizational improvisation and organizational creativity. In terms of organizational context, the rapid response of organizational improvisation requires the organization of flexible operational mechanisms. The transfer and diffusion of knowledge requires organizations to provide platforms and mechanisms for knowledge sharing (Vera *et al.*, 2016). Therefore, this paper will explore the regulatory role of organizational modularity in the relationship between organizational improvisation and organizational creativity.

Literature Review and Theoretical Basis

Pastor Seller and Sanchez Millan (2014) verify the hypothesis that the changes in the profile and needs of the users and the services/resources that they required from the basic structures of the municipal social services is linked to the social and economic crisis, as well as developments in institutional policy of social policies related to social services. Impromptu requires creative elements; organizing creativity in the enterprise can develop new and better ways of implementing project work, and can solve the so-called constantly demanding unplanned work style. The more prominent the charismatic leadership behavior, the higher the enhancement of leadership effectiveness. While the enhancement of leadership effectiveness relies on the promotion of organizational cohesion and leading character perception of employees as well as other psychological empowerment factors. Additionally, subordinates with high emotional intelligence and subordinates with low emotional intelligence are both able to significantly affect the relationship between charismatic leadership behavior and leadership effectiveness, but subordinates with high emotional intelligence are more easily able to promote job performance and job satisfaction through charismatic leadership behavior. Subordinates with low emotional intelligence, on the other hand, are more conducive to the enhancement of organizational citizenship behavior through charismatic leadership behavior. Business leaders can choose subordinates with different emotional intelligence levels based on the actual task

needs. The conclusions have accordingly a great practical significance for further developing more effectively behavioral intervention strategies and improving the quality of enterprise decision-making (Yang & Zhu, 2016). The data were collected from a hospital by means of intrapreneurship scale, organizational factors scale and innovation performance scale. According to the results of Structural Equation Model analysis, intrapreneurship has positive influences on innovation performance. Organizational factors directly and indirectly affect innovation performance (Ekingen *et al.* 2018). Moreover, intrapreneurship has mediation effect between organizational factors and innovation performance.

Organizational improvisation and organizational creativity

Organizational creativity is an organizational capability for companies to integrate and exchange information to generate new knowledge (Duan, 2017; Fang *et al.*, 2015; Pucetaite *et al.*, 2016). Based on the perspective of organizational knowledge, organizations first need to identify new opportunities to initiate the process of “knowledge creation”; then the organization needs to integrate existing knowledge with new knowledge, or integrate existing knowledge in new ways to form new knowledge architecture (Pastor Seller & Sanchez Millan 2014). When the new organizational structure is verified to be beneficial to the organization, the organization needs to store this knowledge and transform it into the organization’s path and ability; finally, in order to avoid the organization’s “path locking” into the “capability trap” organizations need to update their knowledge base from time to time to break path dependence (Rozkwitalska, 2017). Therefore, we deconstructed organizational creativity into four processes: opportunity recognition ability, integration ability, knowledge storage and transformation ability, and breaking path dependence ability (Giustiniano, Lombardi, & Cavaliere, 2016; Friedman & Carmeli, 2018). It also believes that organizational improvisation and experience learning provide the possibility for organizations to cultivate organizational creativity.

This paper argues that organizational improvisation can improve organizational creativity in three ways. First, organizational improvisation offers the possibility for organizations to initiate the creative process. Organization improvisation occurs when an organization encounters an emergency. This sudden situation is either an organization encountering a problem that it has not encountered before, or a new opportunity. This sudden situation often contains new information. It will be passed to the organization promptly through the organization, so organizational improvisation can help the organization to be very careful, and sensitive to what is happening in the “present”. This “present” real-time information can come from within the organization, or it may be related to the environmental information of the organization. It can help the organization to better identify opportunities for innovation, it can also initiate the beginning of “innovation”, and it is an important source of knowledge to organize the process of knowledge creation (Vera *et*

al., 2014; Jiao *et al.*, 2017). Second, organizational improvisation provides the possibility for organizations to integrate knowledge. Organizational improvisation creates a new set of organizational behaviors in new ways by integrating the organization's original knowledge with new, real-time knowledge. This new organizational behavior is based on specific contexts and is based on real-time information, so the knowledge is often only applicable to local contexts. Third, organizational improvisation can help organizations break path dependence. In the process of organizational improvisation, external knowledge provides a source for organizational variability, which challenges the organization's internal paradigm and ignites the spark of creativity for the homogenized mental model within the organization (Koryak *et al.*, 2018; Mahmoud *et al.*, 2016), which can broaden or deepen the organization's knowledge base, resource library. When external knowledge is integrated with the existing knowledge of the organization, it will inject new blood into the organization, it also will newly configure the experience and behavior (Kyriakopoulos, 2011) to help the company avoid the "path lock". Many scholars have pointed out that in an environment of accelerating speed, organizational improvisation is becoming more and more important for enterprise innovation. He can make managers in the organization continue and innovatively adapt to various external changes, and the products created by the organization will continue to the market (Miner, Bassoff, & Moorman, 2014).

Based on the above analysis, this paper proposes the following assumptions:

Hypothesis 1: The improvisation of corporate organizations is positively affecting organizational creativity.

Multiple regression analysis

Multivariate linear regression analysis refers to the method of establishing a predictive model for prediction by correlation analysis between two or more independent variables and one dependent variable. There is a linear relationship between the independent variable and the dependent variable.

Y is set as the dependent variable, x_1, x_2, \dots, x_k is the independent variable, and the linear relationship between the independent variable and the dependent variable, then the multiple linear regression model is as follows.

$$y = b_0 + b_1x_1 + b_2x_2 + \dots + b_kx_k + e$$

b_0 is the constant term; b_1, b_2, \dots, b_k is the regression coefficient. When x_2, x_3, \dots, x_k is fixed by b_1 , the effect of each unit is increased by Y , that is, the partial regression coefficient of Y . When the same b_2 is fixed, the effect of each unit is increased by Y , that is, Y is partial regression coefficient. If both

independent variables are related to the same dependent variable y , the binary linear regression model can be used as follows.

$$y = b_0 + b_1x_1 + b_2x_2 + \dots + b_kx_k + e$$

Multivariate regression analysis after obtaining the estimated least squares of the parameters, it is necessary to perform the necessary tests and evaluations to determine whether the model can be applied.

(1) Determination of the fit degree

Corresponding to the coefficient R^2 of determination in the linear regression, there is multiple determinable coefficient R^2 in the multiple linear regression. It is the proportion of the variation (regressive sum of squares) explained by the regression equation in the total variation of the dependent variable. The regression party fits the sample data points more; the relationship between all independent variables and the dependent variables is closer. The calculation formula is as follows.

$$R^2 = \frac{\sum(\hat{y}-\bar{y})^2}{\sum(y-\bar{y})^2} = 1 - \frac{\sum(y-\hat{y})^2}{\sum(y-\bar{y})^2}$$

Among them,

$$\sum(\hat{y}-\bar{y})^2 = \sum y^2 - (b_0 \sum y + b_1 \sum x_1 y + b_2 \sum x_2 y + \dots + b_k \sum x_k y)$$

$$\sum(y-\bar{y})^2 = \sum y^2 - \frac{1}{n}(\sum y)^2$$

(2) Significance test of regression equation

The significance test of the regression equation is to test the significance of the entire regression equation, or to evaluate whether the linear relationship between all independent variables and the dependent variable is close. Usually the F test is used, and the calculation formula of the F statistic is as follows.

$$F = \frac{\sum(\hat{y}-\bar{y})^2 / k}{\sum(y-\hat{y})^2 / (n-k-1)} = \frac{R^2 / k}{(1-R^2) / (n-k-1)}$$

According to the given significant level α , the degree of freedom ($k, n-k-1$) is checked for the F distribution table, and the corresponding critical value F_α is obtained. If $F > F_\alpha$, then the regression equation has great significance, and the regression is also significant. If $F < F_\alpha$, then the regression equation has no significance, and the regression is not significant.

Research Design and Analysis Results

Research hypothesis

For impromptu organizations, creativity may represent an exceptionally valuable ability, and it is a sudden result of a well-running agile team. It can be said that organizational creativity is essential for the study of impromptu work. In order to get creative results, organizations will find better or unique problem solutions and seek new ways to accomplish their tasks. When organizations need to make rapid counter-attacks to cope with dramatic changes in internal and external environments, solving problems through organizational creativity becomes an important choice for organizations, generating rapid response to impromptu actions, facilitating rapid response and handling of unexpected events.

1. Learning Situation: The Moderating Role of Empirical Learning

Empirical learning theory defines learning as the process of creating new knowledge by transforming experience, emphasizing the importance of experience acquisition and experience transformation in the learning process (Wang, & Miao, 2015). Organizational improvisation and experiential learning can help organizations create new behaviors and new knowledge, but they are two very different learning models. First, the difference between organizational improvisation and empirical learning is mainly reflected in the key element of “time”. The role of this element in organizational learning has received more and more research attention (Berends & Antonacopoulou, 2017). Organizational learning can have divided into two parts: cognition and behavior. Organizational improvisation is a special organizational learning model, including design and implementation. In this learning mode, between design and execution is “zero”. “Time lag, so it is usually regarded as an “on-line” learning mode. Empirical learning is time-divided in understanding and behavior, and is regarded as an “off-line” learning model. Second, the two learning modes have different purposes. Organizational improvisation is a kind of real-time, short-term learning, which often occurs when the organization responds to unexpected events. The purpose is not to learn itself, but to learn from experience. The main purpose is to Learning, the input of experience has deliberately designed to produce different results, and the results

of the experience have carefully observed and recorded by the organization, which translates into knowledge. Third, the knowledge traits brought about by the two kinds of learning are also different. On the one hand, the knowledge created by organizational improvisation has a high degree of context dependence, which is only applicable to local situations, and the knowledge generated by empirical learning can be generalized and extended to the whole organizational level. On the other hand, because organizational improvisation has non-systematic, real-time features, it can produce disappointing behaviors that are not good for the organization. Organization improvisation without trial and error learning may bring “opportunity traps” to the organization.

The different characteristics of the two learning modes, which are experience learning and organizational improvisation, provide the possibility for the organization to foster organizational creativity, which complements and promotes each other. As mentioned by Berends and Antonacopoulou (2017), the new trend of organizational learning is a shift from a differentiated learning model to a balanced, integrated learning model. This paper argues that integrating organizational improvisation and experiential learning can help individuals reach a more comprehensive knowledge base—experience, reflection, thinking, behavior, respond faster, and more accurately convert reliable knowledge into organizational paths and ability. Specifically, this paper argues that experience learning as an important learning situation for organizational improvisation to promote organizational creativity has four reasons.

1. *The decompression effect.* The repeated learning of experience and learning will cultivate the learning experience of individual organizations in the subtle way. The experienced actors are more relaxed and natural in organizing improvisation, because a lot of practice and rule experience make impromptu actors more focused on the creative process. In addition, they will not feel pressure because of “improvisation”.

2. *The raw material effect.* The organization of improvisation to create knowledge is an important “test” material for organizational learning, which means that organizational improvisation is the key to experiencing a new round of organizational creativity, and how to develop new jobs and develop new ones for organizations. The mental model provides inspiration.

3. *Correct the effect.* As mentioned earlier, because of the impromptu “real-time” and strong “context-dependent” characteristics of the organization, the knowledge generated by organizational improvisation is difficult to retain as the permanent design, process, and knowledge of the organization, and sometimes it will bring “opportunity traps” because of opportunistic behavior. Experience learning can have judged and corrected by lagging observing the results of organizational improvisation to create the most suitable input-output ratio for the organization. This article retains it as an organizational path through repeated actions, which in turn translates into organizational capabilities.

4. *The path breakthrough effect.* The self-enhancing characteristics of learning make the organization more inclined to maintain the existing focus and path, and in the case of excessive learning, it may fall into the “lock” effect, or “capability trap.” Organizational improvisation occurs when an organization encounters an emergency (opportunity or problem). This non-systematic, real-time solution will inject fresh “blood” into the organization, and further revisions through empirical learning can make the organization Avoid path locking.

Based on the above analysis, this paper proposes the following assumptions.

Hypothesis 2: Empirical learning positively regulates the relationship between organizational improvisation and organizational creativity.

2. Organizational context: the modularization of organizational modularity

Organizational modularity is an important feature of an organization. It refers to the decomposition of the complex system of organizations into relatively independent entities that coordinate and communicate through a standardized interface (Cabigiosu & Camuffo, 2016). Under the modular structure of the organization, the workflow, knowledge system, and resource package of organization have also decomposed into different parts of low interdependence. This paper considers that the organization of modular negative adjustment organization improvisation and organizational creativity time relationship. First, the “real-time” feature of organizational improvisation requires rapid response from the organization. When a department in an organization faces a sudden opportunity or problem, other corresponding departments of the organization need to coordinate and cooperate in the first time to respond. The fragmented organizational structure, while maintaining mutual independence, clearly does not guarantee the organization’s flexible operation of such mechanisms (Furlan, Cabigiosu, & Camuffo, 2014), thereby reducing the possibility of organizational improvisation for the organization to initiate the creative process. Second, as mentioned earlier, organizational improvisation often produces knowledge that is only applicable to local contexts based on real-time information in a particular context, while organizations with high organizational modularity emphasize the independence of modules, which in turn reduces organization improvisation is the possibility of organizing the integration of knowledge. Third, in the process of organizational improvisation, external knowledge provides a source for organizations to create variability, which will challenge the organization’s internal paradigm, while organizational modularity focuses on the formation of internal independent external interface standards through subdivision tasks. The module, which in turn hinders organizational improvisation, helps organizations break the path-locking advantage (Wang, *et al.*, 2017).

Based on the above analysis, this paper proposes the following assumptions:

Hypothesis 3: Organizational modularity can negatively regulate the positive effects of organizational improvisation and organizational creativity.

Based on the above analysis, the conceptual framework of the relationship between variables is obtained, as shown in *Figure 1*.

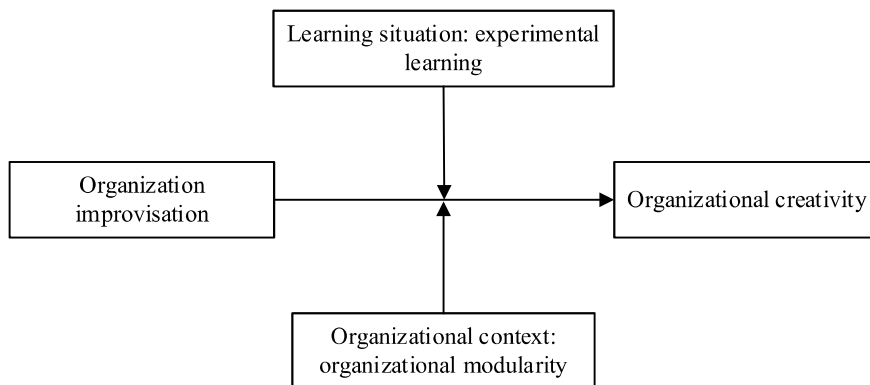


Figure 1. The conceptual model of organizational modularity

Sample Acquisition and Data Situation

In order to test the proposed theoretical research model, this study conducted a questionnaire design with reference to relevant research at home and abroad. After the preliminary design of the questionnaire was completed, 50 SMEs are selected in Shaanxi Province for pre-surveying questionnaires. Based on the questions and suggestions raised by the respondents during the pre-investigation process, the questionnaire has further revised and improved. After the questionnaire has formed, the paper explained the anonymization and cluster analysis only in the explanation of the questionnaire, trying to slow down the influence of social appreciation. Then, 600 companies have randomly selected from the Chinese business directory, and they have contacted by telephone to ask if they would like to participate in the questionnaire survey, and finally confirmed 313 plus companies willing to participate in the survey. Investigate the management personnel of the company to fill out the questionnaire in the form of an electronic questionnaire to ensure that the person filling out the questionnaire has an in-depth understanding of the company. The questionnaire has distributed and recycled by EMAIL, and 310 copies were collected, of which 269 were valid questionnaires, and the effective rate was 86.77%. The reason for the invalidity of the questionnaire is mainly that the filling is incomplete. The average working life of these sample respondents was 3.11 years, which guaranteed the reliability level of this questionnaire to some extent. The characteristics of the sample have described in *Table 1* below.

Table 1. Distribution of sample characteristics of questionnaires

	Project	NO.	Proportion	Project	NO.	Proportion
Industry type	Special equipment manufacturing	83	38.77%	Business scale	100 below	21 9.81%
	Electronic information industry	76	35.62%		100-200	68 31.76%
	New energy and new materials	28	12.92%		200-300	71 33.18%
	Bioengineering and medicine	22	10.46%		300-500	37 17.29%
	Other industries	5	20.23%		500 above	17 7.96%
	Subtotal	214	100%		Subtotal	214 100%
Industry characteristics	Sino-foreign joint venture	60	27.70%	Business age	2 years below	15 7.00%
	Foreign companies	22	10.46%		2-5	68 31.78%
	Local enterprise	128	61.84%		5-10	83 38.79%
	Subtotal	214	100%		10-15	32 14.95%
Listed company	Yes	48	22.43%	15 years above	16	7.48%
	no	166	77.57%		Subtotal	214 100%
	Subtotal	214	100%			

Variable measurement

In this study, a Likert 5-level scale was used, 1 represents very disagree, and 5 represents full agreement. The organization’s creation power table refers to the mature scales of Smith, Collins, & Clark (2005), and uses eight items to measure the opportunity recognition ability, integration ability, knowledge storage and transformation ability, and path dependence ability of organizational creativity. The organization’s impromptu measurement is based on the authoritative scale of Miner, Bassoff, & Moorman and is measured with three items. The empirical learning measurement is based on the authoritative scale of Miner, Bassoff, & Moorman, and it is measured with three items. The organization’s modular scale is based on the scales of Sanchez and Mahoney *et al.* (1996), which is measured using six items.

In addition, based on the existing research results, three variables that may affect the sub-alien results are selected as the control variables, such as the age of the enterprise, the size of the enterprise, and the nature of the enterprise. “1” stands for “less than 100 people”, “2” stands for “100-200 people”, “3” stands for

“200-300 people”, “4” stands for “300-500 people”, and “5” stands for “5” stands for “100” More than 500 people; the age of the enterprise is from the establishment to the time when the questionnaire is recovered. The nature of the enterprise is set as a dummy variable, the value of the high-tech enterprise is 1, and the value of other enterprises is 0.

Reliability and validity test

In this study, the SPSS 20 statistical analysis software was used to test the validity and reliability of the samples. First of all, the scale used is based on the improvement of relevant foreign research, which can guarantee the validity and reliability of the questionnaire to a certain extent. Secondly, the reliability and validity of the variables were tested by using Cronbach’s coefficients α and CR, and KMO and AVE values. The test results (as shown in *Table 2*) indicate that the questionnaire has good reliability and validity, and the measurement indicators in the questionnaire can be used to better measure the core concepts involved in the study.

Table 2. Reliability and validity of the scale

Variable	Item	Factor load	Coefficient α
Organization improvisation CR=0.850 AVE=0.653	Your company’s employees will immediately handle unexpected incidents	0.785	0.735
	Your company’s employees respond quickly	0.802	
	In the event of an unexpected problem, your company’s employees can respond immediately	0.837	
Experience learning CR=0.863 AVE=0.612	Your company’s employees regard mistakes as a channel for learning	0.847	0.851
	Your company employees have a certain initiative	0.902	
	Your company’s employees have some freedom of experimentation	0.886	

Organizational modularity CR=0.903 AVE=0.608	The company describes the main working procedures in the form of documents	0.761	0.871
	The company's work procedures are clearly defined within the functional boundaries	0.828	
	Standardized work procedures between different departments and business units	0.813	
	In the concept development phase, the company uses formal procedures to analyze customer needs and define product (service) characteristics.	0.774	
	Product (service) development engineer has an electronic database document with standardized components and interface descriptions between components	0.732	
	There are standard procedures and systems for transferring knowledge between projects and business units.	0.768	

Organizational creativity CR=0.944 AVE=0.678	Employees often discuss new ideas and new developments related to work	0.824	0.879
	Employees are free to contact anyone in the company to discuss new ideas or work progress	0.828	
	Employees in the enterprise are proficient in integrating and exchanging ideas to solve problems or create opportunities	0.805	
	Employees in the enterprise are able to exchange and integrate different ideas to solve problems	0.860	
	Employees in the enterprise are good at sharing their ideas to generate new ideas, products, or services.	0.784	
	Employees in the enterprise have the ability to share some of their expertise to enable new projects to be realized	0.820	
	Employees in the enterprise know the benefits of exchanging and integrating ideas	0.817	
	The most valuable ideas are often the result of the joint efforts of all our employees.	0.848	

Multiple regression analysis and hypothesis testing

In this paper, multiple linear regression analysis is used to test the correlation between various variables such as organizational creativity, improvisation ability, learning situation and organizational situation, and the rationality of theoretical model is preliminarily tested. The analysis results can provide preliminary support for theoretical assumptions and lay the foundation for subsequent regression analysis. There is a certain correlation between organizational improvisation, empirical learning, organizational modularity, and organizational creativity. At the same time, the discrimination of variable design is obvious. The correlation coefficient often reflects the comprehensive effect of two variables through multiple ways. Therefore, the government and significance of the correlation coefficient can only be used as a reference for analysis.

Table 3. Descriptive statistics and correlation matrix

variable	Mean	Standard deviation	1	2	3	4	5	6	7
Business age	4.180	0.920	1.000						
Business scale	2.480	1.090	0.260**	1.000					
Nature of business	0.540	0.520	0.150**	0.350*	1.000				
Organization improvisation	3.370	0.710	-0.123	0.023**	0.245*	1.000			
Experience learning	3.250	0.860	0.130	0.289	0.142	0.285	1.000		
Organizational modularity	2.940	0.910	0.091**	0.148**	0.062*	-0.189*	0.057**	1.000	
Organizational creativity	3.050	0.890	-0.185*	0.140	0.253	0.231**	0.260	0.046	1

Note: * indicates that the level of $p < 0.05$ is significant; ** indicates that the level of $p < 0.01$ is significant, the same below

In order to further explain the impact of organizational improvisation on organizational creativity in different contexts and confirm the feasibility of theoretical hypotheses, this study conducted a hierarchical regression analysis. The results are shown in Table 4. Model 1 contains only control variables; Model 2 adds independent variables to test the main effects, and Model 3 and Model 4 add adjustment variables and interaction terms between the adjustment variables and the independent variables based on the main effect model.

Table 4. Level Regression Analysis (N=269)

	Variable	Model 1	Model 2	Model 3	Model 4
Control variable	Business age	-0.289	0.188	0.212	0.225
	Business scale	0.129*	0.203*	0.168**	0.152*
	Nature of business	-0.167*	-0.221*	-0.147*	-0.138*
Main effect	Organization improvisation		0.312**	0.287**	0.298**
	Regulation effect			0.028	
Interaction effect	Organization improvisation x experience learning			0.147**	
	Organization improvisation x organization modularity				-0.408
	R ²		0.189	0.212	0.243
	Adj R ²		0.176	0.194	0.226
	F		15.439**	11.792*	14.271**

From the regression results in *Table 2*, it can be seen that there is a significant positive correlation between organizational improvisation and organizational creativity in Model 2 ($\beta = 0.0.312, P < 0.01$), so it is assumed that H1 is established. For hypothesis H2, Model 3 shows that empirical learning has a significant positive effect on organizational improvisation and organizational creativity ($\beta = 0.147, p < 0.01$), so hypothesis 3 passes. In Model 4, organizational modularity has no significant positive effect on organizational improvisation and organizational creativity ($\beta = -0.162, p > 0.10$), so Hypothesis 3 fails to pass the data test.

For hypothesis 1, the empirical results of this paper show that there is a significant positive correlation between organizational creativity and organizational innovation performance, which verifies the views of Eisenberger, Atuahene, and other scholars on creativity to promote organizational innovation performance. Hypothesis 2 believes that experiential learning can enhance the relationship between organizational improvisation and organizational creativity. Empirical data supports this hypothesis, it also indicates that empirical learning that emphasizes experience acquisition and experience transformation in the learning process can effectively promote organizational improvisation to the conversion of organizational creativity. Hypothesis 3 believes that organizational modularity negatively regulates the relationship between organizational creativity and organizational innovation performance, and the empirical results of this paper show that this adjustment effect is not significant. The possible reason for this result is that organizational modularity limits the risk of organizational improvisation to a manageable range, while maintaining flexibility in terms of increasing commitment or shifting to other investment opportunities, to reserve space for the organization's low-cost creativity. At the same time, organizational modularity is a kind of transaction governance model of the organization, which provides a channel for the upcoming market opportunities, so that market information can be quickly integrated into decentralized, parallel production systems, and correspondingly drive low-cost, differentiated production.

Results and discussion

The following images were obtained using SPSS for multiple linear regression analysis.

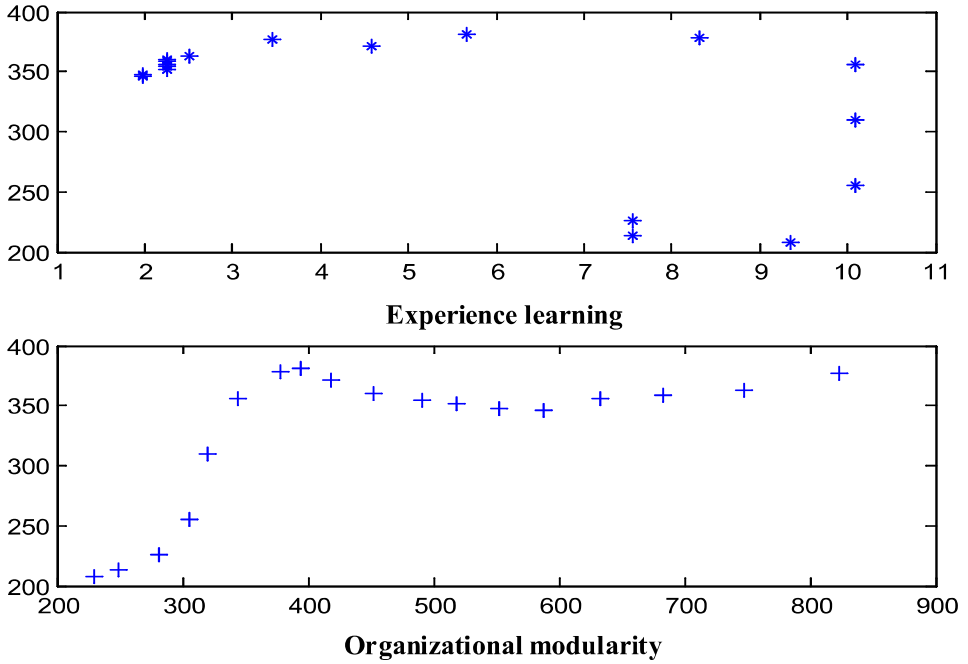


Figure 2. The scatter plot

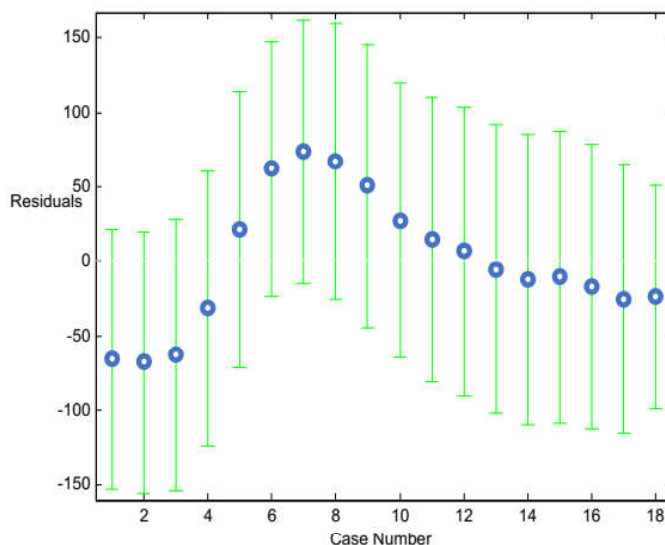


Figure 3. The residual diagram of organization improvisation

It can be seen from the scatter plot that each scatter is randomly distributed in the horizontal band with $e=0$ as the center, which proves that the model is suitable, and it can be seen from the residual normal probability map that the residual of this model is in a normal distributed state. In summary, the data used in this paper is suitable for multiple linear regression models. According to the linear expression obtained above, combined with the relevant task data, drawing the image with MATLAB, the general law can be obtained as follows. In the relationship between organizational creativity and improvisational ability, the positive relationship between organizational creativity and improvisation ability is verified, which is consistent with the research results of some scholars. The positive relationship between organizational creativity and improvisation may be the organization's ability to exploit creativity to produce creative results, try to find more effective solutions, and seek new ways to accomplish tasks. When the internal and external environment changes drastically, solving problems through organizational creativity becomes an important part of the organization. The organization triggers the transformation of existing knowledge through creative thinking, and the formation of new knowledge, and the integration of new knowledge, enables the members of the organization to respond instantly to changes in knowledge or the environment, which is conducive to rapid response and handling of unexpected events. The stronger the creativity of the organization, the more new and useful ideas will be generated, and the immediate response

of the organization will be stronger, which will shorten the response time of the organization to respond to changes.

In terms of regulation effect, the test shows that time pressure plays a regulatory role in the relationship between organizational creativity and improvisation ability, and the regulation of time pressure in the relationship between improvisation ability and strategic change is partially established. The possible reasons for this situation are as follows. On the one hand, when the time pressure is high, the company may encounter an invalid situation when the company encounters an emergency, and needs to respond in time. At this time, the highly creative enterprises can provide a novel and valuable thing for the organization improvisation activities, which can enhance the improvisation ability and enable them to show strong and immediate response capabilities. On the other hand, if a company has strong improvisation capabilities, it can respond quickly and reorganize internal and external resources to seize external opportunities in a timely manner, thereby reducing the challenges faced by enterprises, and making timely strategic adjustments. Therefore, it is difficult for companies to make large-scale strategic decisions without prior integration or preparation, and the impact of time pressure on this process is not very large.

Conclusion

Based on the analysis of the relationship between organizational improvisation and organizational creativity, this paper explores the regulatory effect of empirical learning and organizational modularity on the relationship between organizational improvisation and organizational creativity, and reveals organizational improvisation from the perspective of learning context and organizational context. The theoretical contributions of this research are as follows. First, it expands and enriches existing research theories of creativity. This paper follows the process of knowledge creation process, deconstructs organizational creativity into four dimensions: opportunity recognition ability, integration ability, knowledge storage and transformation ability, and breaking path dependence ability, enriching the relevant research on existing organization creativity literature. Further, starting from the complex learning mechanism, we examine the impact of organizational improvisation on organizational creativity and identify the antecedents of organizational creativity. Secondly, based on the perspective of situational theory, this paper studies the adjustment effect of learning situation and organizational context on the relationship of “organizational improvisation-organizational creativity”. This paper identifies the positive promotion of the learning situation of learning and the negative adjustment of organizational context, and deepens the literature of organizational improvisation. In addition, from a broader perspective, with the development of economic globalization and the increase of environmental dynamics, the impact of the interaction between organizational improvisation and empirical learning

on organizational creativity is enriched, which enriches the relevant study of organizational learning.

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