How motivation stimulates performance: The mediating role of creativity from multilevel perspectives

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Abstract

The study proposed that individual creativity can be motivated through both intrinsic and extrinsic motivations and creativity can also be enhanced by team-level effect. Besides, employees with high level creativity can achieve high work performance. Moreover, the present study also proposed that team climate for innovation affects different kinds of team performance at the team level. Subjective data (independent variables and mediators) were collected from 237 R&D employees (20 project teams) of a company, and objective data (the performance of employees and their teams) were acquired from the organizational record. Results revealed that creativity could fully mediate the relationship between motivation (intrinsic and extrinsic) and performance, and the interaction effects of intrinsic and extrinsic motivations on creativity and performance were significant. Furthermore, team climate for innovation at the team level had cross effect on employee creativity at individual level. The implications of the findings, limitations, and direction for future study are discussed.

Keyword: creativity, motivation, team climate for innovation, multilevel analysis, objective performance

Introduction

Employees' creativity is often the starting point for innovation (Zhou & George, 2001). This proposition assumes that creativity can be described as both the result and the process of producing creative outcomes; in other words, individuals need to first engage in certain process that could help them become more creative (Zhou & Shalley, 2008). Most studies had considered creativity as an outcome to explore what factors might enhance or constrain creativity within the organization (Amabile, Conti, Coon, Lazenby & Herron, 1996; Zhou & Shalley, 2008). There has been debate in the organizational behavior and creativity literature about whether intrinsic motivation could be increased or not. In contemporary motivation theory (Amabile, 1996), the motivation synergy was used to describe the situational effects of intrinsic and extrinsic motivation on creativity. However, there has thus far been relatively little research ifrom situational perspective to the creativity literature.

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Studies viewing creativity as a process had focused on the cognitive perspective and examined employees' overall engagement in creative process in the workplace (Zhou & Shalley, 2008). However, results perspective provided in the literature could not explain the consequence of creativity in the workplace. We argue that: in the process perspective, creativity is an expression of voice (Zhou & George, 2001: 683) to an organizational action that could enable the organization to solve existing problems and to make improvement. In this situation, creativity could be a sign that employees is demonstrating positive attitude toward the organization. A possible consequence of employees' positive attitude is to improve their overall work performance.

However, empirical studies about the relationship between creativity and work performance are rare with mixed results concluded. For example, Oldham and Cummings (1996) investigated 171 manufacturing employees and found a high correlation between creativity (supervisory rated) and work performance (supervisory rated). However, in Van Dyne, Jehn, and Cummings's (2002) study of 195 hair stylists, they found that the relationship between creativity (supervisory rated) and objective service performance was insignificant.

Drawing on above issue, the present study develops a hypothesized framework and examines the proposition that whether creativity can be defined as a result and a process. In the perspective of result, creativity not only can be motivated through both intrinsic and extrinsic motivation (Amabile, 1996; Deci & Ryan, 2008; Prabhu, Sutton, & Sauser, 2008; Wiersma, 1992); but also can be enhanced by cross-level effect (i.e., team climate, West & Anderson, 1996). In the perspective of process, creativity could be an employee's positive response to the organizational situation. It is a degree of perception that comes from an explicit effort to be aware of a situation's particular circumstances (Quinn, 2006: 616).

Through providing empirical evidence on the proposition of creativity as a result and as a process, the study makes some contribution to the creativity literature. Employee creativity were not only motivated by their intrinsic and extrinsic motivation, but also can be enhanced by the contextual effect. The present study also contributes to the growing body of multilevel research. Finally, the present study was conducted in a R&D team-based company. We obtained four types of objective data about team performance from this company; the effect of team climate on different types of performance was also examined. The results can also provide a comprehensive picture of the effect of team climate on different types of team performance.

Theory and hypotheses

Creativity in the organizational context refers to the generation of ideas about new solutions and products (services or process) proposed by employees that are novel and useful to

the organization (Amabile et al., 1996; Oldham & Cummings, 1996) whereas innovation involves the successful implementation of creative ideas by the organization (Zhou & George, 2001: 683). Creativity can be described as both the result and the process of producing creative outcomes; individuals need to first engage in certain process that could help them become more creative than before (Shalley & Zhou, 2008). Most studies had focused on creativity as a result and to explore what factors might enhance or constrain creativity within the organization (Shalley & Zhou, 2008). Other studies, on the contrary, has based on the cognitive perspective and examined employees' overall engagement in creative process at work.

Although scholars had considered creativity as the most predominant factor to individual performance in various domains of work (Sung & Choi, 2009), empirical studies about the relationship between creativity and work performance are still rare with mixed results concluded (Oldham & Cummings, 1996; Van Dyne, Jehn, & Cummings, 2002). A possible explanation is that, in order to generate novel and useful ides, employees have to spend more time on creative cognitive processes in the problem recognition as well as the generation of ideas or solutions, and to seek sponsorship for an idea and produce a prototype (Amabile, Mueller et al., 2002; Scott & Bruce, 1994). Employees may focus on their energy and attention on producing creative outcomes and may devote less effort to traditional dimension of work, thus may jeopardize their overall performance (Oldham & Cummings, 1996: 614).

In the team based setting where employees creativity are required (e.g., the R&D project team), the creative ideas proposed by a team member may contributes to their team in the idea generation stage and this idea may further be transformed into a novel or workable outcomes in the implementation stage. In other words, demonstrating creative behaviors in the workplace might be included in the evaluating of the performance of a specific employee in the team. Moreover, from the mini-c creativity (Kaufman & Beghetto, 2009: 3) perceptive, if individuals interpret the new information, ideas, experiences, and events as novel and personally meaningful, they may demonstrate mini-c creativity. If such mini-c creativity can be used to improve a person's work efficiency, this kind of creativity can also enhance his/her work performance. Accordingly, the present study hypothesizes:

H1: Employees with a high level creativity in the team based organization will achieve high level of work performance.

From the intrinsic perspective, people would be creative when they feel motivated primarily by the interest, enjoyment, satisfaction, and challenge of the work itself (e g ., Amabile, 1983, 1996). Deci and Ryan's (1985, 2008) self-determination theory assumes that people are by nature active and self-motivated, curious and interested, vital and eager to succeed because success itself is personally satisfying and rewarding. Intrinsic motivation represents the

motivation to engage in work primarily for its own sake, because the work itself is interesting, engaging, or in some way satisfying (Amabile, Hill, Hennessey, & Tighe, 1994: 950). Such motivation increases employees' tendency to be curious, cognitively flexible, risk taking, and persistent in the face of barriers; all of which could also facilitate the development of creative ideas (Shalley, Zhou, & Oldham, 2004).

In creativity research, scholars had usually considered intrinsic motivation as the enjoyment or interest in an activity for its own sake (Locke, & Latham, 1990). Csikzentmihalyi (1975) used flow experience to describe flow as a "holistic sensation that people feel when they act with total involvement". Challenge is another kind of intrinsic motivation. Challenge was the sense of working harder for arduous and important tasks (Amabile et al., 1996). Quinn (2005) used goal setting perspective to define challenging goals - accounting for a person's skill - tend to improve performance (i.e., flow) by focusing and increasing the individual effort (concentration). Abundant empirical evidence had proved that employees with a higher intrinsic motivation will demonstrate higher creativity in various domains (Andrews & Smith, 1996; Bommer & Jalajas, 2002; Quinn, 2005; Tierney, Farmer, & Graen, 1999).

There has been debate in the organizational behavior and creativity literature about whether extrinsic motivation could be increased or not. Extrinsic motivation is defined as a motivation to engage in activity primarily in order to meet some external goals other than the work itself; it is marked by a focus on external reward, external recognition, and external direction of one's work (Collins & Amabile, 1999). Deci and Ryan's (1985) proposed that extrinsic motivation has two faces: control and information. Under many situations, extrinsic motivation is perceived as externally controlled which might decrease employees' creativity. If employees perceive as providing competency information (Wiersma, 1992), extrinsic motivation could increase intrinsic motivation and thereby enhance creativity. Research has shown that autonomous motivation predicts persistence and adherence and is advantageous for effective performance, especially on complex or heuristic tasks that involve deep information processing or creativity (Deci & Ryan, 2008). However, an employee's interest to a task may not only result from pleasing experiences such as self-determined types. Besides, in everyday work settings we cannot be sure that behavior, performed in the absence of immediate extrinsic rewards, is intrinsically motivated. It may well be that an individual behaves in a certain manner, without immediate rewards, because he or she expects to receive some kind of extrinsic reward in the future (Wiersma, 1992: 111). Guay, Ratelle, and Chanal (2008) explored the relationship between motivation and a school performance. They found that some motivational types are specific to certain school subjects.

In Amabile's (1996) study, synergetic extrinsic motivator can provide information or enable the employee to better complete the task and can act in concert with the intrinsic motives while non-synergetic extrinsic motivator will lead the employee to feel controlled and are incompatible with intrinsic motives. Thus, extrinsic motivation, the motivation to work primarily in response to something apart from the work itself, such as reward or recognition or the dictates of others (Amabile, Hill, Hennessey, & Tighe, 1994) can also increase employees' creativity. Therefore, intrinsic and extrinsic motivation could synergistically aid creative performance (Prabhu, Sutton, & Sauser, 2008). Accordingly, the current study hypothesizes:

H2: Employees creativity will be affected by the interaction term between intrinsic motivation and extrinsic motivation.

Creativity as a process (Zhou & Shalley, 2008) indicates that employees creativity could be considered as an antecedent of individual performance (Sung & Choi, 2009), organizational innovation, and completive advantage (Hirst, Dick, & Knippenberg, 2009). In order to improve personal performance and help the organization to achieve goals, employees have to engage in the work and to demonstrate creative behavior in the workplace. Most studies based on the cognitive perspective and examined employees overall engagement in creative process.

From the action and awareness perspective (Quinn, 2005), creativity can be seen as an employee's positive response to the organizational situation. It is a degree of perception that comes from an explicit effort to be aware of a situation's particular circumstances (Quinn, 2006: 616). Zhou and George's (2001: 683) referred to the turnover literature and proposed that creativity is an expression of voice and that the specific conditions that may result in dissatisfaction being channeled into creative performance. Employees may choose to use creativity as an expression of voice only when they perceive that creative performance has the potential to be effective (Zhou & George, 2001: 684). Employees may actively try to improve conditions, actively searching for and coming up with new ways of doing things and advocating changes to make things better (Zhou & George, 2001: 683).

Employees' active voice to an organizational action could be seen as a process that enables the organization to solve existing problems and make improvement. Employees can choose to quit the job but they choose to express voice. The kind of voice can be defined as an employee's positive attitude toward the organization which can further enhance employees' performance and organizational innovation. Employees creative behavior can be intrinsically or extrinsically motivated as they feel autonomous in the work (Deci & Ryan, 2008; Amabile, 1996). This study proposes that such creativity is a sign that employees is demonstrating positive attitude toward the organization. Based on the above argument, this study provides a third hypothesis

H3: Creativity as a process which mediates the relationship (a) intrinsic motivation, and (b) extrinsic motivation, and work performance.

For a team to survive in the continuously changing environment, innovation is critical to success (DeDreu, 2002). A team is a collection of individuals who are interdependent in their tasks, who share responsibility for outcomes, who see themselves and who are seen by others as an intact social entity embedded in one or more larger social systems (Cohen & Bailey, 1997). Team innovation refers to the introduction or application of new ideas, procedures, products or process of a team (DeDreu & West, 2001). Recently, scholars have paid more attention to the impact of the organizational context on team innovation or team performance (Shipton et al., 2006). The most widely mentioned factor in team area is team climate.

Climate is an organizational shared perception, interpretation, or experiences of their work environment such as support, organizational policies, practices, and procedures (Hunter et al., 2007; Schneider, 1990). Climate perceptions determine how individuals behave collectively by influencing their perceptions and feelings about certain aspects of their surrounding environment (Tse, Dasborough, & Ashkanasy, 2008). The "shared" means that individuals frequently interact at work, they have some common goals, and their tasks are interdependent such that individuals need to develop shared understanding and expected patterns of behavior (Anderson & West, 1998). Components of climate for innovation—including shared vision, participative safety, task orientation, and support for innovation—serve as social factors that might enhance and motivate employees' innovation and performance (West & Anderson, 1996).

Although climate perception originates with individuals, climate for innovation are expected to be shared by members within discrete workgroups (Tse, Dasborough, & Ashkanasy, 2008). Increased social interaction results in stronger homogeneity of climate perception among team members within team and greater variation across teams (Ashkanasy, Wilderon, & Peterson, 2000). Tse et al. (2008) found that effective climate is differed among workgroups as a result of workgroup-specific differences, rather than organization-wide differences. Team members may feel motivated to a task because team members share a strong perception of climate. The study thus suggests that team climate for innovation might not only affect team behavior at the team level, but also might affect an individual's behavior at the cross level. Therefore, the current research proposed that there is an effect on individuals' climate perception at team level, causing them to share a perception of affect in the workplace that is greater than its organization-wide impact. Therefore, the study indicates this hypotheses:

H4: Employees creativity at individual level will be positively affected by team climate for innovation at team level.

Finally, the present study also explored the effect on specific team performance. Although prior literature had proved that team climate for innovation is a predictable variable construct to team innovation (e.g., radicalness, magnitude, and novelty; see West & Anderson, 1996) and team performance (Gil, Rico, Alcover, & Barrasa, 2005). The authors do not clearly understand what kinds of team performance are affected by team climate for innovation.

Hypothesis 5. Team climate for innovation will positively affect four kinds team performance: (a) quality performance; (b) delivery performance; (c) cost performance, and (d) technical performance (e g., patents).

Methods

Samples were selected based on Amabile, Mueller, Simpson, Hadley, Kramer and Fleming's (2002) proposition that employees' creativity are required in their workplace. Moreover, teams selected in this study were more structured but not be organized by a specific task, and they had high interdependence which team members must rely on each other to perform tasks effectively of their jobs. The 237 R&D employees (20 project teams) of a large company agreed to participative in this study. Data was collected through general manager from two sources: employees' respondents and their objective performance from the organizational record. The objective data was obtained from the organization which included two types of performance: the overall work performance of each employee and performance of each project team with four indicators: quality, delivery, cost, and technical.

At the individual level, R&D employees provided their perception of creativity, intrinsic motivation, extrinsic motivation, and team climate for creativity. At the team level, respondents were asked to rate their perception of team climate for innovation. These variables were measured using a 5-point Likert scale, ranging from 1 for "strongly disagree" to 5 for "strongly agree". ICC and γ_{WG} (Brown & Hauenstein, 2005; LeBreton, James & Lindell, 2005) were calculated to justify appropriateness of aggregating to the team level.

At the individual level, we adopted 13 items from Zhou and Gerorge's (2001) creativity scale to measure creativity (Cronbach's α was .93), and 23 items from Amabile et al.'s (1994) work preference inventory to measure motivation. And we acquired objective data to measure participants' work performance. Finally, two variables were controlled for potential confounding effects: working experience in the domain, and domain knowledge familiarity.

At the team level, Anderson and West's (1998) team climate inventory was used to assess team climate for innovation with 34 items contains four dimensions: vision, participative safety, task orientation, and support for innovation. The values of ICC(1) were all significantly larger than 0. The average r_{wg} values for the climate scales showed good within-group consistency (.95

to .97). In addition, team performance was an objective data obtained from the R&D unit: quality indicator, delivery indicator, cost indicator, and the technical indicator. And we controlled team size at team level.

Results

Table 1 presents means, standard deviations, and inter-correlations for all variables in this study. Before testing the hypothesized model, the two-step procedure involving CFA and path analysis using SEM is used to estimate parameters and to test hypotheses (Anderson & Gerbing, 1988). Results of CFA show that factor loading of each observed item is higher than .60 and statistically significant; therefore the convergent validity of the construct is acceptable (Anderson & Gerbing, 1988).

After examining measurement model of each scale separately, the path analysis using structural equation modeling via the maximum likelihood method was used to estimate the parameters and to test the hypotheses. The fully mediated model through SEM shows that both intrinsic motivation (β=.46, p<.001) and extrinsic motivation (β=.23, p<.001) positively affects creativity. Furthermore, it is evident that creativity also positively affects work performance (β=.32, p<.001). These results support H1. In addition, it is also observed that creativity fully mediates the relationship between both intrinsic motivation and extrinsic motivation. This indicates that H3a and H3b were supported.

Hypothesis 2—which we argued that creativity was influenced by the interaction term between intrinsic and extrinsic motivation. As shown in Table 2, results of hierarchical regression analysis showed that the interaction terms between enjoyment and outward was significantly associated with workable creativity (β= .16, p<.001), but overall creativity and novel were not influenced by any interaction term. We separated total sample into high and low groups by mean of enjoyment. Figure 1a shows that workable creativity was increased when they perceive a high level of enjoyment in the work; on the other hand, enjoyment enhances the positive relationship between outward and workable creativity. As shown in Figure 1b, the plot of slopes of the interaction indicated that outward enhances the positive relationship between enjoyment and workable creativity. Thus, H2 was partially supported.

Results of the hierarchical liner modeling are shown in Table 3. In order to explore the effect of team climate for innovation on novel creativity, we used overall creative climate (model 2a) and separated components of creative climate (model 2b) respectively as predictors. In model 2a, the significant γ_{01} value indicated that the creative climate could predict novel creativity. In model 2b, the significant γ_{03} value indicated there was a strong positive relationship between support for innovation and novel creativity; the significant γ_{04} value

indicated there was a negative relationship between task orientation and novel creativity. The other parameters of components of creative climate were not significant. In model 4b, we used workable creativity as dependent variable. The result indicated that there is only one component of climate could predict workable creativity. In model 4b, the significant γ_{03} value indicated there was a strong positive relationship between support for innovation and workable creativity. Thus, H4 was partially supported.

Table 5 presents the means, standard deviations, zero-order correlation and reliabilities among variables at the team level. Because the sample size at team level was small (n=20), thus the hypotheses at the team level were tested using the hierarchical regression analysis. In Step 1, the control variable (team size) was not significantly correlated with behavior towards technology use (see Table 6). In Step 2, team climate for innovation was associated with quality performance (β=.64, p<.001), delivery performance (β=.66, p<.001), and cost performance (β=.95, p<.001), but insignificantly correlated with technology performance (β=.24, p>.05), therefore H5a, H5b, H5c were supported, and H5d was rejected.

Discussion

Creativity can be described as both the result and the process of producing creative outcomes; individuals need to first engage in certain process that could help them become more creative (Zhou & Shalley, 2008). Based on this proposition, the present study develops a research framework for further investigation. We proposed that creativity can be motivated through both intrinsic and extrinsic motivation and creativity can also be enhanced by cross level effect. Besides, employees with a high level of creativity can achieve a higher level of work performance. At team level, the present study proposed that team climate for innovation affects different kinds of team performance.

In the R&D setting, the present study found that employee's creativity could positively affect work performance. The finding is consistent with Oldham and Cummings's (1996) result. Furthermore, creativity fully mediated the relationship between intrinsic and extrinsic motivation. The results support our proposition that creativity is a process of expressing voices to respond to the organizational action. Employees who demonstrate creative behavior in the workplace imply that they have a positive attitude toward the organization and they are willing to help the organization solve problems and make improvement. Organizational managers can observe employee creativity as a proxy to understand employees' loyalty to their job work environment.

Employees' workable creativity is significantly enhanced by the interaction between enjoyment and outward. The results support Amabile's (1996) proposition that intrinsic and

extrinsic motivation could synergistically improve creativity. As Vallerand, Pelletier, and Koestner (2008) said: "*we need to go beyond the focus of motivational quantity (i.e., high levels of motivation) and take into consideration of the quality of motivation (i.e., absence of self-determined forms of motivation, such as intrinsic motivation)".*

Results of HLM showed that workable creativity was influenced by the contextual variable (support for innovation). The present study enriches creativity literature in the cross-level analysis. Although social psychological theorists proposed that creativity is commonly held to engage from an interaction of the person and the situation (Hunter, Bedell, Mumford, 2007: 69), few studies had examined the contextual effects on creativity in a cross level situation.

At the team level, this study found that team climate for innovation affects three kinds of team performance: quality performance, delivery performance, and cost performance. Although West and Anderson (1996) had proved that team climate for innovation is a predictable construct to team innovation in health care setting, the current study does not clearly understand what kinds of team performance will be affected by team climate in other domains. Results of this study provide some evidence on the effect of team climate on different kind of team performance in the R&D setting.

Finally, there is a limitation but could be potential direction for future research. Through interaction effect testing and cross-level testing, the present study only found that workable creativity is influenced in the organizational context. The workable creativity is used to describe that employee who suggests new way to achieve existing goals without coming up with creative solutions to the problem. A possible explanation is that employees' novel creativity is self-motivated which cannot be affected by contextual factors. Evidence derived from team level analysis. The technical performance (patents) is not significantly correlated with team climate for innovation. The patent is a proxy variable to novel innovation, so team's novelty performance may not also be affected by contextual factors. However, this proposition still needs ample evidence to be examined.

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FIGURE 1
PLOT OF INTERACTION FOR WORKABLE CREATIVITY

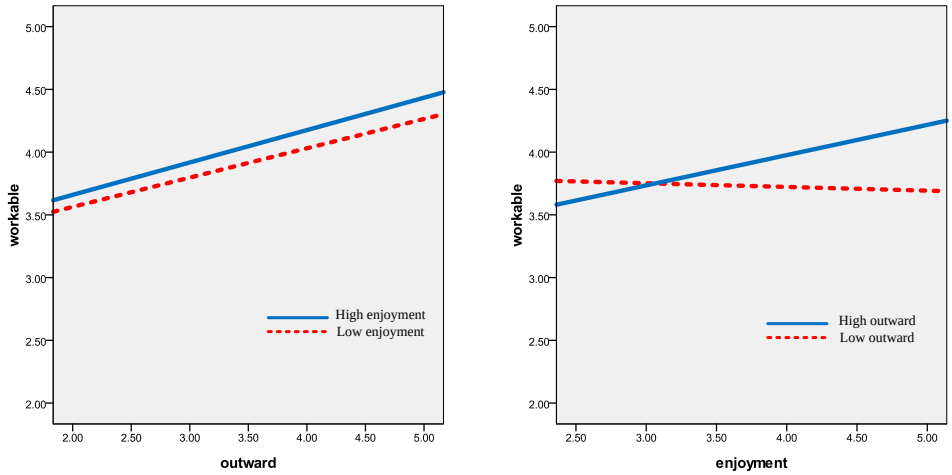

TABLE 1
MEANS, STANDARD DEVIATIONS, AND CORRELATION VALUE FOR EACH VARIABLES AT INDIVIDUAL LEVEL (N=237)

Variables	M	SD	1	2	3	4	5	6	7	8	9	10	11	12
1. Working experience in the domain	3.31	1.48	--											
2. Domain knowledge	3.25	1.54	.80**	--										
3. Intrinsic Motivation	3.86	.41	.05	.03	--									
4. Extrinsic Motivation	4.04	.45	-.01	-.02	.37**	--								
5. Averaged Creativity	3.82	.50	.21**	.20**	.37**	.38**	--							
6. Work performance	81.78	6.01	-.02	.05	.17**	.20**	.16*	--						
7. Enjoyment	3.79	.52	-.04	-.05	.71**	.32**	.12	.19**	--					
8. Challenge	3.92	.58	.12	.07	.77**	.24**	.42**	.07	.11	--				
9. Outward	3.72	.51	-.04	-.05	.31**	.87**	.27**	.13	.35**	.13	--			
10. Compensation	4.35	.52	.01	.01	.34**	.87**	.39**	.22**	.21**	.29**	.51**	--		
11. Workable	3.85	.55	.17**	.17*	.29**	.33**	.85**	.06	.07	.35**	.24**	.34**	--	
12. Novel	3.81	.54	.21**	.19**	.37**	.37**	.97**	.18**	.13	.41**	.27**	.38**	.70**	--

**p<.05, **p<.01, ***p<001*

TABLE 2
RESULTS OF MODERATING EFFECT TESTING FOR OVERALL CREATIVITY AND WORKABLE CREATIVITY

Variable	Overall Creativity			Workable Creativity			Novel Creativity		
	Control	Step 1	Step 2	Control	Step 1	Step 2			
Working experience	.14	.09	.10	.10	.06	.05	.14	.09	.11
Domain knowledge	.09	.10	.09	.08	.10	.10	.08	.09	.08
Enjoyment		.00	-.01		-.03	-.03		.01	.01

Challenge		.32	.32***		.26***	.27***		.31***	.31***
Outward		.13	.12		.11	.10		.12	.12
Compensation		.23**	.25**		.21**	.22**		.22**	.24***
Enjoyment × Outward			.10			.16*			.06
Enjoyment × Compensation			.00			-.06			.03
Challenge ×Outward			-.03			.00			-.04
Challenge × Compensation			.03			-.04			.06
R^2	.04	.30	.31	.03	.21	.23	.044	.283	.293
Adjusted R^2	.03	.28	.28	.02	.19	.20	.036	.264	.261
ΔR^2	.05	.25	.01	.03	.18	.02	.044	.239	.010
F	5.67**	16.22***	10.07***	.37*	10.26***	6.78***	5.42***	15.08***	9.31***

p<.05;p<.01; ***p<.001*

TABLE 3
RESULTS OF CROSS LEVEL ANALYSIS USING HIERARCHICAL LINEAR MODELING

Model	Parameter estimates						
	γ_{00}	γ_{01}	γ_{02}	γ_{03}	γ_{04}	σ^2	τ_{00}
Model 1: One-way ANOVA L1: novel = $\beta_{0j} + r_{ij}$ L2: $\beta_{0j} = \gamma_{00} + U_{0j}$	3.81**					0.30	0.00
Model 2a: Intercepts as outcomes[a] L1: novel = $\beta_{0j} + \beta_{1j}$(ex2)+ β_{2j}(ex4) + r_{ij} L2: $\beta_{0j} = \gamma_{00} + \gamma_{01}$(av_envi)+ U_{0j} $\beta_{1j} = \gamma_{10} + U_{1j}$ $\beta_{2j} = \gamma_{20} + U_{2j}$	1.32	0.39*				0.26	0.31*
Model 2b: Intercepts as outcomes[a] L1: novel = $\beta_{0j} + \beta_{1j}$(ex2)+ β_{2j}(ex4) + r_{ij} L2: $\beta_{0j} = \gamma_{00} + \gamma_{01}$(av_vs)+ γ_{02}(av_ps) + γ_{03}(av_sp)+ γ_{04}(av_to)+ U_{0j} $\beta_{1j} = \gamma_{10} + U_{1j}$ $\beta_{2j} = \gamma_{20} + U_{2j}$	1.99**	0.00	0.22	0.67**	-0.69**	0.25	0.38**
Model 3: One-way ANOVA L1: workable = $\beta_{0j} + r_{ij}$ L2: $\beta_{0j} = \gamma_{00} + U_{0j}$	3.86**					0.30	0.00
Model 4a: Intercepts as outcomes[a] L1: workable = $\beta_{0j} + \beta_{1j}$(ex2)+ β_{2j}(ex4) + r_{ij} L2: $\beta_{0j} = \gamma_{00} + \gamma_{01}$(av_envi)+ U_{0j} $\beta_{1j} = \gamma_{10} + U_{1j}$ $\beta_{2j} = \gamma_{20} + U_{2j}$	2.39**	0.15				0.27	0.17
Model 4b: Intercepts as outcomes[a] L1: workable = $\beta_{0j} + \beta_{1j}$(ex2)+ β_{2j}(ex4) + r_{ij} L2: $\beta_{0j} = \gamma_{00} + \gamma_{01}$(av_vs)+ γ_{02}(av_ps) + γ_{03}(av_sp)+ γ_{04}(av_to)+ U_{0j} $\beta_{1j} = \gamma_{10} + U_{1j}$ $\beta_{2j} = \gamma_{20} + U_{2j}$	2.98**	-0.38	0.04	0.82*	-0.40	0.27	0.20

[a]ex2 and ex4 entered as control variables in level 1.
*$P < 0.05$; **$P < 0.01$

TABLE 4
MEANS, STANDARD DEVIATIONS, AND CORRELATION VALUE FOR EACH VARIABLES TEAM LEVEL (N=20)

Variables	Mean	SD	ICC	r_{wg}	1	2	3	4	5	6	7	8	9	10
1. Team size	11.85	1.90	--	--	-	.								
2. Vision	3.59	.09	.11	.97	.01	-								
3. Participative safety	3.81	.19	.13	.96	-.26	.53*	-							
4. Support for innovation	3.80	.20	.09	.95	-.10	.52*	.69**	-						
5. Task orientation	3.71	.20	.04	.95	-.41	.39	.91**	.72**	-					
6. Team climate	3.72	.15	--	--	-.27	.55*	.94**	.85**	.95**	-				
7. Quality per.	80.25	6.17	--	--	-.17	.57**	.49*	.67**	.52*	.64**	-			
8. Delivery per.	80.50	8.26	--	--	.00	.46*	.40	.71**	.48*	.60**	.85**	-		
9. Cost per.	83.75	6.46	--	--	.02	.40	.72**	.88**	.78**	.87**	.74**	.75**	-	
10. Technology per.	77.89	6.73	--	--	.00	.24	-.41	-.24	-.28	-.28	.21	.09	-.19	-

**p<.05, **p<.01, ***p< 001*

TABLE 5
RESULTS OF HIERARCHICAL REGRESSION ANALYSES

Variables	Quality		Delivery		Cost		Technology	
	Step1	Step 2	Step1	Step 2	Step1	Step 2	Step1	Step 2
Control variable : Team size	-.172	.007.	.005	.187	.030	.290**	-.037	-.104
Team Climate for innovation		.644***		.657**		.95***		.241
R^2	.029	.412	.001	.399	.001	.839	.001	.055
Adjusted R^2	-.022	.346	-.053	.332	-.052	.821	-.051	-.050
ΔR^2	.029	.382	.001	.399	.001	.838	.001	-.054
F	.577	6.301**	.001	5.97**	.014	46.9***	.026	.525***

****p<.001*