Impact of Staff Improvisation on Innovation Performance: An Empirical Study Based on Research and Development Staff in People's Republic of China

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Abstract

This study was developed a theoretical model to account for the effect of organization improvisation on innovation performance by theoretical analysis and literature review. Staff improvisation was defined that, employee utilize immediately available resource to produce creative results in non-routine or unexpected ways. With the objectives to identify the connotation of staff improvisation through literature research and to examine the impact of staff improvisation on innovation performance. Results from a sample of 213 Chinese staff support the study hypothesis, and show that staff improvisation positively affected their innovation performance. Furthermore, the three sub-dimensions of improvisation, including spontaneity, creativity and utilizing available resource, could significantly promoted their creative performance. The results of this research offer guidance to managers about encouraging organization improvisation.

Keywords: Staff Improvisation, Innovation Performance, Empirical Study, Research and Development Staff

Introduction

Organization improvisation in resource lack, dynamic environment and high uncertainty, play an important role in solving problems by making plan, and executing simultaneously with creativity and experience and dealing with unexpected problems or opportunities (Vera & Crossan, 2005). Magni & Etc (2010) believed that improvisation was the ability to manage unforeseen events in an innovative spontaneous way. After 1990s, improvisation was considered a competitive advantage (Vera & Crossan, 2005), especially in the middle of 1990s. The improvisation ability of organization, team and individual is attracting more and more attention, and the number of documents is increasing. However, the study of improvisation is still in an immature stage (Vera & Crossan, 2005; Magni & Etc.,2010).

Most researches on organization improvisation were qualitative, and empirical research was relatively deficient, especially the influence of improvisation on innovation performance. Therefore, in-depth study of the influence of group or individual improvisation on innovation performance is not only enriching the theory of organizational improvisation, but also providing a realistic basis for enterprises to enhance their innovative performance and enhance their core competitiveness.

This research took high-tech enterprise research &development (R&D) personnel as the research object, through theoretical analysis and related literature review, constructed the definition, connotation and evaluation dimension and measurement method of staff improvisation, innovation performance, and test the reliability and validity of the scales of variable in Chinese context. Through empirical research, this study found that staff improvisation has a significant influence on innovation performance. The three dimension of R&D staff improvisation: spontaneity behavior, creativity behavior and Utilizing available resource behavior have a

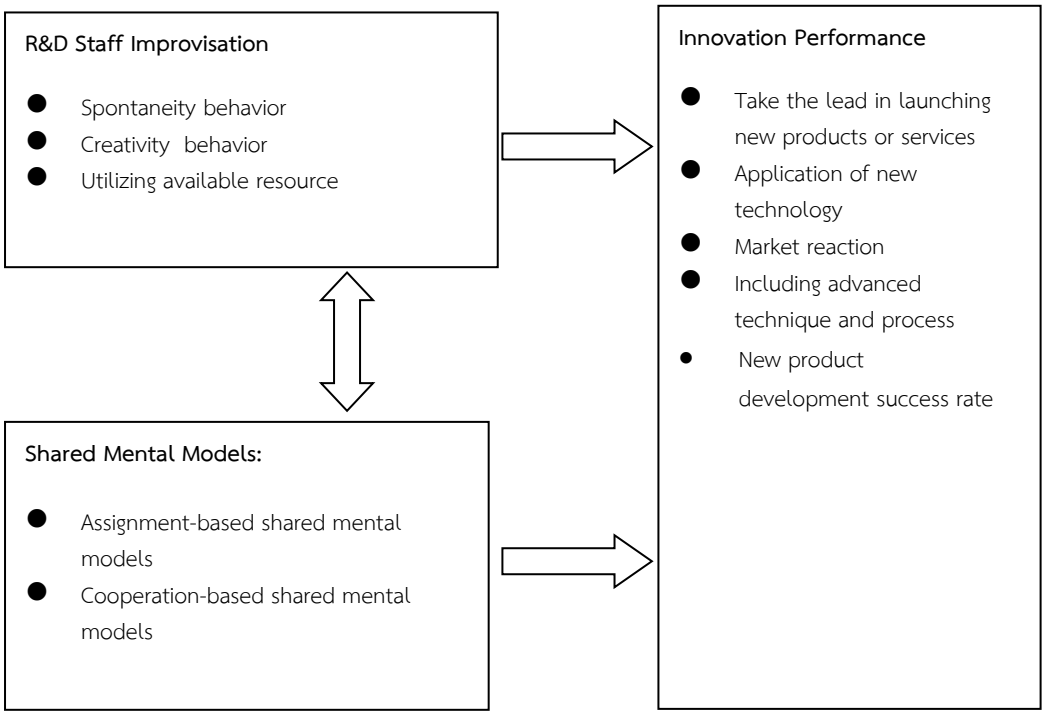
significant influence on innovation performance. Therefore companies, especially high-tech companies can improve innovation performance by encouraging employees to improvise.

Research Objective

This research took high-tech enterprise R&D staff as the investigate population to study the staff improvisation and innovation performance.

1. To identify the connotation of staff improvisation through literature research
2. To examine the impact of staff improvisation on innovation performance.

Conceptual Framework



Research Hypotheses

Improvisation is organizational when it is done by the organization or its members. This paper focused on individual level staff improvisation to identify the connotation of staff improvisation. the following hypotheses was proposed:

H1: Staff improvisation includes three dimensions: spontaneous behavior, creative intention, and utilizing available resource behavior.

Staff could by pass the formal planning system of the organization and rely on personal improvisation to break tasks, so improvisation is considered an unconventional way to complete tasks (Liu, Q. H., & Wang, T.,2010). although many studies have found a positive relationship between improvisation and innovation performance (Wu. D & Qiu Y, 2010; Vera, D., & Crossan, M., 2005). However, there are also studies that have little or even negative correlation between the two. This shows that improvisation is not a sufficient condition

for innovative performance. Therefore, this study took the R&D staff of high-tech enterprises as the survey object, and empirical study the relationship between R&D staff improvisation and innovation performance. The following hypotheses were proposed:

H2: Staff improvisation has a significant influence on innovation performance.

H2a: Spontaneity dimension of staff improvisation has a significant influence on innovation performance.

H2b: Creativity dimension of staff improvisation has a significant influence on innovation performance.

H2c: Utilizing available resource dimension of staff improvisation has a significant influence on innovation performance.

Research Methods

1. Measures

This study mainly referenced the mature measuring items about individual improvisation and firm innovation performance, which are widely cited and proved to be mature with high reliability and validity by researchers in literature.

The item of R&D staff improvisation was designed referring to the scales that developed by Vera & Crossan (2005), Leybourne & Smith (2006) with 9 items. Firm innovation performance of R&D staff was measured by theirs subjective cognition. The scale was constructed using Bell (2005), Ritter and Gemunden (2004), with 5 items. Control variables include some basic information about the employee, such as gender, age, education level, tenure, etc.

2. Data collection

Data were gathered through a standardized questionnaire, which contained 7-point Likert type scales. In order to maximize the commitment to the study, the participants were assured that their responses would be strictly confidential, and the survey outputs would contain data in a aggregated form without any individual identification, and used for research purpose only.

The high response rate supported the use of the data at the team level of analysis (Barrick, Bradley, Kristof-Brown, and Colbert, 2007, pp. 544-557). A liaison person in each firm, who was responsible for distributing and returning the questionnaires. Of a total of 248 individuals involved, 213 usable surveys were completed (a 91% response rate), and no team in the sample had a response rate lower than 80%.

3. Sample

The samples are mainly from employees of R&D teams of technology service companies. To test the hypotheses, a field study of Software Development Enterprise in Beijing, Shanghai, Guangzhou was conducted. 44 R&D team were invited to complete a questionnaire, and the size of team is no less than 3 persons. Respondent’s participation was strictly voluntary in this study.

The demographic profile of the participant was follows: 68.1% of the respondents were male, 31.9.3% were women. The samples collected were mainly young and middle-aged people, 28.6% were 20-25 years

old, 36.2% were 26–30 years old, 21.1% were 31–35, and 11.3 % were 36-40 years old, and 3.8% were more than 40 years old. In terms of educational attainment, the general education level is higher, 13.1% of the respondents had a Junior college, 58.2% had a undergraduate school, and 24.9% had a master degree, and 3.8% had a doctor degree. The average working life of the industry is 2.45 years, and the standard deviation is 1.525, of which 1-4 years (excluding 3 years) account for 40.4%, 3-5 years (excluding 5 years) account for 19.7%, and 5-7 years (excluding 7 Years) accounted for 11.7%, 7-10 years (excluding 10 years) accounted for 10.8%, 10 years and above accounted for 17.4%.

4. Reliability and validity testing

Internal consistency, content validity and construct validity was assessed to test the reliability and validity. The Cronbach's a score of R&D staff improvisation and innovation performance are 0.866 and 0.903, all of which are greater than 0.7; the AVE of all variables are greater than 0.5, and the CR are greater than 0.7. Confirmatory factor analysis was adapted to test the construct validity,The results are shown in the table 4.2, $\chi 2/DF$ is less than 3, RMSEA is less than 0.08, The values of CFI GFI, NFI and TLI are all greater than 0.8, 3 variable measurement scales have good construct validity.

Research Results

1. Factor Analysis of Improvisation

The factor analysis was performed for 9 items describing improvisation behavior. First of all, KMO and Bartlett's Test of Sphericity results showed that KMO equal to 0.839, greater than 0.7, Bartlett spherical test results reached the significance level (x 2= 596.526, df = 36, P < 0.000), the result revealed that the questionnaire data met the prerequisite requirements of factor analysis. The results of principal component analysis are shown in Table 1

Table 1 Principal Component Analysis of Improvisation

Staff Improvisation	Items	Factor	Eigenvalue	% of Variance	Cumulative %
Spontaneity Behavior (SP)	SP1	0.869	2.379	26.431	26.431
	SP2	0.839			
	SP3	0.794			
Creativity Intention (CI)	CI1	0.858	2.355	26.169	25.537
	CI2	0.845			
	CI3	0.794			
Utilizing Resource (UR)	UR1	0.846	2.298	25.537	78.137
	UR2	0.834			
	UR3	0.773			

Table 4.2 revealed that the measurement structure of improvisation consists of three dimensions: spontaneity behavior, creativity intention and utilization resources, and each dimension has three measurement items. The explanatory ability of the three dimensions to the improvisation reached 78.137% and more than

50%, indicating that the three dimensions selected were well representative. So Hypothesis H1 is supported. This study confirm the connotative dimensions of the staff improvisation in China context.

2. Regression Analysis to test the effect models

This study tested the relationship between improvisation and innovation performance through regression analysis. In model 1, R2 is 0.031, indicating that the explicable variation of innovation performance was 3.1%, and Gender had a significant positive impact on innovation performance. This is not the focus of this study and can be analyzed in future studies. In model 2, R2 is 0.402, that indicating the explicable variation of innovation performance was 40.2%. Staff improvisation had a significant positive impact on innovation performance (β =0.615, p<0.001), so hypothesis (H1) was supported.

In model 3, R2 is 0.280, that indicating the explicable variation of innovation performance was 28.0%. Spontaneity behavior of staff had a significant positive impact on innovation performance (β =0.502, p<0.001), so hypothesis (H2a) was supported. In model 4, R2 is 0.282, that indicating the explicable variation of innovation performance was 28.2%. Creativity intention of staff had a significant positive impact on innovation performance (β =0.503, p<0.001), so hypothesis (H2b) was supported. In model 5, R2 is 0.283, that indicating the explicable variation of innovation performance was 28.3%. Utilizing available resource of staff had a significant positive impact on innovation performance (β =0.427, p<0.001), so hypothesis (H2c) was supported. As depicted in Table 2.2.

Table 2 The Result of Regression Analysis

	Innovation Performance				
	M 1	M 2	M 3	M 4	M 5
	β	β	β	β	β
Gender	-0.088***	-0.059	-0.058	-0.074	0.083
Age	0.166	0.084	0.119	0.128	0.200
Education	-0.011	-0.015	-0.003	-0.007	-0.015
IM		0.615***			
SB			0.502***		
CI				0.503***	
UR					0.427***
R2	0.031	0.402	0.280	0.282	0.283
F	3.617***	57.572***	33.284***	33.680***	33.800***

Discussion and Conclusion

The improvisation behavior has multilevel characteristics in the organization, and the individual improvisation is the basis of the improvisation at the group and organization level. This study focuses on the individual level, and constructed and validated the connotation of staff improvisation. Drawing on the research results of organizational improvisation, this paper considered that staff improvisation includes three dimensions: Spontaneity behavior, creativity behavior, and utilizing available resource. Spontaneity highlights the

simultaneity of planning and implementation, in R&D activities, staff is often not deliberate, but act immediately, needless to wait for all the conditions to be complete or carefully analyse.

The process of improvisation emphasize not only quick, but a certain novelty and uniqueness. There are a revision, reorganization, and a new design of the previous scheme in activities. In a word, staff behavior don't carry out the work with the inherent ways and thinking patterns. Utilizing available resource behavior emphasizes that staff to create and respond quickly by utilizing available resource, including material, social and cognitive. Furthermore, this study reference the improvisation scales came from the research of Vera & Crossan (2005), Leybourne & Smith (2006), and ultimately determined the 9 items apply to measuring improvisation of R&D staff.

Improvisation reflects the ability of organizations and employees to adapt to complex and changing environments. However the effect of staff improvisation on their innovation performance isn't clarified. The study finds that staff improvisation positively effected their firm innovation performance. Furthermore, the three sub-dimensions of improvisation, including spontaneity, creativity and utilizing available resource, could significantly promoted their firm innovation performance. This is consistent with studies by Chinese scholars. For example, Jun, W., et al. (2016) based on the empirical survey of 313 enterprises, concluded that the four dimensions of organizational improvisation, including immediate response, intention creation, resource integration and instant collaboration, all showed positive effects to different degrees on the overall performance of enterprises.

Although some scholars abroad shows that the relationship between improvisation with innovation performance was fuzzy. This study found that staff improvisation through spontaneously utilizing the available resources to innovate could improve their ability to face the competitive environment and emergencies, and thus improve the firm innovation performance. So managers should encourage and train the the improvisation ability.

This article further enriches and deepens improvisation research. Since the concept of improvisation was introduced into organization management, the current research perspective has covered topics such as technology research and development, innovation, organizational learning, strategy, and marketing. However, it is clear that improvisation on high-tech enterprises has not received enough attention, and high-tech enterprises are precisely the environment where improvisation is most likely to occur. At the same time, this article decentralizes the perspective of improvisation from the overall level of the organization to individual employees, and examines the effect of individual improvisation in the organization from a more micro perspective, which is conducive to a more precise study of improvisation in organization. Staff improvisation is the source of organizational improvisation. Studying individual improvisation can better explain and manage organization improvisation (Guoxiang, Jianqi, Liqiang., 2015), so this article provides a new path for the research of improvisation.

Limitations and Prospects

Although many useful conclusions and inspirations have been obtained in this study, there are still some problems, which can be improved in the follow-up research. First of all, the data used in this paper are all from employee self-evaluation, In the future, employee self-evaluation and leadership review can be adopted in the form of longitudinal data to continue relevant research. Secondly, this study adopted cross-section data for analysis. Although it reflects the relationship between variables at a certain point in time, subsequent study could carry out longitudinal studies or case studies based on time span to further explore the causal relationship between variables. Especially focusing on the impact of team-level factors on individual improvisation, and further clarifying how individual improvisation plays a role in organizations and teams, and providing more scientific management suggestions for stimulating employee improvisation.

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