

Research on the Influencing Factors of Intentional Innovative Usage of Information System

Based on Employee Entrepreneurship and Team Climate Theory

Xiaofen Zhou*

College of Logistics
Wuhan Technology and Business University
Wuhan, China

Yi Zhang, Xin Li

School of Business and Tourism Management
Yunnan University
Kunming, China

Abstract—Based on Employee Entrepreneurship and Team Climate Theory, this paper studied the mechanism of the influence of Intentional innovative use of information system and built a research model including two dimensions: Individual and Team. The empirical study among 213 employees in a large company examines the research model. The result shows that employee entrepreneurship is strongly and positively related to future intentional innovative use of IS. Moreover, when keeping the high levels of innovation support and task orientation in the Team, employee's willingness to innovate will be better.

Keywords—Employee Entrepreneurship; Team Climate; Intentional Innovative

I. INTRODUCTION

The Information System Innovative Use derived from the discussion of the use-phases of IS by Saga et al [1]. Through the development of Jasperson and other scholars, the Innovative use of Information System has been widely regarded as a "Post-adoption" behavior, and it was agreed that the value of IS will only occur in the post-adoption phase [2].

Despite many researches were taken on Post-adoption behavior, but there are still some defects in them. Firstly, most scholars studied the impact on innovation behavior from an individual or team perspective [3], but few researchers have combined the two perspectives to discuss. Secondly, the research on this area mainly focuses on current behaviors, and rarely discusses the factors that impact on future behavioral intention. Finally, in the research about the Entrepreneurship, most scholars believe that Entrepreneurship was unique features of entrepreneurs, but Soto believed that Entrepreneurship was a state of mind that exists all people [4]. Some scholars directly put forward the concept of Employee Entrepreneurship, and believed that it was commonly exists in all employees, it was a spirit of pursuit [5].

From the perspective of individual and team, this article will take Employee Entrepreneurship as an important aspect of employee traits to explore how to influence employees' intention innovative use of IS.

II. THEORETICAL FOUNDATIONS AND HYPOTHESES

A. Employee Entrepreneurship and Intentional innovative of IS

"Entrepreneurship" originates the field of Economics. Subsequently, the researchers conducted an in-depth study of entrepreneurship and formed two different perspectives. The first view is that entrepreneurship is the concept of "Spiritual Level" and a combination of thinking and behavior based on innovation. Another view is that Entrepreneurship is a concept of "Practical Level" and a management method that reflects entrepreneurial creativity [6]. Regardless of their difference in academic's community, Entrepreneurship is commonly regraded as a trait of managers (entrepreneurs). However, some scholars believed that defining entrepreneurship as unique qualities of managers was debated, and that Entrepreneurship was not limited to entrepreneurs themselves, but also the characteristics of ordinary employees [5,7]. Morris (1998) believed that Entrepreneurship existed in ordinary employees of the company and reflected in the process by which employees using resources to create value. When studying business model innovation, Ding Hao also believed that Entrepreneurship was not trait of the founders of company, it was widely existing in employees that presented a spirit of pursuit. Wang also believed that the spirit of Cooperation and Enterprising spirit were important manifestations of employee entrepreneurship [7]. Based on this, this paper believes that Entrepreneurship is a common trait of corporate employees, including three dimensions: Innovation, Cooperation and Enterprising.

First of all, the Spirit of Innovation refers to the willingness to adopt new methods and process to complete work in the use of IS, involving the used of methods and the expansion of functions [2,8]. The intentional innovative is manifested by the degree to which an individual is willing to make an effort during the work [9]. Studies have shown that individuals with stronger innovation were more likely to support new ideas and methods, thus creating a willingness to innovate. Second, the Spirit of Cooperation refers to the extent to which individuals share their knowledge and ideas with others during the use of IS [8]. Finally, the Enterprising Spirit is an advanced action, which is manifested in the attitude that

employees are not satisfied with the status quo, actively exploring new functions of IS and new methods to accomplish work tasks with higher efficiency [10]. The more enterprising individuals are, the more functions of IS will learn, and new methods and workflow are more likely to use in the future [11]. Thus, it is hypothesized:

H1(a/b/c): Employee Entrepreneurship can have an impact on Intentional Innovational Usage of IS. Among them, Individuals with Innovative Spirit(a), Enterprising Spirit(b), and Cooperative spirit will be positively related to Intentional Innovational Usage of IS in the future.

B. Team Climate Theory and Intentional innovative of IS

The studies of Team Climate originated from the psychology community's discussion of the "Field" theory. In 1951, Lewin proposed the concept of Psychological Atmosphere, which was later introduced into the field of behavioral science and was used to explain the complex relationship between environment and people [12]. The academic circles believed that the Team Climate were both subjective and objective. However, scholars generally believed that the Team Climate was the employee's perception or evaluation of specific situation such as team goals and team structure, and it was a subjective feeling [13,14].

West believes that Team Climate includes four dimensions: Task Orientation, Vision, Support for Innovation and Participation Safety [15]. Among them, Task Orientation emphasizes the sense of responsibility of the team or individual and achieves excellent work performance through the reasonable use of existing procedures and methods, it was closely related to the team vision and work results; Support for Innovation was expressed in terms of support for new working methods and new ideas, which were primarily influenced by the formal rules and regulations of the organization [15]. In explaining the Job Characteristics Model, Hackman (1980) proposed that Job Autonomy was used to describe the degree of freedom of work to an employee in completing the task, which can ultimately affect the employee's working styles and willingness to act. Therefore, this paper regards Job Autonomy as the specific dimension of Support for Innovation, and with reference to West's research conclusions, the Task Orientation and Support for Innovation are the Team Climate factors that affects employees' Intentional innovative use of IS in the future. Thus, , it is hypothesized:

H2: The Team Climate can have an impact on employee behavior. Among them, Support for Innovation will be positively related to Intentional Innovational Usage of IS in the future.

H3: The Team Climate can have an impact on employee behavior. Among them, Task Orientation will be positively related to Intentional Innovational Usage of IS in the future.

III. QUESTIONNAIRE DESIGN AND SAMPLE CHARACTERISTICS

A. Questionnaire design

This study used a questionnaire survey to measure the problems to be studied. The questionnaire consists of three mainly components: a. Employee Entrepreneurship; b. Team Climate; c. Intentional innovative of use IS. Each part of the measurement items was referenced to the classical literature and measured with 7-Likert scales.

a) Employee Entrepreneurship. Three dimensions were measured: Innovative, Enterprising and Cooperative Spirit. Because the measurement objects are mainly from China, therefore, the measurement of Cooperation and Enterprising Spirit in this study mainly referenced the research questionnaires of Xu Jianping [16] and Maruping [8]. For the Support for innovation, we mainly referenced the research results of Ke W. [17]. 20 indicators were used to measure Employee Entrepreneurship, and 8best items were selected for data analysis.

b) Team Climate. Mainly referenced the scale by West and combined with this research situation of this article to make appropriate corrections. Using 18 indicators to measure Support for Innovation and Task Orientation, 6 best items were selected to measure the two dimensions.

c) Intentional Innovative of use IS. Mainly referenced the scaled by Maruping [8], 9 indicators were selected for measurement, and 4 best items be used to analysis.

B. Sample Characteristics

In this study, a questionnaire survey was used to survey a large enterprise in Yunnan Province. A total of 300 questionnaires were distributed and 245 questionnaires were collected. Because there were missing or incomplete information in recycling process, a total of 213 valid questionnaires were adopted, and the recovery rate of 71%, in which males were 93 (43.66%) and 120 (86.68%) respondents were female.

IV. DATA ANALYSIS AND STRUCTURAL MODEL TEST

A. Reliability and Validity Analysis

In general, the reliability test of the scale requires testing the Cronbach's α , but some studies have shown that the magnitude of α was affected by the number of measurements. In additional, Campbell (1993) also believed that the level of α can not representative the stability of the test results. Therefore, the reliability of the scale is evaluated using the Construct Reliability (CR) and the Average Variance Extraction (AVE).

TABLE I. RELIABILITY AND VALIDITY ANALYSIS

Constructs	Item	Cross Loading	CR	AVE
Cooperative Spirit	CS1	0.742	0.808	0.584
	CS2	0.745		
	CS3	0.803		
Intentional Innovative of use IS	IU1	0.907	0.956	0.844
	IU2	0.914		
	IU3	0.926		
	IU4	0.928		
Enterprising Spirit	ES1	0.957	0.961	0.925
	ES2	0.966		
Innovative Spirit	IS1	0.887	0.885	0.721
	IS2	0.806		
	IS3	0.851		
Support for Innovation	SI1	0.737	0.863	0.678
	SI2	0.818		
	SI3	0.907		
Task Orientation	TO1	0.852	0.827	0.618
	TO2	0.726		
	TO3	0.775		

According to Fronell [18], when CR > 0.7, AVE > 0.5, the reliability of the scale passes the tests. From table1, the CR value was between 0.809 and 0.961, which was greater than 0.7, and the smallest AVE is greater than 0.5 (0.586 > 0.5). Thus, the reliability of the scale passed.

TABLE II. CORRELATION COEFFICIENT AND THE SQUARE ROOT OF AVE

Constructs	1	2	3	4	5	6
1.Cooperative Spirit	0.764					
2.Intentional Innovative of use IS	0.222	0.919				
3.Enterprising Spirit	0.219	0.380	0.862			
4.Innovative Spirit	0.128	0.131	0.317	0.849		
5.Support for Innovation	0.083	0.246	0.100	0.289	0.823	
6.Task Orientation	0.091	0.358	0.158	0.127	0.544	0.786

Note: Diagonal bold font is the square root of AVE

The validity of the scale includes: Convergence Validity (CV) and Discriminant Validity (DV). Fronell believed that CV test needs to satisfy two conditions simultaneously: a. Cross Loading for each item > 0.707; b. AVE > 0.5 [18]. From Table I and Table II, the minimum Cross Loading were 0.726 and 0.586 respectively, which satisfy the judgment requirement of CV. Indicates that convergence validity of the scale has passed.

Discriminant Validity can be determined by examining the relationship between the Square Root of AVE and Correlation coefficient. In Table II, all AVE Square Roots were larger than the correlation coefficient (0.764 > 0.544), so the Discriminant Validity has passed.

To sum up, the reliability and validity of scale have passed the test.

B. Structural Model Test

In this paper, the structural model was calculated by Smart PLS 3.0. Gender, Age, Major and Education Background were set as control variables. The results of Structural model were shown in figure 1.

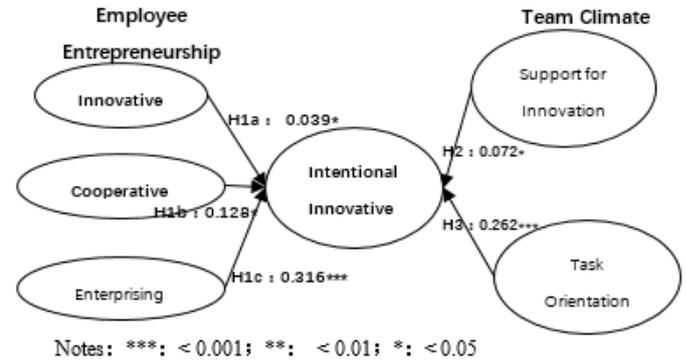


Fig. 1. The Framework and Structural Model Test

V. CONCLUSION

A. Conclusion

Based on the Team Climate Theory and Employee Entrepreneurship, this paper regards the Team climate as organizational level factors that affecting employees' Intentional innovative use of IS in the future, and regards Employee Entrepreneurship as an Individual level factors, and built a multilevel research model for Information System Innovation Use. The structural model was verified with 213 valid samples. The result shows that:

Enterprising ($\beta=0.316, p < 0.001$), Innovative ($\beta=0.039, p < 0.05$), and Cooperative ($\beta=0.128, p < 0.05$) Spirit can influence the future willingness to innovate. The reason for this result may be that employees have different perceptions of their willingness to innovate. In general, enterprising spirit was the motivation for employees to explore new system functions and usage methods. Aggressive employees are more willing to learn new knowledge at work and accomplish tasks through better methods.

The Team Climate was also an important factor which influence employees' Intentional Innovative use of IS. Support for innovation ($\beta=0.072, p < 0.05$) and Task Orientation ($\beta=0.262, p < 0.001$) can directly impact on innovative usage of employees. This shows that the stronger the employee's Job Autonomy within the team, the more novelty methods will become. Because Job Autonomy allowing employees flexibility over how it will operate. At the same time, Task Orientation of the team enables employees to adjust their work methods, and realized that if they want to do their job better, they must go through new methods and processes to stimulate the individual's desire to use IS innovatively.

B. Contribution

The theoretical contributions of this paper is to explore the influencing factors of the innovative use behavior of IS.

First, from research perspective. The existing literature generally regards “Entrepreneurship” as the trait of entrepreneurs. Whether at the individual level, group level or social level of entrepreneurs, “Entrepreneurship” were unique to entrepreneurs [20]. However, based on the views of Wang and Ding [5,7], this paper draws on the research results of Morris and focuses on “Entrepreneurship” to corporate employees, and believes that Entrepreneurship Spirit is not only the unique characteristics of managers, but also generally exist in all employees.

Next, from the subjects of research. This paper analyzes the mechanism of the influence of employees’ intentional innovative use of IS based on the Employee Entrepreneurial and Team Climate perspective. Most of research was based on a static point in time, that is, to study the impact of current factors on the innovation behavior of current IS. But in this article, we mainly discuss whether current factors will affect the future intentions of personal. Therefore, there was innovation in the research objects.

Finally, it supplements the shortcomings of existing theoretical research. The existing research generally studies the impact on individual innovation behavior from the perspective of personal traits or team. Fewer documents consider both factors at the same time. However, this paper considered the influence of individual and group factors on the willingness to use innovative ideas of IS, supplementing the shortcomings of theoretical research. The result shows that the more aggressive the employees are, the more they can generate intentions to innovate; Individuals with stronger spirit of innovation and cooperation tend to inspire intentions to creative.

REFERENCES

- [1] V L Saga, R W Zmud. The nature and determinants of IT acceptance, routinization, and infusion [M]. Pittsburgh Carnegie Mellon University, 1994.
- [2] J JASPERSON, P E CARTER, R W ZMUD. A Comprehensive Conceptualization of Post-Adoptive Behaviors Associated with Information Technology Enabled Work Systems [J]. *Mis Quarterly*, 2005, 29(3): 525-57
- [3] LIANG H, PENG Z, XUE Y. Employees' exploration of complex systems: An integrative view [J]. *Journal of Management Information Systems*, 2015, 32(1): 322-57.
- [4] SOTO. J.H. Socialism, economic calculation, and entrepreneurship (New thinking in political economy) [M]. UK: Edward Elgar, 2010.
- [5] Ding Hao, Wang Bingcheng, Duan Hongliang. Study on the relationship among business model innovation, innovation legitimacy and employee entrepreneurship of S &T-based small business [J]. *Science & Technology Progress and Policy*, 2013, 30(21): 80-5. (In Chinese)
- [6] KODITHUWAKKU S S, ROSA P. The entrepreneurial process and economic success in a constrained environment [J]. *Journal of Business Venturing*, 2002, 17(5): 431-65.
- [7] Wang bingcheng, Ding Hao, Duan Hongliang. An empirical study on the relationship among business model innovation, employee entrepreneurship and personality traits[J]. *Journal of Industrial Technological Economics*, 2013, (6): 106-16. (In Chinese)
- [8] MARUPING L M, MAGNI M. Motivating employees to explore collaboration technology in team contexts [J]. *MIS Quarterly*, 2015, 39:1-16.
- [9] Wang jinfeng, Wu ruiqiang, Fenglijie, Yue junju. Mechanism study on innovative climate, staff innovation willingness and innovative performance—empirical analysis of High-tech enterprises [J]. *Research on Economics and Management*, 2017, 38(9): 127-36. (In Chinese)
- [10] Wang jingyi. Structure model construction and case study about entrepreneurship [J]. *Journal of Technical Economics & Management*, 2018, 264(7): 45-51. (In Chinese)
- [11] Arshia Khan, Janna Madden. Active Learning: A New Assessment Model that Boost Confidence and Learning While Reducing Test Anxiety[J]. *International Journal of Modern Education and Computer Science*, 2018, 10(12):1-9.
- [12] Gu yuandong, Peng jisheng. The effect of organizational creative climate on employees’ creative behavior: the moderating effect of creative self-efficacy [J]. *Nankai Business Review*, 2010, 13(1): 30-41. (In Chinese)
- [13] MUCHINSKY P M. An assessment of the litwin and stringer organization climate questionnaire: An empirical and theoretical extension of the sims and lafollette study [J]. *Personnel Psychology*, 2010, 29(3): 371-92.
- [14] Xie hefeng, Ma qingguo. A study on the effect of organizational climate on employee’s informal knowledge sharing behavior [J]. *Studies in Science of science*, 2007, 25(2): 306-11. (In Chinese)
- [15] ANDERSON N R, WEST M A. Measuring Climate for Work Group Innovation: Development and Validation of the Team Climate Inventory [J]. *Journal of Organizational Behavior*, 1998, 19(3): 235-58.
- [16] Nipaporn Chanamarn, Kreangsak Tamee, "Enhancing Efficient Study Plan for Student with Machine Learning Techniques" [J]. *International Journal of Modern Education and Computer Science*, no. 3, 2017, pp. 1-9.
- [17] KE W, TAN C, SIA C. Inducing Intrinsic Motivation to Explore the Enterprise System: The Supremacy of Organizational Levers [J]. *Journal of Management Information Systems*, 2012, 29(3): 257-89.
- [18] FORNELL C, LARCKER D F. Evaluating Structural Equation Models with Unobservable Variables and Measurement Error [J]. *Journal of Marketing Research*, 1981, 18(1): 39-50.
- [19] Shook, Ketchen, Hult, et al. S Anupama Kumar. Edifice an Educational Framework using Educational Data Mining and Visual Analytics[J]. *International Journal of Education and Management Engineering* 2016, 6(2):24-30.
- [20] Shi pengcheng, Xu lei. The three levels of entrepreneurship and its enlighten [J]. *Foreign Economics & Management*, 2006, 28(2): 44-51. (In Chinese)