

Study on the relationship between Innovation atmosphere and innovation behavior

Chun Hu

Graduate School of Business, Graduate University of Mongolia, Ulaanbaatar 14200, Mongolia

Abstract: In order to investigate the relationship between innovation atmosphere and innovation behavior, a questionnaire survey was conducted on employees of companies in six provinces in China, including Sichuan Province and Guangdong Province, and SPSS statistical analysis software was used to conduct descriptive statistical analysis, reliability analysis, validity analysis, analysis of variance, correlation analysis and regression analysis to conclude that the innovation behavior and innovation atmosphere and achievement motivation of employees in the surveyed companies are at a moderate to high level. There is a significant difference between company establishment time on innovation behavior, company nature on Innovation atmosphere and innovation behavior, and employees' tenure in the company on achievement motivation. Innovation behavior, Innovation atmosphere and achievement motivation are significantly and positively correlated, Innovation atmosphere and innovation behavior are significantly and positively correlated, and achievement motivation plays a partially mediating role in the middle of Innovation atmosphere and innovation behavior. Achievement motivation partially mediates between Innovation atmosphere and innovative idea generation, achievement motivation partially mediates between Innovation atmosphere and innovative idea promotion, and achievement motivation partially mediates between Innovation atmosphere and innovative idea practice. In response to the findings of the study, suggestions are made for the creation of a good Innovation atmosphere, such as the creation of innovation teams, the delegation of authority and the provision of financial and material support.

Keywords: Innovation atmosphere; Achievement motivation; Innovation behavior.

1. Introduction

Innovation is the driving force of enterprise development. In the face of competition between domestic and foreign enterprises in today's world, enterprises must have the core technology, and innovation has become the secret of enterprise invincibility. The innovation of enterprises lies in their own talent management model and employees, after all, employees are the core force and the main body for implementing innovative behavior, during which it is particularly important for enterprises to create an innovative atmosphere, which is more effective in the face of employees who are eager to pursue success. Companies promote the creation of innovative behavior by improving infrastructure, improving the environment for employees, improving work remuneration packages and so on, but the results are not very satisfactory and need to be explored continuously in theory and practice. Based on social cognitive theory, this study proposes and validates a theoretical model of Innovation atmosphere - achievement motivation - innovation behavior, so as to promote the design and implementation of human resource management strategies to stimulate employees' innovation behavior, improve the innovation efficiency of talents and enhance the core competitiveness of enterprises with important theoretical and practical significance.

2. Literature review and research hypothesis

2.1. Related concepts

Innovative behavior can broadly speaking be divided into three levels: firstly, the innovative behavior of the company, secondly, the innovative behavior of the team, and thirdly, the innovative behavior of individual employees of the organisation. This study focuses on innovation behavior at the

individual (employee) level, i.e. the process by which members of an organisation who generate innovative ideas will continue to promote and practice them.

In the early 1940s, research on Innovation atmosphere developed rapidly, with Litwin and Singer (1968) arguing that for organizations to generate innovation, they should first create an Innovation atmosphere that can influence employee motivation and behavior, and then provide innovative products or services, thereby enhancing organisational competitiveness (Chen yu, 2014). Then later, the focus of research began to shift to Innovation atmosphere. The organisational Innovation atmosphere is the perceptual description of the work environment in which employees work, which is more inclined to the innovation-supportive environment provided by the organisation.

McClellan argues that everyone's motivation to achieve is different and that each person is at a relatively stable level of achievement motivation. According to Atkinson, there are two psychological tendencies that arise when people compete: the motivation to achieve and the motivation to avoid failure. Achievement motivation in this study refers to a psychological journey in which employees actively pursue perfect performance and job achievement in a job situation that is self-perceived as competitive and requires high job skills (Gu yuan dong, 2017).

2.2. The relationship between innovative behavior and the Innovation atmosphere and achievement motivation

Numerous studies have examined the impact of organisational Innovation atmosphere on employee creativity (Gilson and Shalley, 2004; Shalley et al., 2009) or employee innovation behavior (Choi, 2004; Scott and Bruce, 1994). Just as the concepts of innovation and creativity intersect and overlap, so too do these two types of research at the individual

level. However, these studies all suggest that organisational Innovation atmosphere has an important influence on employees' innovative behavior, and that generally an organisational Innovation atmosphere (e.g. colleague support, supervisor support, organisational support, etc.) is conducive to stimulating employees' innovative behavior, while a negative organisational Innovation atmosphere (e.g. internal struggle, conservatism) can hinder the performance of employees' innovative behavior.

A large body of research on achievement motivation has generally concluded that achievement motivation has a positive impact on individual behavior and performance (Long, 2003). Numerous studies have also confirmed that internal motivation has a positive effect on creativity (Lu, Xiaojun and Zhang guoliang, 2007; Chen xiao, 2006; Shalley and Oldham, 1997). Achievement motivation, as an important internal motivation, has attracted the interest of researchers for its relationship with employees' innovative behavior or creativity. For example, Liang Liping (2001) pointed out that raising the level of achievement motivation of entrepreneurs is a prerequisite for improving their innovation quality, and Guo Dejun et al. (2000) conducted a study on the relationship between creativity motivation and creativity of technology personnel and found that internal motivation had a significant level of impact on creativity and external motivation had a negative impact on creativity but did not reach a significant level.

2.3. Research hypothesis

Based on the above analysis, the following hypotheses are proposed for the relationship between innovative behavior and the Innovation atmosphere and achievement motivation.

H1: Innovation atmosphere is significantly correlated with achievement motivation, i.e. the stronger the Innovation atmosphere in a company, the stronger the achievement motivation of employees.

H2: Innovation atmosphere is significantly correlated with innovation behavior, i.e. the stronger the Innovation atmosphere of the firm, then the more pronounced the innovation behavior of the employees.

H3: Achievement motivation is significantly correlated with innovative behavior, i.e. the stronger the employee's achievement motivation, then the more pronounced the employee's innovative behavior.

H4: Achievement motivation plays a mediating role in the relationship between Innovation atmosphere and innovation behavior, i.e. the stronger the Innovation atmosphere of the company, the stronger the achievement motivation of the employees and the more pronounced the performance of their innovation behavior.

3. Research Methodology

3.1. Study sample

In this study, a questionnaire survey was conducted for employees of enterprises in six provinces in China, including Sichuan Province and Guangdong Province. 520 questionnaires were sent out, 486 questionnaires were collected, and 471 valid questionnaires were obtained by excluding invalid questionnaires. The majority of the employees were male and female, the majority were around 40 years old, and the majority were educated with higher education. The survey sample was chosen randomly and covered a wide range of areas, which is conducive to the study

drawing credible conclusions.

3.2. Research tools

Innovation atmosphere questionnaire. The scale designed by Zhang zhenggang et al. (2016) in measuring the Innovation atmosphere was used in this study. My colleagues support and assist each other at work, my leader respects and tolerates different opinions and disagreements from subordinates, and the company promotes employees to try new things and learn from mistakes, etc. 12 questions in 3 dimensions. The questionnaire was scored on a five-point scale, with 1-5 representing "very inconsistent", "inconsistent", "unclear", and "conforming" and "very consistent". The higher the score, the stronger the Innovation atmosphere in the company.

Achievement Motivation Questionnaire. The scale composed by Gu Yuan Dong (2017), drawn from a widely used and mature scale in China, has good reliability and validity after a series of tests, and is used in this study in conjunction with the actual situation of this study. It is important to me to do my job to the best of my ability; doing my job to the best of my ability gives me a sense of achievement at work; I work harder when competing with others; and I enjoy working in situations that require a higher level of skill. The scale has four questions and is scored on a five-point scale, with 1-5 representing "very inconsistent", "inconsistent", "unclear", and "conforming" and "very consistent". The higher the score, the more motivated the employee is to achieve.

The Innovation behavior Questionnaire (IBIQ) was developed by Janssen (2000), who proposed that innovation behavior can be divided into three stages: the idea generation stage, the innovation promotion stage and the innovation practice stage. The questionnaire is based on a five-point scale, with 1-5 representing "very inconsistent", "inconsistent", "unclear", and "conforming" and "very consistent". The higher the score, the more significant the innovative behavior of the employees.

3.3. Research steps

The questionnaire was tested for reliability and validity and purified to form a formal questionnaire. After passing the reliability, validity and normality tests on the survey data of 471 employees, descriptive statistical analysis, correlation analysis, one-way ANOVA and regression analysis were conducted to empirically prove the current situation of Innovation atmosphere, achievement motivation and innovation behavior and the interrelationship between them.

4. Study results

4.1. Innovative behavior and the current state of the Innovation atmosphere and achievement motivation

A descriptive statistical analysis of the survey of 471 corporate employees is presented in Table 1. the data shows that innovation behavior and Innovation atmosphere and achievement motivation are at a moderate to high level. Further research revealed that there were significant differences in the individual statistical variables for innovative behavior, Innovation atmosphere and achievement motivation, as shown by the fact that the time of establishment of the company was significant ($p < 0.05$) for a total of one item for innovative behavior, and the specific analysis showed that: the mean scores of the groups with more

significant differences were "more than 20 years > 1-5 years; The results of the comparison of the mean scores of the groups with significant differences are: "more than 20 years > 1-5 years; more than 20 years > 6-10 years; more than 20 years > 11-15 years". private enterprises; tri-capital enterprises > private enterprises; institutions > state-owned enterprises; tri-capital enterprises > state-owned enterprises; institutions > joint ventures; tri-capital enterprises > joint ventures", and the comparison of the mean scores of the groups with significant differences in innovation behavior was "institutions > private enterprises; tri-capital enterprises > private enterprises; institutions > state-owned enterprises; tri-capital enterprises > state-owned enterprises; institutions > joint ventures; tri-capital enterprises > joint ventures". The results of the comparison of the mean scores of the groups with more significant differences in the nature of the company on innovative behavior are: "Business unit>private enterprise; Tricapital enterprise>private enterprise; Business unit>state-owned enterprise; Tricapital enterprise>state-owned enterprise", and the results of the comparison of the mean scores of the groups with more significant differences in the nature of the company on innovative behavior are The comparison of the mean scores of the groups with significant differences in motivation for achievement is "grassroots cadres > general employees", and the comparison of the mean scores of the groups with significant differences in innovation behavior is "grassroots cadres > general employees".

The results of the analysis of the correlation showed that

Table 2. Results of linear regression analysis - simplified format

	Regression coefficient	95% CI	VIF
Constants	-0.070 (-0.498)	-0.346 ~ 0.206	-
Motivation for achievement	0.518** (11.385)	0.429 ~ 0.607	1.936
Innovative atmosphere	0.447** (11.241)	0.369 ~ 0.525	1.936
Sample size		471	
R ²		0.642	
Adjustment R ²		0.641	
F-value		F (2,468) =420.108, p=0.000	

Dependent variable: innovative behavior

D-W value: 2.085

* $p < 0.05$ ** $p < 0.01$ t-values in parentheses

Source: Compiled by this study

A linear regression analysis was conducted with Achievement Motivation and Innovation atmosphere as independent variables and Innovation behavior as the dependent variable. As can be seen from Table 2, the model formula is: Innovation behavior = -0.070 + 0.518*Achievement Motivation + 0.447*Innovation atmosphere. The model passed the F-test (F=420.108, $p=0.000 < 0.05$), which means that at least one of achievement motivation and Innovation atmosphere has an effect on innovation behavior. The D-W values were around the number 2, thus indicating that the model was not autocorrelated and that there were no correlations between the sample data and the model was good. The final analysis showed that the regression coefficient for achievement motivation was 0.518 ($t=11.385$, $p=0.000 < 0.01$), which means that achievement motivation has a significant positive effect on innovation behavior. The regression coefficient value for Innovation atmosphere was 0.447 ($t=11.241$, $p=0.000 < 0.01$), implying that Innovation atmosphere would

the Innovation atmosphere was significantly and positively correlated with achievement motivation, with a correlation coefficient of 0.695 ($p < 0.01$), and the research hypothesis H1 passed the test. Innovation atmosphere was significantly and positively correlated with innovative behavior with a correlation coefficient of 0.737 ($p < 0.01$), and the research hypothesis H2 was tested. Achievement motivation was significantly and positively correlated with innovative behavior with a correlation coefficient of 0.739 ($P < 0.01$) and research hypothesis H3 passed the test.

Table .1 Variable means, standard deviations and correlation coefficients

Variables	Average value	Standard deviation	Innovative atmosphere	Motivation for achievement
Innovative atmosphere	4.068	0.703		
Motivation for achievement	4.156	0.615	0.695**	
Innovative behavior	3.900	0.726	0.737**	0.739**

* $p < 0.05$ ** $p < 0.01$

Source: Compiled by this study

4.2. The relationship between Innovation atmosphere, achievement motivation and innovation behavior

have a significant positive influence relationship on innovative behavior. To conclude the analysis, it can be seen that all of them have a significant positive influence on innovation behavior.

A linear regression analysis was conducted with Innovation atmosphere as the independent variable and achievement motivation as the dependent variable, as seen in Table 3, the model formula was: achievement motivation = 1.682 + 0.608*Innovation atmosphere and the model R-squared value was 0.484, meaning that Innovation atmosphere could explain 48.4% of the cause of change in achievement motivation. An F-test of the model revealed that the model passed the F-test (F=439.117, $p=0.000 < 0.05$), which means that Innovation atmosphere must have an influential relationship on achievement motivation, and the final specific analysis shows that the regression coefficient value of Innovation atmosphere is 0.608 ($t=20.955$, $p=0.000 < 0.01$), which means that Innovation atmosphere will have a significant positive effect on The regression coefficient of 0.608 ($t=20.955$,

p=0.000<0.01) implies that Innovation atmosphere has a significant positive effect on achievement motivation. To conclude the analysis, it can be seen that all of the Innovation

atmospheres have a significant positive influence on achievement motivation, and the research hypothesis H1 is again validated.

Table 3. Results of linear regression analysis - simplified format

	Regression coefficient	95% CI	VIF
Constants	1.682** (14.039)	1.447 ~ 1.917	-
Innovative atmosphere	0.608** (20.955)	0.551 ~ 0.665	1.000
Sample size		471	
R ²		0.484	
Adjustment R ²		0.482	
F-value		F (1,469) =439.117, p=0.000	

Dependent variable: motivation to achieve D-W value: 1.874

* p<0.05 ** p<0.01 t-values in parentheses

Source: Compiled by this study

The Innovation atmosphere has three dimensions and was analysed in separate regressions. A linear regression analysis was conducted with colleague support as the independent variable and achievement motivation as the dependent variable, and as seen in Table 4, the model R-squared value was 0.442, meaning that colleague support explained 44.2% of the cause of change in achievement motivation. When the model was F-tested it was found that the model passed the F-test (F=372.074, p<0.05), which means that colleague support must have an influential relationship on achievement motivation, as well as the model formula: achievement motivation = 1.628 + 0.604*colleague support. The final specific analysis shows that the regression coefficient value for colleague support is 0.604 and shows significance (t=19.289, p=0.000<0.01), implying that colleague support will have a significant positive influence relationship on achievement motivation. To summarise the analysis, it can be seen that all of the colleague support has a significant positive effect on achievement motivation. For model 2: its change in F-value after adding supervisor support to model 1 showed

significance (p<0.05), implying that the addition of supervisor support has explanatory significance for the model. In addition, the R-squared value increased from 0.442 to 0.472, implying that supervisor support could have an explanatory strength of 2.9% for achievement motivation. Specifically, the regression coefficient value for supervisor support was 0.254 and showed significance (t=5.105, p=0.000<0.01), implying that supervisor support would have a significant positive relationship on achievement motivation. For model 3: its change in F-value after adding organisational support to model 2 showed significance (p<0.05), implying that the addition of organisational support has explanatory significance on the model. In addition, the R-squared value increased from 0.472 to 0.488, implying that organisational support could have an explanatory strength of 1.6% on achievement motivation. Specifically, the regression coefficient value for organisational support was 0.183 and showed significance (t=3.877, p=0.000<0.01), implying that organisational support can have a significant positive relationship on achievement motivation.

Table 4. Results of stratified regression analysis

	Stratification 1	Stratification 2	Stratification 3
Constants	1.628** (12.258)	1.624** (12.554)	1.589** (12.434)
Colleague support	0.604** (19.289)	0.359** (6.319)	0.319** (5.608)
Supervisor support		0.254** (5.105)	0.124* (2.098)
Organisational support			0.183** (3.877)
Sample size	471	471	471
R ²	0.442	0.472	0.488
Adjustment R ²	0.441	0.470	0.485
F-value	F (1,469) =372.074, p=0.000	F (2,468) =209.010, p=0.000	F (3,467) =148.530, p=0.000
ΔR ²	0.442	0.029	0.016
ΔF value	F (1,469) =372.074, p=0.000	F (1,468) =26.063, p=0.000	F (1,467) =15.034, p=0.000

Dependent variable: motivation to achieve

* p<0.05 ** p<0.01 t-values in parentheses

Source: Compiled by this study

4.3. A test of the mediating role of achievement motivation on the relationship between Innovation atmosphere and innovation behavior

The analysis of the mediating effect of achievement motivation involved a total of three models, which are as

follows, innovation behavior = 0.801 + 0.762*Innovation atmosphere, achievement motivation = 1.682 + 0.608*Innovation atmosphere, innovation behavior = -0.070 + 0.447*Innovation atmosphere + 0.518*achievement motivation, combined with Table 5, it can be seen that achievement motivation plays a part in the relationship between Innovation atmosphere and innovation behavior mediating role and the research hypothesis H4 passed the test.

Innovative behavior consists of three dimensions, and again the mediation analysis was conducted. Table 6 shows that there are three models involved in the analysis of mediating effects, which are as follows: innovative behavior = 0.832 + 0.232*co-worker support + 0.149*supervisor support + 0.376*organisational support, achievement motivation = 1.589 + 0.319*co-worker support + 0.124*supervisor support + 0.183*organisational support, innovative behavior = -0.000 + 0.065* Colleague support + 0.084* Supervisor support +

0.280* Organizational support + 0.524* Achievement motivation, combined with Table 6, shows that achievement motivation partially mediates the relationship between Innovation atmosphere and innovative idea generation, achievement motivation partially mediates the relationship between Innovation atmosphere and innovative idea promotion, and achievement motivation partially mediates the relationship between Innovation atmosphere and innovative idea practice.

Table 5. Summary of results of the intermediary role test

Item	c Total effect	a	b	a*b Intermediary effect value	a*b (Boot SE)	a*b (z-value)	a*b (p-value)	a*b (95% BootCI)	c' Direct effects	Test conclusion
Innovation atmosphere=> Motivation to achieve =>Innovation behavior	0.762**	0.608**	0.518**	0.315	0.044	7.236	0.000	0.219 ~ 0.388	0.447**	Some agents

* p<0.05 ** p<0.01

* p<0.05 ** p<0.01

Source: Compiled by this study

Table 6. Summary of results of the intermediary role test

Item	c Total effect	a	b	a*b Intermediary Effect Value	a*b (Boot SE)	a*b (z-value)	a*b (p-value)	a*b (95% BootCI)	c' Direct effects	Test conclusion
L1	0.699**	0.608**	0.559**	0.340	0.046	7.326	0.000	0.249 ~ 0.428	0.359**	Some agents
L2	0.800**	0.608**	0.481**	0.293	0.045	6.531	0.000	0.178 ~ 0.354	0.507**	Some agents
L3	0.787**	0.608**	0.512**	0.312	0.043	7.194	0.000	0.197 ~ 0.365	0.475**	Some agents

* p<0.05 ** p<0.01

Remarks: L1: Innovation atmosphere => motivation for achievement => innovative idea generation

L2: Innovation atmosphere => motivation for achievement => innovative idea promotion

L3: Innovation atmosphere=> Motivation to achieve =>Innovation ideas in practice

Source: Compiled by this study

Combining the above studies, it is concluded that innovation behavior and Innovation atmosphere and achievement motivation are at a moderate to high level. There is a significant difference between the time of company establishment and innovation behavior, a significant difference between the nature of the company and Innovation atmosphere and innovation behavior, a significant difference between the time employees have been with the company and achievement motivation, a significant positive correlation between Innovation atmosphere and achievement motivation, a significant positive correlation between Innovation atmosphere and innovation behavior, a significant positive correlation between achievement motivation and innovation behavior, a partial intermediary role between achievement motivation and Innovation atmosphere and innovation behavior, a partial intermediary role between achievement motivation and Innovation atmosphere and innovation idea generation, and a partial intermediary role between achievement motivation and Innovation atmosphere and innovation idea promotion. Achievement motivation partially mediates between Innovation atmosphere and innovative behavior, achievement motivation partially mediates between Innovation atmosphere and innovative idea generation, and

achievement motivation partially mediates between Innovation atmosphere and innovative idea promotion, achievement motivation partially mediates between Innovation atmosphere and innovative idea practice.

5. Conclusions and Outlook

The generation or increase of innovative behavior among employees is not a simple matter, it is a comprehensive project in which the organisational Innovation atmosphere plays an important role. A good Innovation atmosphere, which promotes the generation of innovative inspiration among employees, is of great significance. Companies can establish innovation teams and encourage team communication to increase a strong innovation atmosphere. Enterprises should also be bold and decentralised to encourage employees to be bold and innovative, and give them full trust. Enterprises can give financial and material support to motivate employees to innovate. Companies should pay attention to the motivation of employees to achieve, and give encouragement and support when appropriate. A "psychological revolution" should be carried out between the company and its employees, so that they can really feel the innovative atmosphere created by the company.

References

- [1] Chen Yu. 2014. Research on the influence of leadership member exchange on employees' innovation behavior. PhD thesis, Southwest University of Finance and Economics.

- [2] Choi JN.2004.Individual and contextual predictors of Innovation performance: the mediating role of psychological processes.
- [3] Gilson LL, Shalley C E.2004.A little creativity goes a long way:an examination of teams' engagement inInnovation processes. *Journal of Management*, 30:453-470.
- [4] Gu Yuan Dong. 2017.Organizational Innovation atmosphere, innovation self-efficacy, and employee innovation behavior. Beijing: Science Press.
- [5] Guo, D.J., Huang, M.E.,Ma,Q.X.2000.A study of creativity motivation and creativity among science and technology personnel. *Applied Psychology*, 6(2): 8-13.
- [6] Janssen O.2000. Job demands, perceptions of effort-reward fairness and innovative work behavior.
- [7] Liang, L.2001.A study on the innovative quality of enterprise groups. *Research in Quantitative Economics and Technology Economics*, 10: 13-15.
- [8] Long,L.R,2003,Factors influencing self-career management among corporate employees. *Journal of Psychology*, 35(4): 541-545.
- [9] Lu,S.J.,Zhang,G.L.2007.A study on the influence of work motivation on individual innovation behavior. *Soft Science*, 6: 124-127.
- [10] Scott S G,Bruce R A.1994.Determinants of innovative behavior:a path model of individuals in the workplace.*Academy of Management Journal*,37(3):580-607.
- [11] Shalley C E, Gilson LL,Blum T C.2009.Interactive effects of growth need strength, work context,and job complexity on self-reportedInnovation performance.*Academy of Management Journal*,52(3):489-505.
- [12] Shalley C E, Oldham G R.1997.Competition andInnovation performance:effects of competitor presence and visibility. *Creativity Research Journal*, 10:337-345.
- [13] Tagiuri R, Litwin G H. 1968. *Organizational Climate: Exploration of a Concept* Boston : Harvard University Press.
- [14] Zhang ZG, Li YJ, Li JJ.2015. Research on the relationship between psychological capital, innovation atmosphere perception and innovation behavior. *China Science and Technology Forum*, 2: 119-124.