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Relationship between Entrepreneurial Leadership and Innovative Behavior: The Mediating Effect of Entrepreneurial Self-Efficacy and the Moderating Effect of Openness to Experience and Extraversion

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Abstract: This study investigated the relationships between entrepreneurial leadership and innovative behavior in 224 dyads of technological supervisors and subordinates from military arsenals of Materiel Production Center, Armament Bureau and Ministry of National Defense. The results indicated that entrepreneurial leadership positively influenced innovative behavior through the mediating effect of entrepreneurial self-efficacy; moreover, the effect of entrepreneurial self-efficacy on innovative behavior was moderated by openness to experience and extraversion, such that lower openness to experience and extraversion exhibited stronger positive effect of entrepreneurial self-efficacy on innovative behavior. The directions for further research and implications are discussed in the conclusion.

Key words: Entrepreneurial leadership, entrepreneurial self-efficacy, openness to experience, extraversion, mediating effect, moderating effect

INTRODUCTION

In the past several decades, western types of managerial styles have been widely evaluated and discussed by academicians and researchers. In view of globalization, informational technology and competition, middle-sized and small enterprise have been invested in and managed by entrepreneurs. The owner-managed business is arguably, even more than the corporate business, dependent on most decisions being made by the entrepreneur personally. Some institutions may need more than they currently have, such as government agencies, labor unions, universities and schools, hospitals, community and charitable organizations, professional and trade associations and the like all of whom need to be entrepreneurial and innovative fully as much as any business does.

Entrepreneurship is a distinct feature whether of an individual or of an organization. It is not a personality trait. People who need certainty are unlikely to make good entrepreneurs. But such people are unlikely to do well in other activities as well; in politics, for instance, or in command positions in a military service (Drucker, 1985). In all such positions, decision making must be done; what's more, the essence of any decision is uncertainty. Those

who can deal with decision making under uncertain circumstances can learn to be an entrepreneur and carry out entrepreneurship. As a result, entrepreneurship is a behavior rather than a personality trait. Moreover, Drucker (1985) also suggested that innovation is the specific instrument of entrepreneurship. In other words, entrepreneurial activities can provide resources with a new capacity to improve wealth. As mentioned above, whether in a modern business or non-business environment, entrepreneurship and innovation are extensively seen as key sources of economic growth and profits increase (Drucker, 2004). Van de Ven (1986) indicated that innovation and entrepreneurship played important roles for social and economic development. Certainly, entrepreneurs are involved in creating new businesses irrespective of high levels of uncertainty and risk. The important role of entrepreneurial activity for translation of technological and organizational innovation into new and more effective products and services is well known (Schumpeter, 1934). As above mentioned, indeed, it can be seen that entrepreneurship is associated with innovative behavior.

In current scholarly debate (Block, 1995; Costa and McCrae, 1995; Hogan and Roberts, 1996; Ones and Viswesvaran, 1996), personality has had a major influence

on research into the relationship between personality and organizational behavior, which is extensively used and cited (Barrick and Mount, 1993; Mount and Barrick, 1995; Wiggins and Trapnell, 1997). Also, personality variables may have an important role to perform in developing theories about the entrepreneurial process in such areas as entrepreneurial intentions (Grant, 1996; Zhao *et al.*, 2005). Chen *et al.* (1998) also found support for a positive relationship between entrepreneurial self-efficacy and entrepreneurial intentions with a sample of 265 MBA students. As stated by Social-Cognitive Theory (SCT; Bandura, 1986), self-efficacy is described as a symbol of a central mechanism of personal behavior. It is thought to influence not only one's level of effort and persistence on a particular task but also one's very choice of activities and behavioral setting, such as innovative behavior. However, as far as we are concerned, researchers have not examined how personality traits may moderate an individual's self-efficacy in organizations.

ENTREPRENEURIAL LEADERSHIP, ENTREPRENEURIAL SELF-EFFICACY AND INNOVATIVE BEHAVIOR

Recent years have witnessed growth in the research effort devoted to entrepreneurship. Terms such as intrapreneuring (Pinchot, 1985), intrapreneurship (Hisrich and Peters, 1998; Antoncic and Hisrich, 2000), entrepreneurial traits (Baum and Locke, 2004), entrepreneurial intentions (Zhao *et al.*, 2005), key components and implications of entrepreneurship (Ma and Tan, 2006), innovations and entrepreneurship (Dew and Sarasvathy, 2007) have been used to describe the phenomenon of entrepreneurship. Drucker (1993) suggests that innovation and entrepreneurship can be organized-are in need of being organized-as systematic work. Knight (1997) argued that entrepreneurship refers to the pursuit of creative or novel solutions to challenges confronting the firm, including the development or enhancement of products and services, as well as new administrative techniques and technologies for performing organizational functions. Furthermore, Antoncic and Hisrich (2003) suggested that corporate entrepreneurship was defined as entrepreneurial activities that occur within an existing organization. Accordingly, it referred not only to the creation of new business ventures, but also to other innovative activities and orientations. Moreover, Ma and Tan (2006) suggested that entrepreneurship is defined as the process in which pioneers, innovators or champions of innovation, immersed in and guided by the creativity-oriented perspective, engage in the practice of creation and innovation driven activities which lead to a certain level

of performance as indicated by the realized creation and innovation. Such attributions of entrepreneurship should lead to increased innovation for organizational profits. Entrepreneurial leadership involves a process whereby intentional influence is exerted by one person, who embraces entrepreneurship, over other people to guide and facilitate activities and relationships in a group or organization.

The other important dependent variable is innovation behavior. One way for organizations to become more innovative is to take advantage of their employees' ability to innovate. Employees can help to improve performance through their ability to generate novel ideas and use these for new and better products, services and work processes. Furthermore, innovation has to do with the production or adoption of useful ideas and idea implementation (Kanter, 1988; Van de Ven, 1986). In sum, individual innovation begins with problem recognition and the generation of ideas or solutions, either novel or adopted.

Our research question is narrowly focused not on the impact of entrepreneurship on innovative behavior, especially the relationship between supervisors or managers and employees, but on factors that possibly affect innovative behavior, such as the individual's self-efficacy. Chen and Bliese (2002) argued several key potential predictors of self-efficacy; especially leadership in an organizational setting is likely to be an important determinant of employee motivation. Furthermore, we suggest that entrepreneurial leadership may enhance an individual's self-efficacy. Entrepreneurial leaders communicate a high level of spirit, such as enthusiasm, positivity, innovation and adventure. Miner (1990, 1993) identified five role prescriptions that characterize the task system of entrepreneurial leaders: self-achievement; avoiding risks; feedback of results; personal innovation; and planning for the future. This spirit on the part of leaders may have a paragon effect on members' own self-efficacy. Consequently, we proposed that an employee's perception of entrepreneurial leadership to be positively related to their entrepreneurial self-efficacy.

In previous research, Boyd and Vozikis (1994) developed a theoretical model in which self-efficacy was proposed as a critical antecedent of entrepreneurial intention and behavior. The efficacy beliefs, which are intentions, are influenced by different sources of information that are more or less convincing depending on a person's cultural values. Intentionality is embedded in socio-psychological theories of behavior; an intention is a demonstration of a future itinerary of action to be performed, it is not simply an expectation of future actions but a proactive commitment to bringing them about (Bandura, 2001). Intentions are a symbol of the belief that an individual will perform certain behavior (Urban, 2006).

Boyd and Vozikis (1994) proposed entrepreneurial self-efficacy as “an exploratory variable in determining both the strength of entrepreneurial intentions and likelihood that those intentions will result in entrepreneurial actions.” Also, Chen *et al.* (1998) suggest that entrepreneurial self-efficacy should be defined as an individual’s confidence in his or her ability to successfully perform entrepreneurial roles and tasks. There have been widespread discussions of self-efficacy and its implication for management and entrepreneurship (Gist, 1987; Boyd and Vozikis, 1994; Wood and Bandura, 1989; Chen *et al.*, 1998).

Chen *et al.* (1998) examined the positive relationship between entrepreneurial self-efficacy and entrepreneurial intentions with a sample of students. In addition, Zhao *et al.* (2005) continued (Chen *et al.*, 1998) research to find that entrepreneurial self-efficacy was positively related to entrepreneurial intention. Intentions represent the belief that one will perform certain behavior (Urban, 2006), such as innovative behavior in this study. Furthermore, we intend to examine that employees perform the degree of innovative behavior after perceiving entrepreneurial self-efficacy in the workplace. Based on as mentioned, we propose the subsequent hypothesis:

- **Hypothesis 1:** Entrepreneurial leadership will positively influence innovative behavior through the mediating effect of entrepreneurial self-efficacy

Openness to experience as a moderator: According to social learning theory (Bandura, 1986), manifestation of individual behavior is influenced by interactions among belief, behavior and environment. On the interactive process, an individual’s self-efficacy plays a critical role to affect the choice of mission, diligence and insistence. However, researchers have not examined whether personality has an impact on an individual’s self-efficacy. This study adopted an interactional approach to a subordinate’s innovative behavior by investigating the interactive effects of a subordinate’s self-efficacy and personality traits that have not been examined in combination in past research.

We predicted that in work environments, openness to experience and extraversion of Big Five by Costa and McCrae (1992), would moderate the relationship between a subordinate’s self-efficacy and innovative behavior. Openness to Experience is a personality dimension that characterizes someone who is intellectually curious and tends to seek new experiences and explore novel ideas, especially aspects of intelligence related to creativity, such as divergent thinking (McCrae, 1987). Also, this dimension describes the extent to which individuals are

broad-minded, imaginative, sensitive to aesthetics, curious, independent thinkers and amenable to new ideas, experiences and unconventional perspectives (Costa and McCrae, 1992; McCrae, 1996). According to Costa and McCrae (1997), open individuals are highly motivated to actively seek out new and varied experiences. We proposed that someone high on openness can be illustrated as creative, innovative, imaginative, reflective and untraditional. Instead, someone low on openness can be typified as conventional, narrow in interests and non-analytical.

As said by SCT (Bandura, 1986), self-efficacy is thought to influence not only one’s level of effort and persistence on a specific task but one’s very choice of activities and behavioral settings. High self-efficacy expectations regarding performance in a specific behavioral setting lead individuals to approach that setting, whereas low self-efficacy expectations lead individuals to avoid that setting (Wood and Bandura, 1989). However, for someone low on openness to experience, we propose that the relationship between individual entrepreneurial self-efficacy and innovative behavior should be strongly correlated, because someone high on openness to experience should be able to perform well at their jobs notwithstanding the quality of the relationship between individual entrepreneurial self-efficacy and his (or her) innovative behavior. In contrast, employees high on openness to experience are in an apparently insecure condition in which their personalities do not correspond with their desires to seek divergent thinking to help them adapt to their roles of their work setting. We therefore propose that for someone low on openness, individual innovative behavior will be related to entrepreneurial self-efficacy such that the higher the individual’s entrepreneurial self-efficacy, the higher his (or her) innovative behavior. As such, we developed the following hypothesis:

- **Hypothesis 2:** The positive direct effect of entrepreneurial self-efficacy on innovative behavior is moderated by openness to experience. The higher the openness to experience, the weaker the positive association between entrepreneurial self-efficacy and innovative behavior are

Extraversion as a moderator: Our exploration of literature for potential moderators identified another key personality variable: extraversion. Extraversion has surfaced as an individual difference variable that is durable and wields an impact on an extensive range of employee behaviors. Barrick and Mount (1991) deduced that being extraverted was beneficial for people in managerial jobs but less essential for people with other professions, for example

secretaries, accountants, production workers, engineers and architects. Recently, research has shown that extraversion is a valid predictor across criterion types for managers (Bauer *et al.*, 2006). They further showed the empirical result that extraversion was viewed as a moderator of the relationship between leader-member exchange and performance.

Personality theory and research have revealed that people high on extraversion are illustrated as searching for interaction opportunities with others, normally liking other people, being gregarious, assertive, dominant, energetic, active, talkative and enthusiastic (Costa and McCrae, 1992) and being high in reward sensitivity. Depue and Collins (1999) defined reward sensitivity as the tendency to experience “an incentive motivational state that facilitates and guides approach behavior to a goal.” Extraversion is positively related to interest in enterprising occupations (Coata *et al.*, 1984). Entrepreneurs must interrelate with a varied range of ingredients, as well as venture capitalists, partners, employees and customers. Although, extraversion may be a valuable trait for entrepreneurs or even managerial work, we look forward to extraversion to be more important for employees. That is, individuals who were high on extraversion (extraverts) are likely to be cheerful, to like people and large crowds and seek excitement and inspiration. Instead, individuals who were low on extraversion (introverts) prefer to spend more time alone and are illustrated as reserved, quiet and independent.

Self-efficacy perceptions are individuals’ extents of confidence to achieve organizational goals. Individuals perceiving higher self-efficacy have the capability to successfully perform specific tasks and related behaviors (Saks, 1995). Similarly, self-efficacy involves a generative capability in which one must organize cognitive, social and behavior sub-skills into integrated courses of action (Bandura, 1986) and extraverts desire social interaction and enjoy expressing actively. In essence, the preferences and behavioral tendencies that characterize extraverts parallel the qualities of both high self-efficacy and performing innovative behavior. Therefore, for extraverts, we suggest that entrepreneurial self-efficacy and innovative behavior should be weakly interrelated, because extraverts should be able to perform well at their jobs regardless of the quality of the relationship between a subordinate’s entrepreneurial self-efficacy and his (or her) innovative behavior. On the foundation of the theory and research discussed above, we recommend the following hypothesis:

- **Hypothesis 3:** The positive direct effect of entrepreneurial self-efficacy on innovative behavior is moderated by extraversion. The higher the

extraversion, the weaker the positive association between entrepreneurial self-efficacy and innovative behavior are

MATERIALS AND METHODS

Date and procedure: The heterogeneous sample for this study is comprised of supervisors and subordinates from five arsenals of the Materiel Production Center (MPC), Armament Bureau (AB) and Ministry of National Defense (MND). Participants are targeted through contacts of technological supervisors and subordinates at the arsenal. Hence, this study adopted a questionnaire that regarded dyads of supervisors and subordinates as subjects. All questions were answered on a 6-point Likert scale (ranging from 1 = very strongly disagree to 6 = very strongly agree). Questionnaires were sent to potential participants through the mail system of Chunghwa Post. The tools contained one “subordinate questionnaire” and one “supervisor questionnaire.” The former was completed by subordinate and included questions on his (or her) supervisor’s leadership behavior, individual self-efficacy, personal traits and background information. At the same time, the supervisor filled out the latter questionnaire asking for descriptions of rated subordinates’ innovative behavior and background information. Importantly, each envelope included an introduction letter from the author. The letter explained that participation in this study was strictly voluntary and confidentiality would be maintained. Respondents were guaranteed anonymity and provided with a stamped envelope pre-addressed to author. The language in which the questionnaire was originally written was English. However, because the conventional language of Taiwan residents is Chinese, we translated the contents of the surveys distributed in Taiwan into Chinese. To strengthen the representative reliability of samples and confirm the translated version was not ambiguous or difficult to understand. The questionnaire was adapted to a pretest with dyads of 25 supervisors and 25 employees in the military organization. Consequently, each Cronbach’s α of a variable has reached at least 0.70. As a result, this procedure did not lead to major changes to any of the items.

MEASURE

Entrepreneurial leadership: Entrepreneurial leadership was measure with a 7 items out of 14 items by Knight (1997). Each supervisor was rated by their direct report, who was the study participant. This dimension was measured to the degree to which subordinate perceived supervisor’s entrepreneurial leadership. It showed that the higher the scores, the higher the degree to subordinate’s perception.

Entrepreneurial self-efficacy: We used 15 items which was originated in reference to the 15 roles and tasks identified (Chen *et al.*, 1998) earlier to measure ESE. Fifteen items loaded on the four factors, including innovation, management, risk-taking and financial control. This dimension was measured to the degree to which subordinate performed entrepreneurial self-efficacy. It showed that the higher the scores, the stronger the degree to subordinate's entrepreneurial self-efficacy.

Innovative behavior: We measured this variable by summing responses to a 6-item scale, which was completed by each supervisor for one of his (or her) subordinates, adapted from Scott and Bruce (1994). This dimension was measured to the degree to which subordinate emerged innovative behavior. It showed that the higher the scores, the stronger the degree to subordinate's innovative behavior. Consequently, all items reached over 4.

Openness to experience: We assessed openness to experience using 10 items developed by Big Five Inventory (BFI) (John and Srivastava, 1999). This dimension was measured to the degree to which subordinate emerged openness to experience. It showed that the higher the scores, the higher the degree to subordinate's openness to experience. Consequently, in addition to item 7, 9 and 10, other items reached over .4.

Extraversion: We measured extraversion using 12 items developed by NEO-Five Inventory (NEO-FFI; Costa and McCrae, 1992). This dimension was measured to the degree to which subordinate emerged openness to experience. It showed that the higher the scores, the higher the degree to subordinate's openness to experience. Consequently, in addition to items 6, 9 and 12, other items reached over 4. Then, those matched items were applied to follow-up data analysis.

Control variables: We identify several potentially relevant control variables, including gender, age, education, seniority. Gender and age have been shown to relate to executive relationship formation (Lyness and Thompson, 2000). Also, Baer and Oldham (2006) suggested that education has positive effects on creativity. We therefore include these potentially relevant variables as controls in our hypothesis tests for reducing the likelihood that other variables likely to affect self-efficacy and innovative behavior would confound the relations examined in this study. In addition, research shows that the amount of interaction between supervisors and subordinates is directly related to entrepreneurial

leadership and innovative behavior. In view of the above, we ask supervisors and subordinates to report time that they got along with each other.

RESULTS

Correlations: To examine the potential influence of control variables in the study, we examined the correlation matrix. The means, standard deviation and correlations among all the variables were shown in Table 1. Coefficient alphas for the overall sample are also presented. Regarding the related coefficients, in control variables, subordinates' gender had negative correlation with education ($r = -0.27, p < 0.01$). Also, subordinates' age had negative correlation with education ($r = -0.15, p < 0.05$) but had significant positive relation to time with Supervisor ($r = 0.24, p < 0.01$). And then, among control, independent and dependent variables, only the subordinates' gender had negative correlations with entrepreneurial self-efficacy ($r = -0.22, p < 0.01$), innovative behavior ($r = -0.28, p < 0.01$), openness to experience ($r = -0.17, p < 0.01$) and extraversion ($r = -0.15, p < 0.05$). That is, it showed that the male has more innovative behavior, openness to experience, and extraversion than female. In addition, the correlations among entrepreneurial leadership, entrepreneurial self-efficacy, innovative behavior, openness to experience and extraversion were positively related to each other between $r = 0.15 (p < 0.05)$ and $r = 0.74 (p < 0.01)$.

Mediating effect of entrepreneurial self-efficacy: To test Hypothesis 1, we used four steps to testing mediation by Baron and Kenny (1986). Therefore, Table 2 presented the results for the direct effect of entrepreneurial leadership on entrepreneurial self-efficacy and innovative behavior and the effect of entrepreneurial self-efficacy on innovative behavior. Entrepreneurial leadership was significantly related to entrepreneurial self-efficacy and, separately, to innovative behavior. When we included both entrepreneurial leadership and entrepreneurial self-efficacy as predictors of innovative behavior, only entrepreneurial self-efficacy had a statistically significant effect ($\beta = 0.69, p < 0.01$). The beta for entrepreneurial leadership on innovative behavior, with entrepreneurial self-efficacy controlled for, was not significant ($\beta = 0.08$). These results indicate that entrepreneurial self-efficacy mediated the relationship between entrepreneurial leadership and innovative behavior. These findings support Hypothesis 1.

Moderating effect of openness to experience: Moderated regression was used to test the interaction predicted in

Table 1: Contrast means, standard deviation and correlation among study

Variables	M	SD	1	2	3	4	5	6	7	8	9
Gender	0.68	0.47	-								
Age	4.63	1.54	-0.09	-							
Education	3.62	0.94	-0.27**	-0.15*	-						
Tenure with supervisor	2.53	1.31	-0.05	-0.24**	0.01	-					
Entrepreneurial leadership	3.61	0.86	-0.09	-0.05	0.00	0.03	(0.80)				
Entrepreneurial self-efficacy	4.39	0.59	-0.22**	0.06	0.06	0.10	0.30**	(0.91)			
Innovative behavior	4.28	0.73	-0.28**	0.06	0.09	0.11	0.30**	0.74**	(0.91)		
Openness to Experience	4.30	0.66	-0.17**	0.00	0.07	0.08	0.15*	0.56**	0.61**	(0.88)	
Extraversion	4.44	0.60	-0.15*	-0.00	0.05	0.04	0.19**	0.41**	0.37**	.50**	(0.83)

N = 227, *p<0.05, **p<0.01

Table 2: Regression analysis entrepreneurial leadership entrepreneurial self-efficacy innovative behavior

	Entrepreneurial self-efficacy	Innovative behavior	Innovative behavior	Innovative behavior
Control variables				
Gender		0.18**	0.24**	0.12*
Age		0.04	0.03	0.00
Education		0.02	0.03	0.01
Tenure with supervisor		0.07	0.08	0.03
Mediator				
Entrepreneurial self-efficacy				0.71**
Independent				
Entrepreneurial leadership	0.28**		0.28**	0.8
R ²	0.14**		0.16**	0.56**

N = 224, *p<0.05, **p<0.01, ***p<0.001

Table 3: Regression analysis entrepreneurial self-efficacy openness to experience innovative behavior

Variables	Innovative behavior			
	Step 1	Step 2	Step 3	Step 4
Control variables				
Gender	0.27**	0.12*	0.10*	0.11*
Age	0.01	-0.00	0.01	0.00
Education	0.01	0.01	0.01	0.00
Tenure with supervisor	0.09	0.03	0.02	0.02
Independent				
Entrepreneurial self-efficacy		0.71**	0.56**	0.53**
Mediator				
Openness to experience			0.28**	0.25**
Interaction term				
Entrepreneurial self-efficacy × Openness to experience				-0.10*
R ²	0.09**	0.56**	0.61**	0.62*
ΔR ²	0.9	0.47	0.05	0.01
F	5.10	235.44**	30.51**	4.51*

N = 224, *p<0.05, **p<0.01, ***p<0.001

Hypothesis 2 (Table 3). The results show that the entrepreneurial self-efficacy × openness to experience was significantly negative related to innovative behavior ($\beta = -0.10$, $\Delta R^2 = 0.01$, $p < 0.05$). Also, it explained that the relationship between entrepreneurial self-efficacy and innovative behavior was stronger for subordinates with low openness to experience than those with high openness to experience. Further, the interaction was plotted with cut values of one standard deviation below the mean and one standard deviation above the mean on moderator variable. The plot revealed that the positive effect of entrepreneurial self-efficacy on innovative behavior was stronger among subordinates

who had low openness to experience traits (Fig. 1). This plot was consistent with Hypothesis 2.

Moderating effect of extraversion: Moderated regression was used to test the interaction predicted in Hypothesis 6 (Table 4). The results show that the entrepreneurial self-efficacy × extraversion was significantly negative related to innovative behavior ($\beta = -0.19$, $\Delta R^2 = 0.592$, $p < 0.01$). Also, it explained that the relationship between entrepreneurial self-efficacy and innovative behavior was stronger for subordinates with low extraversion than those with high extraversion. Further, the interaction was plotted with cut values of one standard deviation below

Table 4: Regression analysis entrepreneurial self-efficacy, extraversion, innovative behavior

Variables	Innovative behavior			
	Step 1	Step 2	Step 3	Step 4
Control variables				
Gender	0.27**	0.17**	0.11*	0.12*
Age	0.01	-0.00	0.01	-0.00
Education	0.01	0.01	0.01	0.01
Tenure with supervisor	0.09	-0.03	0.03	0.01
Independent				
Entrepreneurial self-efficacy		0.71**	0.68**	0.62**
Mediator				
Openness to experience			0.07	0.04
Interaction term				
Entrepreneurial self-efficacy × Extraversion				-0.19**
R ²	0.85**	0.56**	0.564	0.592**
ΔR ²		0.475	0.003	0.028
F	5.10**	235.44**	1.72	14.91**

N = 224, *p<0.05, **p<0.01, ***p<0.001

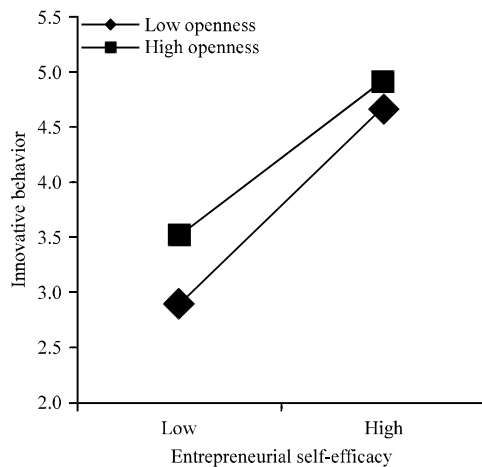


Fig. 1: Innovative behavior predicted by the entrepreneurial self-efficacy and openness to experience interaction

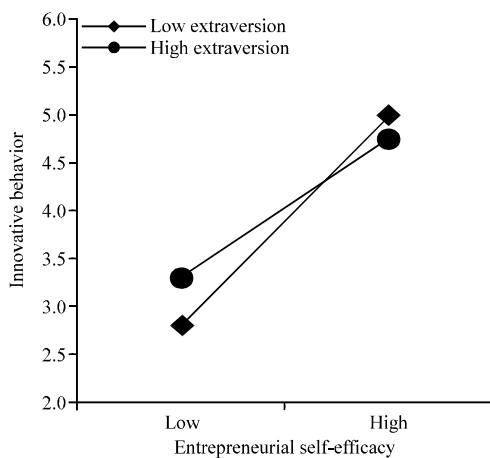


Fig. 2: Innovative behavior predicted by the entrepreneurial self-efficacy and extraversion interaction

the mean and one standard deviation above the mean on moderator variable. The plot revealed that the positive effect of entrepreneurial self-efficacy on innovative behavior was stronger among subordinates who had low extraversion traits (Fig. 2). This plot was consistent with Hypothesis 3. Hence, Hypothesis 3 was supported.

DISCUSSION

This study explored how openness to experience and, separately, extraversion influences subordinate approaches to entrepreneurial self-efficacy and how these approaches, in turn, influence innovative behavior. As in previous studies examining (Drucker 1993; Dew and Sarasvathy, 2007), we found that supervisor's entrepreneurial leadership was associated with subordinate innovative behavior in five arsenals of MPC, AB, MND. This relationship was mediated by entrepreneurial self-efficacy. Entrepreneurial leadership influenced entrepreneurial self-efficacy and consequently, innovative behavior to a greater extent among individuals that were low in openness to experience and, separately, low in extraversion.

Theoretical and practical implications: Entrepreneurial leadership was significantly related to entrepreneurial self-efficacy and had the largest direct effect on innovative behavior in our model. This finding provides empirical support for ideas that supervisor's entrepreneurial leadership can have a positive impact on subordinate entrepreneurial self-efficacy to initiate innovative behavior. Prior research indicated that leadership was related directly to self-efficacy at different organizational levels (Chen and Bliese, 2002). High self-efficacy expectations regarding performance in a specific behavioral setting lead individuals to approach that setting (Wood and Bandura, 1989). Our current findings support and extend these views but at

the same time examine possible further reasoning. Inclusion of this cognitive appraisal of the task environment in entrepreneurship research may help to explain the finding of the intermediate impact we report here and is thus an important direction for future research.

Our study reveals that the positive effect of entrepreneurial self-efficacy on innovative behavior was stronger among subordinates who had a low openness to experience trait. In other words, low openness to experience subordinates can perform higher innovative behavior especially when they have higher confidence capability. This prescription of the association between low openness to experience and high innovative behavior is consistent with the idea that previous research indicated that openness to experience was positively related to creative behavior (George and Zhou, 2001) and furthermore, objective conditions in the workplace were substantially related to creativity by the moderating effect of openness to experience (Baer and Oldham, 2006). As for extraversion, although, unrelated prior research was presented for examining the interrelation on creativity or innovation, this study shows that low extraversion subordinates can perform higher innovative behavior when they have higher entrepreneurial self-efficacy in particular. Consequently, this is consistent with Bauer *et al.* (2006) findings showing that for individuals low in extraversion, there is a relationship between leader-member exchange and performance. Therefore, it would be helpful to expand the current study with future research that includes objective performance ratings or peer performance ratings.

The higher one's self-efficacy, the more likely one is to engage and persist in related behavior. Thus, efficacy beliefs, whether at the individual level or group level, are related to important individual and organizational outcomes. Specifically, these findings confirm the notion that leaders are focused on enhancing the performance of individual members. At higher or lower organizational levels, respectively they can best boost individual self-efficacy by clarifying the subordinate's work role or by providing sufficient socio-emotional support (Bliese and Castro, 2000). As a result, leaders can improve subordinate innovative behavior performance to create new and effective products and services for organization profits by displaying leadership that embraces entrepreneurship in uncertainty settings.

Our findings that individuals low on openness to experience had particularly strengthened their entrepreneurial self-efficacy and consequently, displayed higher innovative behavior when they perceived the leader as being entrepreneurial, suggests that leaders who

embraced characteristics of entrepreneurship may exert intentional influence over them to guide and facilitate activities and relationships. Thus, if management is further interested in boosting innovative behavior, subordinates with being suitable degree of openness to experience might perceive their leader's behavior that enhances the self-efficacy as being entrepreneurial of those to perform innovative behavior. Next, management should consider assigning subordinates who are high on openness to experience to these conditions and encourage supervisors to support the innovative efforts of such subordinates.

This study also showed that the positive effect of individual entrepreneurial self-efficacy on performing innovative behavior is moderated by extraversion. The innovative behavior of individuals high on extraversion appeared unrelated to entrepreneurial self-efficacy, with extraverts performing at the same level regardless of their self-efficacy impact. Conversely, those individuals who were introverted and who were unable to embrace a high self-efficacy had lower innovative behavior. As a result, if management is further interested in boosting innovative behavior, subordinates with extraversion might perceive leader's behavior that enhance the self-efficacy as being entrepreneurial of those to perform innovative behavior. After that, it should consider assigning subordinates who are extraverts to these conditions and encourage supervisors to support the innovative efforts of such subordinates.

CONCLUSIONS AND IMPLICATIONS

One limitation of this study is that our sample only included military officers who are mainly in charge of producing, manufacturing, project planning, research and development and quality control in those units and it is not clear that our results generalize to other populations. Future research might make an attempt to test the ideas developed in this study across different samples and settings.

A second limitation was that the level of leader measured only included primary supervisors. Future researchers may wish to examine our study with senior or top leaders to see whether their sub-supervisors or subordinates' response to entrepreneurial leadership is also influenced by individual personality traits. Furthermore, analyses of longitudinal data on leadership behavior, personality traits and innovative behavior will provide greater confidence in causal inferences.

As armed workforces are simplified year by year, turning rapidly to diversity and military organizations become modernized, leaders face a pressing need to

express their behaviors to various followers. Our findings indicate that subordinates vary substantially in the degree to which they embrace entrepreneurial leadership and derive self-efficacy emerging from it and that individual personality traits, such as openness to experience and extraversion are significant constructs driving these distinctions. Also, above all, the proof of the sincerity and seriousness of a leader is uncompromising emphasis on integrity of character. For it is character through which leadership is exercised; it is character that sets the example and is imitated. Simply, leadership is not rank, privilege, titles, or money; it is responsibility. We further learn that not only does the supervisor need to assign properly qualified personnel for appropriate positions, but also top management must correctly appoint excellent personnel to senior positions because his or her character serves as the model for subordinates. As the proverb has it, "Trees die from the top".

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