Innovative Cognitive Style, Proactive Personality and Employee Creativity: The Moderating Effects of Work Discretion and Time Pressure

Yu-Yu Chang, Ming-Huei Chen
National Chung Hsing University, Taiwan

Abstract—This paper aims to examine the influence of innovative cognitive style, proactive personality and working conditions on employee creativity by taking an interactional perspective. Innovative cognitive style refers to individual's idiosyncrasy of thinking about and dealing with original idea, while proactive personality conceptualizes individual's strategic opportunity-seeking behaviors toward exploring novelty. Work discretion and time pressure, two critical contextual factors suggested to impact employee creativity in organizational literature, may also influence how individuals convert their innovative cognitive style and proactive personality into creativity. In an attempt to extend current understanding of creativity in organizations, this study examines the relationship between individual characteristics (innovativeness and proactiveness) and employee creativity, and how the relationship is moderated by work discretion and time pressure.

Hierarchical regression analysis was used to examine the proposed hypotheses for a sample of 344 middle-level managers in Taiwanese manufacturing companies, including R&D managers and marketing managers.

Results reveal that innovative cognitive style and proactive personality are positively related to employee creativity. Work discretion was found to enhance employee creativity while time pressure was found to constrain creativity. Our findings support the hypothesized moderating effects, indicating that employees will exhibit the highest level of creativity when they possess innovative cognitive style and proactive personality as well as performing tasks with high work discretion and less time pressure.

I. INTRODUCTION

Existing work has suggested that individual creativity is under the influence of both personal traits [1] and relevant environmental factors [2]. Although in the literature there has been much effort to investigate the antecedents of employee creativity, the relationship between individual attributes, working conditions, and employee creativity has yet to be fully understood. Integrating both individual and contextual factors from the interactionist perspective of creativity [3], this study aims to explore the effects of innovative cognitive style and proactive personality on employee creativity and how the relationship is moderated by contextual working conditions of work discretion and time pressure.

In modern organizations the bureaucratic structure often exerts a constant pressure on employees to be methodical, prudent, disciplined and to attain an unusual degree of conformity [4], but a high level of conformity can stifle an individual's creative potential [5]. In his seminal work, Kirton [6] proposed the adaptive-innovative cognitive style, which divided individual cognition into adaptiveness and innovativeness. Specifically, the adaptive orientation makes individual behave in conformance with existing patterns of acting, but it also leads people to overlook the importance of creating new value and indentifying opportunities through breaking existing paradigms and doing things differently [6]. In contrast, the innovative cognitive style activates the individual tendency to break existing paradigms through divergent thinking [7], which was suggested as an indicator of the potential for creative problem solving [8]. Since innovative change by nature involves increased risk, uncertainty, and imprecision [9], an innovative employee is less conforming to rules, social norms, and accepted work patterns, thus having better chances to identify more creative ideas [7].

In addition to innovative cognitive style, proactive personality has been argued as another critical personal trait affecting individual creativity [10, 11]. Proactive personality has been suggested as a behavioral disposition that guides an individual, through a forward-looking perspective, to seek and create new opportunities not relating to present lines of thought in order to act ahead of competitors and shape the environment [12, 13, 14]. Innovative cognitive style and proactive personality both reflect an individual's strong tendency to advance beyond their counterparts in introducing novel ideas or methods, often involving radical changes and increased risks [6, 15]. The innovative cognitive style displays a person's individual ways of thinking about and dealing with original ideas, while the proactive personality conceptualizes an individual's actual strategic behaviors toward exploring novelty. Therefore, the proactive personality should be considered as a complementary factor to the cognitive style from the viewpoint of strategic behavior. Since innovative cognitive style has been proposed as a determinant of creativity [6], based on the reasoning mentioned above, the proactive personality must be also considered when investigating the relationship between personal cognitive traits and creativity. Further, since most empirical works on the effects of innovative cognitive style and proactive personality on individual creativity have been conducted in Western contexts, the first aim of this study is to replicate previous findings, extending the current evidence by examining this relationship in order to ascertain that the effects of the both individual dispositions are also effective in determining creativity in an East-Asian context.

The effects of environmental factors on employee creativity have drawn considerable attention in the literature [1, 2]. Organizational environment can determine and shape
the way employees perform their tasks as well as their behavioral disposition when dealing with work problems. Creativity, per se, is an interactive process with which individuals interact with and are affected by the working conditions and environmental climate [16]. In order to enrich existing knowledge about how the working environment affects employee creativity, the influences of two contextual factors, i.e. work discretion and time pressure, are included in this study. Work discretion has been identified as a decisive antecedent for employee creativity through stimulating interest, intrinsic motivation, and cognitive flexibility [17, 18], while time pressure has been found to limit creativity since it decreases employees’ intrinsic motivation and concentration necessary for creative outputs [19, 20].

As prior scholars have pointed out, investigating the interactions among personal and contextual characteristics is a potentially fruitful direction [1, 3]. Although much prior work has been done on both personal traits and contextual characteristics which may influence individual creativity, there are still many important questions about how those factors interact with each other and further determine employee creativity. To be more specific, an employee with innate creative potential may still fail to behave creatively without sufficient working resources, such as time or information. Therefore, in order to better understand creativity in organizations, most creativity scholars concern with the necessity of scrutinizing the interactive effects of individual differences and contextual working conditions [18, 21].

In this study we draw upon prior theory and empirical research into the nature of innovative cognitive style and proactive personality to provide a rationale and justification for investigating three related research questions. These are: (1) what is the relationship between innovative cognitive style and employee creativity; (2) what is the relationship between proactive personality and employee creativity; and (3) what is the role of “contextual fit” in explaining the relationship to creativity, that is, the extent to which the relationship of innovative cognitive style and proactive personality to creativity is contingent on the specific working conditions under which these processes occur. This study makes a contribution through incorporating proactive personality as a complementary individual trait to innovative cognitive style, and this inclusion can help capture the impact of employees’ personal attributes on their creativity. Furthermore, this examination of the interaction of individual disposition (innovative cognitive style and proactive personality) and contextual factors (work discretion and time pressure) also extends the current understanding of how to enhance employee creativity through appropriate working conditions.

II. THEORETICAL BACKGROUND AND HYPOTHESES

Drawing upon the literature on disposition-creativity relation, we first discuss how prior work defined creativity and suggest that innovative cognitive style and proactive personality may stimulate employee creativity. Both innovative cognitive style and proactive personality are expected to affect individuals’ creativity by influencing the extent to which they apply various strategies that may facilitate creative idea production. Specifically, the proactive personality fosters actual behaviors for seizing opportunities and shaping future trends, whereas the innovative cognitive style represents an individual tendency towards challenging conventional paradigms and bringing about radical changes. Working conditions have long been found to notably influence employee creativity and the literature on the influence of work discretion and time pressure is then reviewed. Finally, how these two contextual factors moderate the effects of innovative cognitive and proactive personality on employee creativity is discussed.

A. Employee creativity

Creativity, which has long been considered an important source of competitive strength for organizations [22], refers to the generation of novel and useful ideas concerning products, services, processes, and procedures [18, 23, 24]. In line with the componential theory of creativity [23], academic work has suggested that there are three key components determining creativity in the workplace: domain-relevant skills, creativity-relevant processes, and intrinsic motivations [2, 25, 26]. A large body of research has examined the possibility that individual traits and contextual characteristics can affect creativity through influencing the three key creative components [1].

The interactionist perspective of creativity in organizations, which indicates that creativity is a phenomenon at the individual level affected by both dispositional and contextual factors, has been widely acknowledged in organizational behavior literature [3]. Underpinned by interactional psychology [27, 28], scholars have reached a consensus that the interaction of an individual’s disposition and situational factors can more fully predict creative performance [1, 2, 5]. This study, based on the interactive perspective on creativity, not only attempts to explore the effects of both individual traits and contextual characteristics, but also addresses how these factors interact with each other to determine employee creativity.

B. Innovative cognitive style

In the work that first introduced adaption-innovation theory, Kirton [6] suggested that innovativeness is a cognitive style with which individuals tend to embrace novelty and be more willing to break patterns of presently accepted modes of thought in order to develop problem solutions. Previous work
has also indicated that individuals’ cognitive style may directly influence their creativity [3, 29]. More specifically, much effort has been made to examine the relationship between cognitive style and creative performance [30, 31, 32], revealing that individuals with higher innovative style are more creative than their counterparts who exhibit lower innovative style. Moreover, the research of Tierney, Farmer and Graen [33] showed that innovative cognitive style was indeed predictive of two indicators of employee creativity (supervisory ratings and number of research reports).

Innovative cognitive style has been regarded as a critical component of creativity-relevant processes [29], and has been suggested to better enable individuals to uncover original ideas since individuals with the innovative cognitive style are likely to challenge existing rules, paradigm and social norms [7]. The more the paradigm of a problem is treated as part of the problem, the more any solution is likely to be a breakthrough; Conversely, the less the status quo is challenged, the more any solution is likely to be mediocre [30]. A recent empirical study found that employees' innovative cognitive style may increase creative performance by supporting their feedback seeking behaviors [34]. Innovative cognitive style, which shapes an individual’s willingness to challenge uncertainty within certain bounds, is the fundamental mindset of being creative [21]. Therefore, the following hypothesis is proposed:

Hypothesis 1: Employees with innovative cognitive style are more creative.

C. Proactive personality

Bateman and Crant [12] defined proactive personality as a tendency to take personal initiatives across a range of activities and situations, effecting environmental change that differentiates people based on the extent to which they take action to influence their environments. Proactive individuals are relatively unconstrained by situational forces, so they identify opportunities, act on them, show initiative, and persevere until meaningful change occurs [35]. Development of creative ideas is based on mental breakthroughs evolving out of an intellectual process, requiring hard working, consistent focus and uninterrupted flow of thought [22]. A proactive individual is eager to gain insights into current trends and seize opportunities, resulting in more concentration on the task and better chance to produce creative ideas. A proactive personality makes an individual more curious about the future and the means to grasp opportunities. This curiosity is an important condition fostering the development of creative ideas [21].

Furthermore, in order to produce creative ideas, it is necessary for an employee to learn and acquire an abundance of factual knowledge and expertise in a given professional domain [29]. Proactive individuals are natural learners because they are inherently driven by a strong desire to anticipate the future [36]. Thus, individuals with a proactive personality are likely to possess high learning orientation, which is an effective channel for receiving new knowledge and useful information, thereby improving the domain-relevant skills necessary to produce creative ideas [37, 38]. As a result, proactive personality may provide individuals with inspiration regarding problems or opportunities that others in their own work units have not recognized [10].

Empirical studies have recognized the proactive personality’s beneficial effect on employee creativity. For instance, the proactive personality was found to be positively associated with an individual’s innovative behaviors such as developing new and creative ideas [39]. More recent research has revealed that proactive personality positively affects employee creativity since proactive individuals are more likely to engage in networking behavior and information exchange [10, 40, 41]. Thus, the arguments suggest the following hypothesis:

Hypothesis 2: Employees with proactive personality are more creative.

D. Work discretion

Work discretion has been defined as the degree to which a task provides substantial freedom, independence, and autonomy to individuals in determining the procedures to be used in carrying out the task [42]. Employees experience higher level of work discretion if they perceive that they have enough flexibility in task-related affairs. Kohn and Schooler [43] argued that more work autonomy and less routine imply higher decision latitude, which benefits creativity through improving an individual’s intellectual flexibility and openness to new experiences. In an interview-based study on R & D scientists’ creativity, Amabile and Gryskiewicz [44] found that the most influential environmental feature surrounding high-creativity events was freedom and autonomy. Similarly, an investigation on Dutch firms indicated the importance of work discretion on employees’ ability to develop new products [45]. It has been widely suggested that in order to be creative, individuals need freedom for them to play with ideas and expand the range of considerations and material from which a solution emerges (e.g. Amabile [23], Zhou [46]). Since fixed work procedures may affect the way an employee thinks about a problem and the knowledge structures that are subsequently activated, individuals with high work discretion to handle tasks in their own way would have more freedom to manipulate novel ideas and thus have higher levels of creativity than individuals with low work discretion [47]. Furthermore, work discretion has also been suggested to influence employee creativity due to its crucial role in affecting individual willingness to engage in creative actions [48].

According to cognitive evaluation theory, individuals will have high intrinsic motivation toward a task when they feel competent and self-determining for that task [49]. With work
discretion, employees perceive that they are supported and encouraged to take initiatives and to try new things, with little external pressure to achieve certain things in prescribed ways [21]. The more work discretion perceived, the higher employees' intrinsic motivation to creatively deal with tasks. Therefore, a better chance to bring about creative outcomes can be expected. Although the moderating role of work discretion in influencing employee creativity has been commonly acknowledged in prior empirical research, its direct effect has yet been found [46, 47]. Nevertheless, current understanding and conceptualization provide us with a strong theoretical foundation to hypothesize the direct effect of work discretion on employee creativity. Based on the rationale above, we propose:

**Hypothesis 3:** Employee-perceived work discretion is positively related to creativity.

### E. Time pressure

The presence of tight time deadlines is regarded as a constraint on creativity [1] and psychological studies have demonstrated that time availability is directly correlated to the exploration of alternative possibilities and creative ideas [2, 50]. It has thereby been argued that excessive work load will undermine creativity, especially if the time pressure is perceived as being imposed externally as a means of control [29]. Experience of high time pressure stifles individual creativity by reducing the extent to which employees engage in exploratory thinking and by causing them to rely on familiar algorithms when performing tasks [20, 51].

Drawing upon the rationale of cognitive evaluation theory [49], the intrinsic motivation required for creativity needs to be based on individuals’ perceived self-competence and self-determination in performing tasks. When employees sense themselves frequently working under time pressure or struggling to meet tight deadlines, their perception of self-competence and self-determination is impaired, and this is likely to result in reduced intrinsic motivation and creativity [19].

There have been, however, only a few studies to investigate the relationship between time pressure and employee creativity. One experimental study revealed that individuals working under a 10-minute time limit exhibited lower levels of creativity than those working under a 20-minute limit [52]. Similarly, the study of Andrews and Smith [20] found a negative relation between experienced time pressure and the creativity of ideas produced by marketing professionals. Using content analysis to examine data obtained from employees in Brazilian organizations, Soriano de Alencar and Bruno-Faria [53] concluded that an excess of tasks and intense time pressures are major obstacles to creativity. Empirical work has also provided evidence for the negative relationship between time pressure and employee creativity. For example, Madjar and Oldham’s study [54] demonstrated that low time pressure is related to high creativity. Employees who experience a high level of time pressure will behave less creatively especially when receiving low supervisory support for creativity (Baer & Oldham, 2006). Moreover, based on qualitative interview data, Unsworth and Clegg [48] suggested that time availability is a critical working resource which determines an employee’s willingness to try new approaches for producing creative outcomes. Most of the existing literature has consistently posited that the time pressure resulting from tight schedule or excessive volume of tasks is likely to make individuals perform poorly in creative activities since time pressure reduces intrinsic motivation as well as willingness to actually make an attempt to produce creative ideas. As discussed, we propose:

**Hypothesis 4:** Employee-perceived time pressure is negatively related to creativity.

### F. The moderating effects of work discretion

Work discretion has been commonly considered as a critical moderating factor on employee creativity in most of the empirical studies (e.g. Shalley [47], Zhou, [46], Volmer, Spurk & Niessen [55]). In this study, we also incorporate work discretion as it interacts with innovative cognitive style in affecting employee creativity. Employees with innovative cognitive style tend to think outside of existing frameworks and adopt new ways to solve work problems and generate ideas [33]. As a core job characteristic, work discretion gives employees the opportunity to try out new and useful combinations of work procedures [42, 55]. Innovative cognitive style makes an individual more interested in challenging existing rules, paradigms, perspectives and way of performing tasks. Therefore an appropriate degree of work flexibility may be necessary for employees to turn their imagination into reality [46]. In most cases, an employee with innovative cognitive style may still not produce creative ideas if there is insufficient discretion in handling work tasks since there is no opportunity for validating those ideas. Moreover, too many fixed work procedures and control can easily stifle employees’ intrinsic motivation towards tasks, which has been suggested to determine individual willingness to actually engage in creative activities [21, 29]. Accordingly, a high level of work discretion is needed for employees with innovative cognitive style, so that the influence of their creative potential can be fully exerted on generating creative ideas. Therefore, we propose:

**Hypothesis 5:** Employee-perceived work discretion positively moderates the relationship between innovative cognitive style and creativity. Employees exhibit greater creativity when possessing innovative cognitive style and presented with more work discretion.

The relationship between proactive personality and creativity can be justified through a proactive individual’s disposition to understand current trends and make active
behave to effect environmental change in order to identify and grasp opportunities [12, 35]. Work discretion provides employees with more flexibility to anticipate changing conditions, and this greater work freedom will be beneficial for dealing with the inherent uncertainty of the creative process [45, 56]. Proactive individuals are especially effective at identifying better ways to perform tasks when given the opportunity to try [41]. If enough work discretion is provided, employees’ proactive attempts are more likely to be fully converted into creative potential. Furthermore, intrinsic motivation is also critical in clarifying the proactiveness-creativity relationship. Intrinsic motivation results from employees’ perception of interest, involvement, curiosity, satisfaction and positive challenge [29]. An intrinsically motivated individual tends to be curious and learning-oriented, to be cognitively flexible, to be willing to take risks, and to be persistent when faced with obstacles and challenges [49, 57, 58]. Proactive initiatives inevitably entail obstacles and risks. If employees are not given enough work discretion, their intrinsic motivation for tasks diminishes due to a lack of enthusiasm, ambition for taking risks, and willingness to overcome obstacles, which are essential factors in creative activity [2]. To actually come up with creative ideas, proactive personnel especially require the provision of enough work discretion, so that they can make real proactive actions without the constraints of unfavorable regulations or fixed work settings. Hence, we propose:

**Hypothesis 6:** Employee-perceived work discretion positively moderates the relationship between proactive personality and creativity. Employees exhibit greater creativity when possessing highly proactive personality and presented with more work discretion.

### G. The moderating effects of time pressure

The moderating effects of time pressure on creativity in organizations has received little discussion in the existing literature [47], though much theoretical work has corroborated the notion that time availability does matter in shaping employee behavior within the workplace [51, 59, 60]. Employees are unlikely to generate creative ideas without the necessary time flexibility because working within temporal constraints may easily impair their intrinsic motivation. When experiencing time pressure, employees are prone to use familiar and conservative methods and try to avoid possible risks since such approaches could at least maintain their self-confidence to complete tasks within a tight schedule [20]. As a result, the positive effect of innovative cognitive style on employee creativity may be reduced. Similarly, employees’ engagement in creative activities at work, such as exploratory behavior and experimentation, has important implications for their creativity [21, 51]. High level of time pressure has been assumed to result in lower engagement in exploratory activities and suboptimal creativity [51, 61]. Although employees with innovative cognitive style have the potential for creativity, enough time flexibility is still needed to increase their willingness to actually conduct creative activities since perceived time pressure hampers employees’ self-confidence in taking exploratory or experimental behaviors. Thus, we propose:

**Hypothesis 7:** Employee-perceived time pressure negatively moderates the relationship between innovative cognitive style and creativity. Employees exhibit greater creativity when possessing innovative cognitive style and working under less time pressure.

Based on relevant research [10, 37], the premise derived in this study suggests that proactive personality leads to high creativity because the curious nature of proactive behaviors influences employees to actively learn and seek more external knowledge [36]. Learning and knowledge assimilation are time-consuming processes; individuals need to take the necessary amount of time to fully comprehend all the pieces of new information as well as drawing inspiration from them. If they are assigned an excessive volume of tasks or urgent task deadlines, proactive individuals are less likely to exploit their advantageous proactive disposition for dealing with tasks creatively. In addition, the positive relationship between proactive personality and creativity can also be explained by an individual’s intrinsic motivation. It is possible that proactive personality arouses positive attitudes towards the work itself, such as interest, involvement and curiosity, and these qualities have been regarded as catalysts for intrinsic motivation and creativity [29]. However, if intense time pressure is presented, employees’ intrinsic motivation may therefore suffer, reducing the effect of proactive personality on creativity. Given this logic, we propose:

**Hypothesis 8:** Employee-perceived time pressure negatively moderates the relationship between proactive personality and creativity. Employees exhibit greater creativity when possessing highly proactive personality and working under less time pressure.

### III. METHODS

#### A. Research design and data collection

In this study, middle managers were chosen as representatives of company employees, and creativity in managers has drawn scholars’ attention in the past decade [62, 63]. Middle managers as survey sample are suitable for research on employee creativity because in most cases their jobs include not only personal work but also managing lower level organizational members and developing future work plans for their divisions. Therefore, compared to works of ordinary employees, the missions of middle-level managers, which are more uncertain and comprehensive in nature, require higher level of creativity. We especially targeted middle managers in marketing departments and R&D departments. Since marketing personnel endeavor to come
out with promotion strategies, while R&D engineers develop new products or new materials, both of the two departments are relatively creativity-intensive in a large manufacturing company.

Through a questionnaire survey we collected research data from 344 middle-level managers working for manufacturing companies in Taiwan, including both R&D managers and marketing managers. We selected these from a directory of Taiwan’s 500 largest manufacturing companies compiled by Common Wealth Magazine, which is the most respected publication on business and economics in Taiwan. Initially, questionnaires were mailed to middle managers in charge of the marketing division and the R&D department of each company with a cover letter indicating the purpose of this study as well as providing instructions for filling out the questionnaire. A stamped and addressed return envelope was enclosed for convenience of response. In order to stimulate receivers’ willingness to participate in the study, we undertook charitable activity in which we donated to a respected philanthropic organization on behalf of the informants after receiving their responses. Collecting data for several months, we received a total of 344 valid questionnaires used as the final research sample in the subsequent analyses.

Among all the respondents, 81 percent were male; 18 percent of them had a vocational degree, 37 percent of them had a Bachelor’s degree, 38 percent had a Master degree, and 6 percent of them had a doctoral degree. In addition, 57 percent of the respondents were the middle managers of a research and development department and 43 percent were in a marketing department. The average age of respondents was between 31 to 40 years, and on average those middle managers had 11 to 15 years’ working experience in their overall career.

B. Measures and validation

**Employee creativity.** Creativity requires not only originality, novelty, and uniqueness, but also effectiveness, appropriateness and contextual fitness [24]. Employee creativity in this study is defined as the extent to which individual creates novel and useful ideas on task-related knowledge, task-related innovation, and creative problem solving. A four-item scale was utilized to measure employee creativity by assessing respondents’ creativity in comparison to other employees in the company, ranging from 1, “much worse,” to 7, “much better” [64, 65]. Factor loadings of each item ranged from .77 to .87 (α=.87). Items include “I decide the way in which I accomplish my tasks,” “It is basically my own responsibility to decide how I do my job gets done,” and “This organization provides freedom and means of one’s work tasks.” The 5-point Likert-type scale ranged from 1, “strongly disagree,” to 5, “strongly agree.” Factor loadings of each item ranged from .81 to .85 (α=.55).

**Work discretion.** To measure work discretion, we integrated the concept proposed by Shalley [47] and adapted the scales developed and used in previous management literature [55, 69]. The scale of work discretion measures how much flexibility the workplace offers over sequence, method, and means of one’s work tasks. The 5-point Likert-type scale ranged from 1, “strongly disagree,” to 5, “strongly agree.” Items include: “I decide the way in which I accomplish my tasks,” “It is basically my own responsibility to decide how my job gets done,” and “This organization provides freedom to use my own judgment.” Factor loadings of each item ranged from .80 to .89 (α=.79).

**Time pressure.** The construct was measured with a scale adapted from the Innovation Climate Questionnaire [70]. This scale, ranging from 1, “strongly disagree,” to 5, “strongly agree,” has been used to measure employee-perceived time...
pressure in the literature [51, 71]. Respondents were asked about their perception of time pressure while performing work tasks, and the time flexibility they had for thinking of new ideas. Items include “Thinking of new ideas takes time I don’t have,” and “I feel that I am always working with time constraints on my job.” Factor loading of each item ranged from .74 to .96 (α=.66).

**Control variables.** We controlled for three demographic variables that have been found to be significantly related to creativity, namely company tenure, work experience, and gender [1].

### C. Analyses

We first conducted principal components factor analysis to validate the construct measures [72]. Results show that items of five latent constructs are all with factor loadings above the threshold of .7, all average variance extracted values (i.e. AVE) are above the threshold of .5, and composite reliability values (i.e. CR) of the constructs are all above the threshold of .6, indicating that the requirements of convergent validity are satisfied [73]. Additionally, to verify discriminant validity, based on the idea that a latent construct should explain more of the variance in its item measures that it shares with another construct [73, 74], the value of average variance extracted should be greater than the squared correlation coefficient for adequate discriminant validity. Since the average variances extracted from each construct, ranging from .69 to .74, were all above the corresponding squared correlation coefficients, showing that the criterion is met.

In order to mitigate and assess the magnitude of common method bias, we conducted a Harman’s one-factor test suggested by Podsakoff, Mackenzie, and Lee [75], extracting five distinct factors that accounted for 72 percent of the total variance, with the first factor explaining 35 percent. Based on the results, no single factor emerged, nor did one factor account for most of the variance. The results suggest little threat of common method bias and provide support for the validity of our measures.

Finally, we tested hypothesized relationships using hierarchical regression since this technique allowed us to test for the presence of both direct relationships (Hypotheses 1 to 4) and interaction effects (Hypotheses 5 to 8). Hierarchical regression analysis enables researchers to compare alternative models with the additions of interaction terms, where a moderating effect only exists if the interaction term contributes significantly to the variance explained in the dependent variable over the main effects of the independent variables [76]. As recommended by Aiken and West [77], the independent variables were mean-centered prior to the formation of interaction terms. For all models, we used several regression diagnostics to assess whether modeling assumptions were satisfied. In addition, we assessed the variance inflation factor (VIF) values and found no significant multi-collinearity problems (VIF<1.26).

### IV. RESULTS

Table 1 provides descriptive statistics and zero-order correlations among the variables used in this study. Respondents’ average tenure in their current company is 6 to 10 years, the respondents have an average of 11 to 15 years’ work experience, and 81% of respondents are male. Table 2 reports the results of the hierarchical regression analyses. In the first step, control variables were entered, and none of the three control variables exhibited significant effect on employee creativity. In the second step, we entered four independent variables, namely innovative cognitive style, proactive personality, work discretion, and time pressure, to test their respective main effects on employee creativity. This addition increased the explained variance in employee creativity (model 2: ΔR²=.31, p<.001). Hypothesis 1 postulates a positive effect of innovative cognitive style on employee creativity. The results showed that the effect of proactive personality is positive and significant, supporting hypothesis 2 (model 2: β=.28, p<.001). Next, Hypothesis 2 predicts a positive effect of proactive personality on employee creativity. The results showed that the effect of proactive personality is positive and significant, supporting hypothesis 2 (model 2: β=.28, p<.001). Hypothesis 3 states that work discretion is positively related to employee creativity, and the results supported the hypothesis (model 2: β=.39, p<.001). Hypothesis 4, which posits that time pressure has a negative effect on employee creativity, was also supported (model 2: β=-.14, p<.01).

### TABLE 1

**MEANS, STANDARD DEVIATIONS, CORRELATIONS**

<table>
<thead>
<tr>
<th>Variable</th>
<th>Mean</th>
<th>s.d.</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Employee creativity</td>
<td>5.01</td>
<td>.79</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>2. Company tenure</td>
<td>2.21</td>
<td>1.30</td>
<td>.02</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>3. Work experience</td>
<td>3.01</td>
<td>1.58</td>
<td>.00</td>
<td>.42**</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>4. Gender</td>
<td>1.13</td>
<td>.48</td>
<td>-.03</td>
<td>-.14**</td>
<td>-.00</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>5. Innovative cognitive style</td>
<td>4.17</td>
<td>.53</td>
<td>.44**</td>
<td>-.02</td>
<td>.06</td>
<td>-.00</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>6. Proactive personality</td>
<td>4.18</td>
<td>.52</td>
<td>.38**</td>
<td>.02</td>
<td>.14**</td>
<td>-.08</td>
<td>.39**</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>7. Work discretion</td>
<td>4.05</td>
<td>.55</td>
<td>.39**</td>
<td>.03</td>
<td>.03</td>
<td>-.07</td>
<td>.34**</td>
<td>.31**</td>
<td>-</td>
</tr>
<tr>
<td>8. Time pressure</td>
<td>3.24</td>
<td>.74</td>
<td>-.14**</td>
<td>-.07</td>
<td>-.10</td>
<td>-.10</td>
<td>.00</td>
<td>.00</td>
<td>.01</td>
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</table>

*a*=344

**p<.01** (two-tailed test)
In the third step, we entered interaction terms to test our hypotheses on the moderating effects of work discretion and time pressure. This addition of the interaction terms significantly increased the variance explained in the employee creativity (model 3: $\Delta R^2 = .02$, $p < .10$). Hypothesis 5 predicts that the relationship between innovative cognitive style and creativity will be positively moderated by work discretion. The interactive effect of innovative cognitive style and work discretion was not significant, not supporting hypothesis 5 (model 3: $\beta = -.02$, n.s.). Hypothesis 6 suggests that the higher work discretion employees perceive, the stronger the effect of proactive personality is on creativity, and our results supported this hypothesis (model 3: $\beta = .10$, $p < .05$). Hypothesis 7, which states that time pressure negatively moderates the relationship between innovative cognitive style and creativity, was also supported by our results (model 3: $\beta = -.11$, $p < .05$). Hypothesis 8 contends that the relationship between proactive personality and creativity is negatively moderated by time pressure, but our results did not support this hypothesis (model 3: $\beta = .04$, n.s.). The research framework with results of regression analysis is shown in Figure 1.

### TABLE 2

RESULTS OF HIERARCHICAL REGRESSION ANALYSES\(^a\) (N=344)

<table>
<thead>
<tr>
<th></th>
<th>Employee creativity</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Model 1 Model 2 Model 3</td>
</tr>
<tr>
<td></td>
<td>$\beta$  $t$  $\beta$  $t$  $\beta$  $t$</td>
</tr>
<tr>
<td><strong>Control variables</strong></td>
<td></td>
</tr>
<tr>
<td>Company tenure</td>
<td>.02  .31  .04  .81  .03  .68</td>
</tr>
<tr>
<td>Work experience</td>
<td>-.01  -.10  -.08  -1.62  -.08  -1.50</td>
</tr>
<tr>
<td>Gender</td>
<td>-.03  -.58  .02  .41  .03  .67</td>
</tr>
<tr>
<td><strong>Individual characteristics</strong></td>
<td></td>
</tr>
<tr>
<td>Innovative cognitive style</td>
<td>.28  5.55***  .30  5.84***</td>
</tr>
<tr>
<td>Proactive personality</td>
<td>.21  4.19***  .21  4.21***</td>
</tr>
<tr>
<td><strong>Working conditions</strong></td>
<td></td>
</tr>
<tr>
<td>Work discretion</td>
<td>.23  4.74***  .22  4.37***</td>
</tr>
<tr>
<td>Time pressure</td>
<td>-.14  -3.13***  -.14  -2.95***</td>
</tr>
<tr>
<td><strong>Interactions</strong></td>
<td></td>
</tr>
<tr>
<td>Work discretion * Innovative cognitive style</td>
<td>-.03  -.50</td>
</tr>
<tr>
<td>Work discretion * Proactive personality</td>
<td>.10  2.03***</td>
</tr>
<tr>
<td>Time pressure * Innovative cognitive style</td>
<td>-.11  -2.28**</td>
</tr>
<tr>
<td>Time pressure * Proactive personality</td>
<td>.05  .93</td>
</tr>
<tr>
<td>$\Delta R^2$</td>
<td>.00  .31  .02</td>
</tr>
<tr>
<td>$R^2$</td>
<td>.00  .32  .34</td>
</tr>
<tr>
<td>$F$</td>
<td>.17  38.61***  2.34*</td>
</tr>
</tbody>
</table>

\(^a\)Standardized coefficients are reported

\(* p < .10\); ** $p < .05$; ***$p < .01$
Moreover, as suggested by Aiken and West [77], we plotted the two supported interaction effects as well as conducting simple slope tests to advance further interpretations. According to Figure 2, although a higher level of proactive personality is related to higher employee creativity, proactive personality is more effective in influencing creativity when employees perceive higher work discretion. The plot demonstrates the positive moderating effect of work discretion on the relationship between proactive personality and creativity. The results of simple slope tests confirm that an employee’s proactive personality has a stronger effect on creativity when work discretion is perceived to be high ($\beta=.68$, $t=2.139$, $p<.05$) than when work discretion is perceived to be low ($\beta=.50$, $t=2.712$, $p<.01$). Furthermore, the plot in Figure 3 illustrates that innovative cognitive style is positively associated with employee creativity, and the influence of innovative cognitive style is even stronger when employees experience less time pressure, indicating the negative moderating effect of time pressure on the relationship between innovative cognitive style and creativity. The results of simple slope tests confirmed that the positive effect of innovative cognitive style on employee creativity is stronger and more significant when an employee’s perceived time pressure is low ($\beta=.28$, $t=2.057$, $p<.05$) than when such time pressure is perceived to be high ($\beta=.11$, n.s.).
V. DISCUSSION

Assessment of employees’ cognitive characteristics and personality can serve to select appropriate candidates who have potential for high creative performance [62]. It has been argued that organizations that wish to emphasize creativity and innovation can be more successful if they recruit employees who possess innovative cognitive style [33] as well as proactive personality [41], and our findings are in line with this perspective. However, innovative cognitive style and proactive personality only provide individuals with the potential to be creative [21], but not a guarantee of high creativity. Whether or not employees with better creative potential will actually exhibit high level of creativity depends on not only the organizational context [18], but also whether the individuals are motivated to do so [29]. Work discretion over tasks and enough time for idea generation have both been regarded as important factors in influencing organizational creative climate [16]. As acknowledged in the literature, the interactionist perspective asserts that investigating interactions between individual disposition and contextual factors can more effectively predict creative performance [3]. In this study, our results support the interactionist premise that both innovative cognitive style and proactive personality indeed interact with contextual conditions of work discretion and time pressure to affect creativity.

According to our findings, employees will exhibit the highest level of creativity when they possess innovative cognitive style and proactive personality as well as performing tasks with high work discretion and less time pressure. A recent empirical study on Dutch architects showed that innovative cognitive style indirectly relates to an architect’s success in creative design via self-efficacy [78]. According to their inference, self-efficacy has been regarded as an important predictor of creative performance [79]; since individual self-efficacy is gradually developed through the accumulation of positive past experience [80], individuals with innovative cognitive style may have more positive experience in dealing with creative tasks and therefore have more ability to produce creative designs. On the other hand, proactive personality also plays an important role in determining an individual’s creative potential. As suggested by prior research, individuals with proactive personality are inclined to possess high level of curiosity and learning orientation [10, 36], which are both favorable to creative ideas generation. In an investigation into the relationship between proactive personality and employee creativity, Kim, Hon and Lee [11] found that employees will exhibit the highest level of creativity especially when they have proactive personality, work for a job with high creativity requirements, and receive supervisory support for their creativity.

At the early stage of theoretical development for environment-creativity relationship, work discretion and time pressure were initially found to not or weakly link to creativity [2]. Although subsequent work revealed the direct effects of work discretion [46] and time pressure [51] on employee creativity, explanation and empirical evidence of the relationship are still very limited. Our findings suggest that employee-perceived work discretion is positively related to creativity. In an interview-based study, Unsworth and Clegg [48] concluded that although the nature of some tasks inherently involves creativity, some work settings, such as structured work design for reliability and contractual requirements for minimum changes, are likely to hinder employees’ creative potential. As they stated, work discretion is a resource that allows employees to feel capable and therefore to feel that the effort involved in undertaking creative action would be worthwhile. A recent study, which empirically examined the relationship between work autonomy and employee creativity in the hotel industry, indicated that work discretion represents an effective stimulant to the intrinsic motivation necessary for creativity since it entails employees’ perceived self-determination [81]. Those results and our findings all imply that an appropriate degree of work discretion is a prerequisite for creativity in work place.

Similarly, time pressure’s direct negative effect on employee creativity was identified in this study. High level of time pressure decreases employees’ intrinsic motivation to a task and makes them more rely on imitating their past experience rather than trying to come up with novel ideas through exploratory thinking, thereby stifling individuals’ potential for creativity [20, 51]. Previous research also yielded the same results on an empirical basis [53, 54]. Although our findings and prior work have indicated time pressure’s negative influence on employee creativity, in some studies time scarcity was found to improve creativity [82]. The qualitative work of Unsworth and Clegg [48] showed that when time is scarce and creativity requirements of tasks are high, employees will focus more on the job at hand and still engage in the creative process. Ohly and Fritz [83], who considered time pressure as challenge-related stressor that leads to creativity through creating positive challenges to employees, also provided empirical findings for the positive effect of time pressure on employee creativity. In addition to the linear effect of time pressure, evidence for an inverted U-shaped curvilinear relationship has also been proposed in literature, and those theories suggested that employees exhibit the highest creativity when perceiving an intermediate level of time pressure [51, 85]. Remarkably, to clarify the inconsistent results of existing literature on the relationship between employee-perceived time pressure and creativity, Baer and Oldham [51] provided an explanation: Most previous research assessed the overall amount of time pressure employees experienced at work, which may or may not have captured the extent to which they experienced pressure with respect to creativity. Employees may not necessarily feel high levels of overall time pressure in their jobs, but may still feel that they have little time available to pursue creative activities (p.963). In order to better reflect the
effect of time pressure on creativity in working environment, this study complies with the measurement approach proposed by Baer and Oldham, adopting measures specifically for assessing employees’ perceived time pressure on pursuing creative activities.

As discussed above, work discretion and time pressure largely determine an employee’s intrinsic motivation, which is meaningful in explaining how individual characteristics are linked to creativity. This study is, to the best of our knowledge, the first endeavor simultaneously linking innovative cognitive style and proactive personality to employee creativity as well as examining the moderating effects of work discretion and time pressure. Work discretion has widely been considered as an important moderator in several creative studies. For example, Shalley [47] investigated the interacting effect of work discretion and goal setting, finding that individuals exhibited high creativity when they were given both creativity goals and high work discretion. Likewise, a study recently found that work discretion moderates the relationship between leader-member exchange and creativity, suggesting that quality of leader-member exchange will positively affect employee creativity when enough job autonomy is presented [55]. In this paper, work discretion was hypothesized and found to positively moderate the relationship between proactive personality and employee creativity. Employees with proactive personality may require enough work discretion to feel more self-determination when engaging in the creative process. To stimulate the creativity of proactive employees, perceiving self-determination is critical since it drives how individuals experience intrinsic motivation towards a task as well as influencing their willingness to really conduct proactive behaviors. Based on our findings, proactiveness of employees can be better converted into creative outputs when work discretion is presented.

Unlike the positive moderating effect of work discretion, employee-perceived time pressure was found to exhibit negative moderation, which reduces innovative cognitive style’s positive and significant effect on creativity. Although the direct effect of time pressure on individual creativity has been discussed in literature, its moderating effect has yet to draw much attention. The work of Andrews and Smith [20] is one of the few studies which regarded time pressure as a moderator affecting the relationship between individual characteristics and creative performance. According to their findings, the influence of product managers’ experience diversity on the creativity of marketing program they carried out is negatively moderated by time pressure. Our paper, instead, demonstrates the moderating role of time pressure in the relationship between innovative cognitive style and employee creativity. Individuals with the innovative cognitive style tend to adopt new ways to perform tasks, while embracing novelty and originality inevitably involves high uncertainty [6]. If employees frequently work under high time pressure, their willingness to really engage in new idea generation diminishes. Thus, we argue that time flexibility is extraordinarily important for an innovator to yield creative ideas.

To summarize, it has been suggested that recruiting and selecting employees with the right set of cognitive style and personality for creativity can be desirable, while setting up the right working conditions for producing creative outcomes appears to be most promising direction [21]. Correspondingly, the empirical findings of this study provide evidence for the impacts of individual characteristics and working conditions on employee creativity, and the effects of innovative cognitive style and proactive personality are shown to be moderated by work discretion and time pressure respectively.

VI. CONCLUSION

Several theoretical contributions to the existing literature are made in this study. Firstly, the study integrates innovative cognitive style and proactive personality in predicting employee creativity. This theorization sheds light on how individual attributes determine creativity from a more comprehensive angle of both cognitive style and behavioral tendency, and the mixture complements the current understanding of the individual creative process. Secondly, this study empirically tests and proves the direct effects of work discretion and time pressure, which had not been elaborated in past literature. Thirdly, this study further contributes to the current theoretical progress of the interactionist perspective on individual creativity study, suggesting that work discretion and time pressure can influence the effects of innovative cognitive style and proactive personality on employee creativity.

In addition, this paper also has several practical implications for company leaders. Based on the findings, company leaders who intend to improve organizational creativity in R&D, marketing, HR practice, or business strategy of the whole company should try to identify, recruit, and retain employees with innovative cognitive style and proactive personality since their nature of not being constrained by existing rules and conventions as well as their attempts to exploit opportunity through exploring current trend can facilitate the generation of creative outcomes. Supportive working conditions, such as high work discretion and less time pressure, to employees are also critical to their creativity. Employees’ intrinsic motivation and self-confidence in engaging creative processes needs to be strengthened by receiving enough work freedom and time resources, so they will judge it is worthwhile to act creatively.

VII. LIMITATIONS AND FUTURE DIRECTIONS

The arguments made in this study are predominantly guided by cognitive evaluation theory [49] since we proposed that employees’ intrinsic motivation necessary for creativity can be impacted by work discretion and time pressure. According to Zhou and Shalley [21], cognitive evaluation theory has driven much of the prior work on creativity [22, 46,
85]. However, although existing study discuss the importance of intrinsic motivation as the psychological process from which employee creativity accrues, little research has clearly demonstrated that intrinsic motivation exercises its mediating effects on context-creativity relationship. Therefore, future research is encouraged to investigate how intrinsic motivation intervenes in the relations among working context, individual dispositions and employee creativity. Furthermore, prior research covering the impacts of work discretion and time pressure, and this paper as well, has yielded different results. Future academic effort is needed to provide more comprehensive explanation for these inconsistencies. Moreover, another limitation of this study is the possibility that other unmeasured variables, such as supervisory support for creativity, may influence how the effects of innovative cognitive style and proactive personality on creativity are moderated by work discretion and time pressure. For example, even under low work discretion and high time pressure, an innovative and proactive employee may still behave creatively if there is reward or support from upper management for proposing creative ideas. Finally, the creative process is highly situational dependent, so the effect of contextual factors on creativity could vary across different work settings. Therefore, we believe that future research will provide better insights into individual creative process if adopting a contingent perspective for investigating the relationship between other relevant contextual factors and employee creativity.

REFERENCES


