ENHANCING CREATIVITY IN A GENERAL WORK ENVIRONMENT:

THE ROLE OF PROBLEM-SOLVING DEMAND

by

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This thesis is dedicated to my family.

献给我的家人。

Acknowledgement

Several friends and colleagues have offered support and encouragement during the past four years. However, the support of a few people in particular must be noted. It is an understatement to say that I am grateful to the people mentioned below.

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Enhancing Creativity in a General Work Environment:

The Role of Problem-Solving Demand

Thesis Summary

In the increasingly competitive global business environment, organisations rely strongly on employee creativity for organisational innovation and survival. Creative ideas from employees help organisations improve products and/or services, offer valuable solutions to work-related problems, and provide new ways of doing things. Consequently, employee creativity is a key resource upon which organisations can draw to build up their capacity to innovate and to create competitive advantage. It is, therefore, imperative for organisations to nurture a work environment that facilitates employee creativity. Prior research suggests that management can employ cognitively demanding job attributes to promote employee creativity. However, it is not clear what specific type of cognitive demand is particularly important for creativity, what processes underpin the relationship between demanding job conditions and creativity and what factors lead to employee perceptions of demanding job attributes. This research sets out to address the aforementioned issues by examining: (i) problem-solving demand (PSD), a specific type of cognitive demand, and the processes that link PSD to creativity, and (ii) antecedents to PSD.

Based on social cognitive theory, PSD was hypothesized to be positively related to creativity through the motivational mechanism of creative self-efficacy. However, the relationship between PSD and creative self-efficacy was hypothesized to be contingent on levels of intrinsic motivation. Social information processing perspective and the job crafting model were used to identify antecedents of PSD. Consequently, two social-contextual factors (supervisor developmental feedback and job autonomy) and one individual factor (proactive personality) were hypothesized to be precursors to PSD perceptions.

The theorized model was tested with data obtained from a sample of 270 employees and their supervisors from 3 organisations in the People's Republic of China. Regression results revealed that PSD was positively related to creativity but this relationship was partially mediated by creative self-efficacy. Additionally, intrinsic motivation moderated the relationship between PSD and creative self-efficacy such that the relationship was stronger for individuals high rather than low in intrinsic motivation. Results also showed supervisor developmental feedback, job autonomy, proactive personality and the interaction between job autonomy and proactive personality were positively related to PSD.

The findings represent a productive first step in identifying a specific cognitive demand that is conducive to employee creativity. In addition, the findings contribute to the literature by identifying a psychological mechanism that may link cognitively demanding job attributes and creativity. In line with social cognitive theory, creative

self-efficacy is shown to be a potential motivational mechanism underpinning the context-creativity relationship. Consistent with interactionist perspective, the findings also suggest that intrinsic motivation may be a boundary condition that one needs to consider when examining the context-creativity relationship. Furthermore, the findings provide insight into how organisational (i.e. supervisor developmental feedback and job autonomy) and individual factors (i.e. proactive personality) facilitate PSD perceptions. These findings bear meaningful implications for practitioners. For instance, to facilitate employee creativity, organisations and their managers may promote PSD perceptions at work by providing developmental feedback and/or job autonomy. Meanwhile, managers need to be aware that individuals may respond differently to PSD due to different levels of intrinsic motivation. Consequently, they need to ensure that developmental feedback or job autonomy provided should match employees' intrinsic motivation levels to foster creative self-efficacy and consequent creativity.

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Chapter 1: Introduction

Background to the research problem

Employee creativity, the generation of new and useful ideas regarding products, processes and work related problems, is a highly desirable organisational outcome. When employees demonstrate creativity at work, they provide new and useful ideas to improve products or services, processes or practices, which eventually enhance the quality of products/services. In today's competitive business environment, employee creativity is particularly crucial for organisations to survive and thrive (Amabile, 1996; Nonaka, 1991). Since Oldham and Cummings' (1996) observation that, "little is known about the conditions that promote the creative performance of individual employees in organisations", the last decade or so has witnessed a steady stream of research on creativity in organisations. In a recent review, Shalley, Zhou, and Oldham (2004) highlighted the separate and interactive influences of personal (e.g. personality, cognitive style) and contextual factors (e.g. job attributes, relationship with supervisors, coworkers, rewards and evaluation) on employee creativity.

Although personal and contextual factors are often examined in the same study (e.g. Oldham & Cummings, 1996; Tierney, Farmer, & Graen, 1999), it is important to note that research on personal and contextual factors represent two different research domains in creativity research: person-oriented and context-oriented research.

Person-oriented creativity research

The examination of the relationships between personal factors and creativity can be traced back to the 19th century. The research was premised on the notion that

creativity is a personal trait, i.e. creative individuals tend to possess certain unique characteristics contributing to their creativity. The aim of the research, therefore, was to identify these characteristics (c.f. Albert & Runco, 1999). Two sets of personal factors, individual personalities and cognitive styles, have received much research attention in examining employee creativity in organisational contexts.

Personalities that have been frequently related to creativity are creative personality measured by the Creative Personality Scale (CPS) (Gough, 1979) and the Five Factor Model of personality (FFM, Costa & McCrae, 1992). CPS is a 30-item Adjective Check List developed by Gough and Heilbrun (1965) to measure one's overall creative potential. For instance, high CPS individuals are those who score high on such adjectives as "self-confident", "reflective", "interests wide" and low on such adjectives as "cautious", "honest", and "interests narrow". Compared with low CPS individuals, high CPS individuals are more likely to approach problems with divergent thoughts (Barron & Harrington, 1981), self-confidence, tolerance for ambiguity and persistence in developing ideas, leading to creativity (Gough, 1979). Empirical studies have provided support for the positive relationship between CPS and creativity (e.g. Feist, 1998; Gough, 1979; Oldham & Cummings, 1996; Zhou & Oldham, 2001).

Among the FFM dimensions, (i.e. neuroticism, agreeableness, conscientiousness, extraversion, and openness to experiences), openness to experience has been widely examined for its effects on creativity. It is believed that individuals high in openness to experience are curious, unconventional and broad-minded, attributes which are conducive to creativity whereas those low in openness to experience are disinterested,

conventional, and intolerant of unfamiliar situations and perspectives, attributes which do not foster creativity. Empirical studies have provided some support for the positive relationship between openness to experience and creativity (e.g. Feist, 1998).

In terms of cognitive styles, researchers have attached much importance to innovative cognitive style derived from Kirton's (1976, 1994) Adaption-Innovation Theory. According to this theory, there are two types of cognitive styles: innovative and adaptive, and are located at opposite ends of a continuum. Individuals with an innovative cognitive style (innovators) tend to go beyond the established ways of doing things and take risks by adopting new approaches in problem-solving activities. In contrast, individuals with an adaptive cognitive style (adaptors) are predisposed to solve problems within the prescribed procedures or conventional ways of doing things. Innovative cognitive style has been shown to be positively related to creativity (Tierney et al., 1999). Furthermore, compared with adaptors, innovators were found to be more creative (Keller, 1986; Lowe & Taylor, 1986).

Nevertheless, research on personal factors-creativity relationships has been criticized for its narrowness. Amabile (1983: 63) observed that:

> "In the past, the psychological study of creativity has been hampered by the tendency of individual investigators to narrow their theoretical focus to a single concern – the distinctive personality characterises of outstandingly creative persons, or the special cognitive abilities of creative artists and scientists, or (less frequently) the social environments that hinder or foster creativity. However sound the empirical research directed toward those single issues, this approach has lead to a theoretical fragmentation within the psychology of creativity."

Additionally, empirical studies have demonstrated that personal factors alone "cannot reliably and potently predict actual creative performance across situations in the workplace" (Zhou & Shalley, 2003:203). For instance, as discussed earlier, openness to experience has been shown to be positively related to creativity in many studies (Feist, 1998; Scratchley & Hakstian, 2000). However, George and Zhou (2001) reported that openness to experience, instead of having a direct impact on creativity, was positively related to creativity only when individuals received positive feedback while working on heuristic tasks (i.e. tasks with unclear ends or means).

Furthermore, the person-oriented research posits that individuals with less creative personalities (e.g. low CPS individuals) are less likely to produce creative performance. However, researchers have found that these individuals are able to provide creative performance under some circumstances (e.g. George & Zhou, 2001; Shin & Zhou, 2003; Tierney et al., 1999). For instance, Madjar, Oldham, and Pratt (2002) reported that individuals low in CPS demonstrated higher level of creativity when they received high rather than low levels of family/friend support. Similarly, Tierney and her colleagues (1999) found that individuals with adaptive rather than innovative cognitive style were more likely to provide high creativity when they experienced supportive and high-quality relationships with supervisors.

Consequently, although personal factors have remained important in understanding creativity in organisations (Shalley et al., 2004), it has become more and more obvious that one needs to go beyond 'creative individuals' to investigate "the social and environment situations that can positively or negatively influence the creativity of most individuals" (Amabile, 1983 : 5).

Context-oriented creativity research

Research on contextual influences on individual creativity dates back to the 1970s. This line of research was based on the notion that the context in which one works (e.g. supervisory behaviours, job attributes) affects his or her creative performance. Consequently, the objective of the research was to identify contextual factors that foster or hinder individual creativity. Some of the earliest investigations were conducted by Andrews and his associates (e.g. Andrews & Farris, 1967; Andrews & Farris, 1972). For instance, Andrews' (1975) study of 115 scientists showed that the relationship between individual creative potential and creative performance was stronger when individuals experienced individual discretion, few external interventions and stable employment at work. These early studies provide preliminary supporting evidence for contextual influences on individual creativity. However, examination of the impact of contextual factors on individual creativity in organisations did not take off until emergence of the subfield of social psychology of creativity in the 1980s (Amabile, 1983, 1988).

Fundamental assumptions of social psychology of creativity include: (1) creativity exists in everyday life as well as in the domains of science, literature and the arts. Therefore, individuals with normal cognitive abilities can to some extent produce creative work; (2) There are degrees of creativity within a particular individual's work; and (3) It is possible to increase creativity to some extent (Amabile, 1983). Amabile (1983 :67) also observed that individual factors such as "talents, education, or cognitive skills do not by themselves appear to be sufficient for high levels of creativity". Even though some individuals may exhibit certain creative personality traits they are "not creative at all times or in all domains". Based on

these assumptions and observations, Amabile (1983, 1996) proposed that individual creativity is, to a large extent, subject to the influences of social-environment factors. She further suggested that social-environmental factors supporting autonomy, competence, or task involvement are conducive to creativity. In contrast, social-environmental factors that connote control and constraints are detrimental to individual creativity (Amabile, 1996).

Based on the social psychology of creativity, a large amount of research has been conducted to investigate the relationships between various contextual factors and creativity in organisations (cf. Shalley & Gilson, 2004; Zhou & Shalley, 2003). This line of research has covered a wide range of contextual factors, such as feedback and evaluation (Zhou, 1998, 2003; Zhou & George, 2001), supervisory behaviours (e.g. George & Zhou, 2001; Oldham & Cummings, 1996; Redmond, Mumford, & Teach, 1993; Scott & Bruce, 1994; Tierney et al., 1999), co-workers (George & Zhou, 2001; Zhou, 2003), job attributes (e.g. Amabile, 1983; Amabile & Gryskiewicz, 1989; Oldham & Cummings, 1996; Shalley, 1991; Tierney & Farmer, 2002; Zhou, 1998), rewards (Amabile, 1996; Eisenberger, 1992), and work settings (Oldham, Cummings, & Zhou, 1995; Shalley & Oldham, 1997). I do not intend to review all these studies, which has been thoroughly done by Shalley et al. (2004) and Zhou and Shalley (2003). Instead, I discuss three key observations derived from the extant literature.

First, empirical findings have generally supported the critical role of context in employee creativity. In line with Amabile's (1988, 1996) notion of 'environment for creativity', researchers have found that employees will provide creative performance when they experience supportive supervision (Scott & Bruce, 1994), receive positive

and developmental feedback (Zhou, 1998, 2003), work under transformational leadership (Jung, Chow, & Wu, 2003; Kahai, Sosik, & Avolio, 2003; Shin & Zhou, 2003), or when they feel challenged in the work place (Amabile, Conti, Coon, Lazenby, & Herron, 1996; Oldham & Cummings, 1996).

Second, previous research has also revealed complex processes through which contextual factors influence creativity. The relationships between contextual factors and creativity are moderated by individual differences (e.g. CPS, innovative cognitive style, openness to experience or values) (cf. Shalley et al., 2004). The moderating effects of individual differences have been evidenced by a number of studies (e.g. George & Zhou, 2001; Madjar et al., 2002; Oldham & Cummings, 1996; Shin & Zhou, 2003; Tierney et al., 1999; Zhou & George, 2003). For instance, in a study of 290 Korean employees, Shin and Zhou (2003) observed that the relationship between transformational leadership and creativity was stronger when individuals' value of conservation was high rather than low. Contextual factors have also been shown to interact with other contextual factors in affecting creativity in both laboratory and field studies (Scott & Bruce, 1994; Shalley, 1995; Shalley & Perry-Smith, 2001; Zhou, 1998). For instance, Zhou (2003) reported supervisors' non-controlling and supportive behaviours had a stronger relationship with employee creativity when co-workers exhibited high rather than low levels of creative behaviours. Furthermore, a number of studies have provided preliminary evidence that certain psychological mechanisms link contextual factors and creativity. For instance, Shin and Zhou (2003) reported a mediating effect of intrinsic motivation in the relationship between transformational leadership and creativity. Redmond et al. (1993) showed that self-efficacy mediated leader's behaviours and creativity. Madjar et al (2002) provided

evidence that positive affect mediated the relationship between social support and creativity.

Third, a newly emergent issue in the context-oriented creativity research is examination of antecedents of creativity-enhancing contextual factors. This line of research aims to understand how creativity-enhancing contexts emerge and what management interventions are likely to foster or inhibit employees' perceptions of such contexts (e.g. Amabile, Schatzel, Moneta, & Kramer, 2004). In an initial attempt, Amabile and her colleagues (2004) conducted an exploratory study with 238 knowledge employees to identify specific leader behaviours contributing to employees' perceptions of leader support, which has been shown to be positively related to employee creativity (Amabile et al., 1996; Oldham & Cummings, 1996; Scott & Bruce, 1994). By analysing employees' daily dairies, Amabile and her coauthors (2004) reported that there were a variety of supervisors' day-to-day behaviours that influenced the levels of perceived leader support. Specifically, supervisors' *supporting* (e.g. helping alleviate stressful situations for subordinates), *appropriate monitoring* (e.g. timely monitoring, constructive feedback), *recognising* (e.g. acknowledging good performance in either public or private), and *consulting* (e.g. asking for employees' opinions) behaviours were positively related to perceived leader support. In contrast, supervisors failing in clarifying roles and objectives (e.g. not providing enough clarity about an assignment) and inappropriate monitoring (e.g. checking on the status of the assignment too often, or providing non-constructive feedback) were negatively related to perceived leader support. This research bears significant theoretical and practical implications. As Amabile and her coauthors (2004: 26) stated, 'Our study suggests that the componential theory, which has

focused on the creativity consequences of work environment perceptions, be expanded to include specific antecedents of those perceptions...' From a managerial perspective, identification of specific antecedents of creativity-enhancing contextual factors (e.g. perceived leader support) provides specific suggestions for managers to facilitate a work environment that foster creativity.

Consequently, as an alternative and complementary approach to traditional person-oriented approach, the context-oriented perspective has enhanced our understanding of individual creativity in organisations. However, there are a number of challenges requiring further investigation regarding the influences of context on employee creativity. For instance, Shalley and her colleagues (Shalley et al., 2004; Zhou & Shalley, 2003) urge creativity researchers: (1) to expand the range of contextual factors that are related to creativity, and (2) to further investigate the complex processes that characterize the relationships between contextual factors and creativity. Specifically, more work is required to enhance our understanding of the boundary conditions (e.g. individual differences and/or other contextual factors) and the psychological mechanisms or mediators of the relationships between contextual factors and employee creativity. Further investigation is also needed to identify antecedents of creativity-enhancing contextual factors. So far, only one study has examined antecedents of a single creativity-enhancing contextual factor (i.e. perceived leader support) (Amabile et al., 2004). Antecedents of other creativity-enhancing contextual factors, such as demanding job attributes have not been examined. Against this background, this research seeks to advance our understanding of individual creativity in organisations by focusing on an important work context dimension: job attributes.

Extant research on job attributes-creativity relationships

The job design literature has long established that job attributes are related to various individual and organisational outcomes such as job satisfaction (Hertzberg, 1966), motivation, and performance (Hackman & Lawler, 1971; Hackman & Oldham, 1980; Turner & Lawrence, 1965). Job design has been one of the most applied management interventions to achieve desired employee outcomes (Parker & Wall, 2001). More recently, job attributes have been shown to have important potential for promoting employee creativity. This has been evidenced in a number of studies (e.g. Amabile, 1983; Amabile et al., 1996; Amabile & Gryskiewicz, 1989; Oldham & Cummings, 1996; Shalley, 1991; Tierney & Farmer, 2002; Zhou, 1998). A review of job attributes-creativity literature reveals that this stream of research has examined mainly two types of job attributes: job autonomy and job demands. Before, proceeding to the discussion of the impact of job autonomy and job demands on creativity, I will define creativity first.

Creativity

There is consensus among many researchers that creativity should be defined by its outcomes, such as creative ideas (Amabile, 1996; Shalley et al., 2004; Zhou & Shalley, 2003). Like much creativity research in organisations, creativity in the present research refers to the generation of new and useful ideas to improve products/services and operations and solve problems at work (Amabile, 1996; Zhou & George, 2001). By definition, ideas will be considered creative if they satisfy two conditions. First, ideas are unique and different from what have been currently applied or available in operations and problem-solving. Second, ideas need to be useful such that management can apply them in developing new products, improving processes and solving problems at work (Zhou & George, 2001).

Creativity can also be radical breakthroughs in an R&D context or can be an incremental development in a general work environment (Mumford & Gustafson, 1988). While the former is more common in a context where creativity is an expected outcome (e.g. R&D team), the latter occurs in a context where creativity is less emphasised such as shop floor or front line operation. The notion that creative ideas may come from employees working in the second context (Madjar et al., 2002; Shalley, Gilson, & Blum, 2000) has attracted much research attention (e.g. Mumford, Whetzel, & Reiter-Palmon, 1997; Oldham & Cummings, 1996; Tierney & Farmer, 2002). Consequently, I focus on creative performance that involves incremental developments or adjustments that are provided by employees working in a general work environment.

Job autonomy refers to the freedom and discretion that an individual has in carrying out his/her tasks. Job autonomy has been conceptualised as a form of choice or personal discretion in laboratory settings (Amabile & Gitomer, 1984; Shalley, 1991, 1995; Zhou, 1998) and as perception of freedom at work in field settings (Amabile et al., 1996; Amabile & Gryskiewicz, 1989). Empirical studies have reported mixed effects of job autonomy on creativity. While Amabile and her colleagues provided evidence that job autonomy had a positive effect on creativity in both laboratory and field settings (Amabile et al., 1996; Amabile & Gitomer, 1984; Amabile & Gryskiewicz, 1989), other researchers did not find a direct impact of job autonomy on creativity (Shalley, 1991; Zhou, 1998). Rather, job autonomy was found to interact with goals (Shalley, 1991) and feedback (Zhou, 1998) in affecting individual creativity. Therefore, the reason why job autonomy does not have a

consistent effect on creativity may be due to the neglect to examine boundary conditions or moderators of the job autonomy-creativity relationship. Another explanation for the mixed findings and more pertinent to this research is the possibility that job autonomy may be a relatively distal variable in relation to creativity. Consequently, its influence on creativity may be indirect through some other job attributes that are more proximal to creativity. For instance, job autonomy has been shown to be an antecedent of various forms of job demands, e.g. task complexity (Oldham & Cummings, 1996) and creative requirements (Shalley et al., 2000), which have been shown to be associated with creativity (Oldham & Cummings, 1996; Shalley, 1995; Unsworth, Wall, & Carter, 2005).

Job demands are the requirements that employees need to meet in carrying out their tasks. Two types of job demands have been examined in the creativity literature: quantitative and cognitive demand.

Quantitative demand. Quantitative demand refers to the demand employees experience in the form of high workload and time pressure (e.g. Amabile & Gryskiewicz, 1989; Andrews & Farris, 1972), requiring them to work very fast and for long hours in order to accomplish the tasks. Studies examining the relationships between quantitative job demand and creativity have reported mixed results. For instance, Andrews and Farris (1972) found time pressure had a positive relationship with scientists' creative performance. In contrast, Amabile and her colleagues (Amabile, 1988) argued that time constitutes an important resource for one to exhibit creative performance. One needs time to understand the problem more comprehensively and explore alternative options, which are crucial for creativity.

Under high time pressure or heavy workload, creativity is expected to decrease. In a series of studies with R&D team members, they found that time pressure/deadline was negatively related to creativity (Amabile, 1988; Amabile et al., 1996; Amabile & Gryskiewicz, 1989). Other researchers have suggested the relationship between quantitative job demands and creativity to be more complicated. In a more recent study, Janssen (2001) observed a curvilinear relationship between job demands (workload, time pressure) and creativity, especially when employees perceived high fairness at work. Indeed, rather than being an intrinsic attribute of the job, quantitative demand presents an external control (Amabile et al., 1996), associated with resources (e.g. time) and the distribution of resources (e.g. fairness) (Janssen, 2001). In this research, I do not intend to investigate the relationships between quantitative job demands and creativity. Rather, I focus on cognitive job demand, which constitutes an intrinsic attribute of the job and has been shown to be more effective in promoting employee creativity (Shalley et al., 2004).

Cognitive demand. Cognitive demand arises from tasks which are characterised by difficulty, challenge, complexity or in Karasek's word, "intellectual responsibility" (1979 : 301). Employees need to use their mental rather than physical resources, to work smarter rather than quicker in order to accomplish the tasks. Two examples of cognitive demand examined in the creativity literature are task complexity (Oldham & Cummings, 1996; Tierney & Farmer, 2002) and creative requirement (Unsworth et al., 2005). As discussed earlier, these job attributes contribute to employees' experience of challenge at work. Working under such job conditions, employees are likely to provide creative performance (Amabile, 1983, 1996).

However, the extant literature on cognitive demand-creativity relationships is limited in a number of ways. First, the conceptualisation of cognitively demanding job attributes has been limited to general constructs, such as task complexity (e.g. Hackman & Oldham, 1980; Roos & Treiman, 1980), which encompass several dimensions. Some of these dimensions may not be directly related to creativity. For example, as discussed earlier, job autonomy, an important dimension of task complexity (Oldham & Cummings, 1996), has been shown to have an inconsistent influence on creativity (Shalley, 1991; Zhou, 1998). Regarding the conceptualisation of job demand, Sonnentag and Frese (2003) suggested that it is necessary to be specific because specific demands are related to specific employee outcomes. Similarly, Wall and his colleagues (Wall, Corbett, Clegg, Jackson, & Martin, 1990) suggested that different types of cognitive demand may differentially influence employees. While demand for attention (i.e. monitoring demand) may lead to job-related strain, demand for seeking solutions to work-related problems (i.e. problem-solving demand, PSD) may lead to intrinsic satisfaction with the job. Therefore, to examine the relationship between cognitive demand and employee creativity, it is necessary to focus on a specific type of cognitive demand (e.g. PSD) that is important for employee creativity.

Second, although complex and cognitively demanding job attributes (i.e. cognitive demand) are positively related to employee creativity (Oldham & Cummings, 1996; Tierney & Farmer, 2002), we are not clear as to why and how such a linkage exists. Specifically, we do not know the psychological mechanism that underpins the relationship between these two. Nor do we know whether this positive relationship holds across all circumstances for all individuals. Consequently, the

processes through which cognitive demand influences creativity have remained a 'black box' requiring further investigation.

Third, theorists have suggested that job attributes are affected by different factors, such as objective characteristics of the job (Hackman & Lawler, 1971), social context (Salancik & Pfeffer, 1978), and individual factors (Wrzesniewski & Dutton, 2001). Parker and Wall (2001) suggested two benefits of investigating the antecedents of job attributes. First, it enables managerial interventions apart from direct manipulations of job attributes. Second, it helps better predictions of the settings where certain types of job attributes are likely to be found. Despite theoretical suggestions and potential practical implications, antecedents to creativity-enhancing job attributes have remained understudied.

In sum, job attributes have been shown to be an important dimension affecting employee creativity. While the influences of job autonomy and quantitative job demand on creativity have been inconclusive, cognitive demand has been shown to have a more direct and consistent impact on creativity. However, as discussed in the preceding paragraphs, there are a number of gaps that need to be addressed in order to fully understand the cognitive demand-creativity relationship. This research intends to address these gaps by examining a specific type of cognitive demand, i.e. PSD, focusing specifically on its antecedents and processes that link it and creativity.

Research objectives and contributions

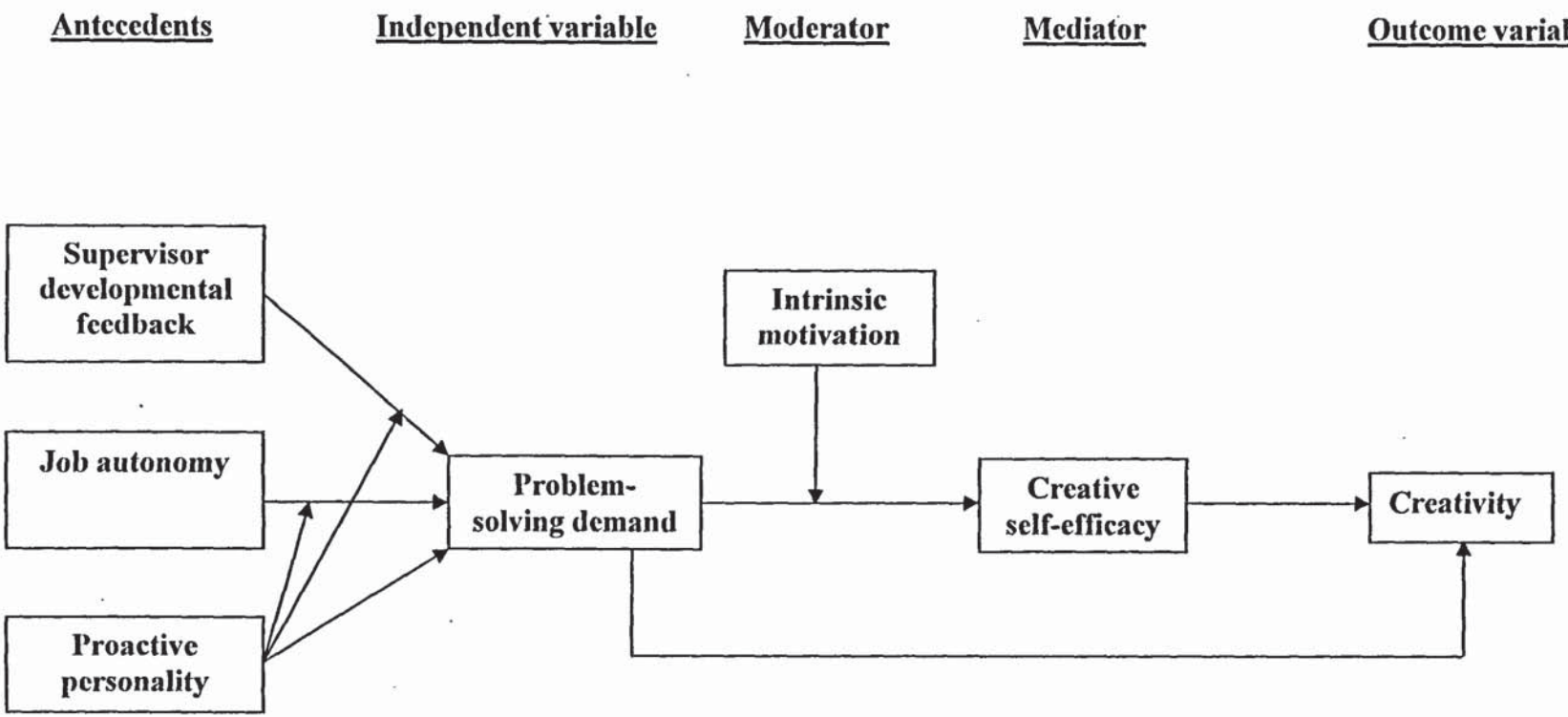
Consequently, this research has four objectives. First, it examines the relationship between PSD and creativity. Second, it tests a psychological mechanism

(i.e. creative self-efficacy) that may link PSD and creativity. Third, it examines a boundary condition (i.e. intrinsic motivation) that may moderate the relationship between PSD and creative self-efficacy. Finally, this research examines supervisor developmental feedback, job autonomy, proactive personality and their interactions as antecedents to PSD. Figure 1 depicts a schematic representation of the relationships examined in this study.

This study contributes to the literature in several ways. First, PSD, as an emerging job attribute, has important implications for employee outcomes (Parker & Wall, 2001), including creativity. To date, however, the impact of PSD on creativity is yet to be empirically examined. This study is the first to theorize and test the positive relationship between PSD and creativity. Second, a full understanding of the context-creativity relationships requires examination of why and how contextual factors are related to creativity (Shalley et al., 2004). Unfortunately, prior research has provided a limited knowledge regarding the processes that may link PSD and creativity. By investigating a psychological mechanism (i.e. creative self-efficacy) through which PSD may influence creativity, this research contributes to the growing but sparse body of work on why contextual factors influence employee creativity (e.g. Madjar et al., 2002; Shin & Zhou, 2003). Furthermore, by investigating the moderating influence of intrinsic motivation on the PSD-creativity relationship, this study contributes to research on the moderators of the context-creativity relationships (e.g. George & Zhou, 2001; Oldham & Cummings, 1996; Shin & Zhou, 2003). Finally, in response to calls to investigate antecedents to creativity-enhancing contextual factors (Amabile et al., 2004), this research is among the earliest to investigate antecedents to PSD. Prior research has provided some intriguing

evidence that employees are likely to engage in creative performance when they perceive job attributes as complex and challenging (Amabile et al., 1996; Oldham & Cummings, 1996; Unsworth et al., 2005). Little, however, is known about how perceptions of complex and challenging job attributes emerge and what management can do to facilitate such perceptions. Consequently, this research extends our understanding of the job attributes-creativity relationship examining some antecedents to job attributes. The findings will suggest managerial interventions that organisations can adopt to shape job attributes, thereby fostering creativity.

Figure 1: A systematic model for examining PSD-creativity relationship



Organisation of the thesis

Chapter 2 (*PSD and employee creativity*) focuses on the relationship between PSD and creativity. First, it provides a review of the theoretical frameworks that have influenced creativity studies and develops a model of the relationship between PSD and creativity. Second, it presents the hypotheses that explicate the processes through which PSD affects creativity.

Chapter 3 (*Antecedents of PSD*) focuses on antecedents of PSD. It first provides a review of the theories of antecedents of job attributes. Second, it presents different problem situations that may lead to PSD, culminating in a discussion of antecedents to PSD. Specifically, supervisor developmental feedback, job autonomy, proactive personality and their interactions are identified as antecedents of PSD.

Chapter 4 (*Research design and method*) presents the model tested in the present research and describes research paradigms and methodologies, including details of project design, procedure, sample and relevant ethical research issues. This is followed by a description of the measures of the study variables and the translation and back-translation of the questionnaire.

Chapter 5 (*Results*) has two parts. Part one is *Data analysis*, including the discussion of confirmatory factor analysis (CFA), tests for mediation, moderation and moderated mediation. Part two reports the results of CFA, descriptive statistics and hypotheses testing.

Chapter 6 (*Discussion)* summarises the findings of this research, and discusses the implications of the findings for theory and practice. This is followed by a discussion of the limitations of the study, directions for future research and concludes with a brief summary, particularly of the central message of this thesis

Summary

This chapter has discussed the background to the research problem, identified gaps in the extant literature, and presented the objectives and potential contributions of the present research. It has also provided an outline of structure of the thesis. In the next chapter, I review the literature on the relationship between PSD and creativity.

Chapter 2: PSD and employee creativity

Introduction

In the last two decades, research on the relationships between contextual factors and employee creativity has been largely influenced by three conceptual frameworks: (1) the componential model of creativity (Amabile, 1983, 1996); (2) an interactionist approach (Woodman, Sawyer, & Griffin, 1993), and (3) creative action in multiple social domains (Ford, 1996). I compare and contrast these three conceptual frameworks, and derive an integrative theoretical framework to examine the relationship between PSD and creativity and the processes linking these two.

The discussion will unfold as follows: First, I review three theories on creativity, from which I propose an integrative framework for examining the relationships between contextual factors and creativity. Second, against this integrative framework, I review empirical studies examining the relationships between cognitive demand (which has been conceptualised as task complexity, perceived challenge, and creative requirement) and creativity. This is followed by a discussion of limitations of the extant literature. Lastly, to address these limitations, I propose to examine the relationship between PSD, a specific type of cognitive demand, and creativity and the underlying processes by applying the afore-mentioned integrative framework. Hypothesized relationships are formally presented.

Theories of creativity

The componential framework of creativity. Based on the social psychology of creativity, Amabile (1983, 1996) proposed a componential model of creativity to explicate the impact of social/contextual factors on creativity. As discussed earlier, Amabile's (1983) social psychology of creativity stresses the important role that social / contextual factors play in influencing creativity. This componential model of creativity provides a "working framework" to examine the environmental conditions that foster or inhibit individual creativity (Amabile, 1983, 1996). According to this framework, creativity comprises three components: *domain-relevant skills, creative-relevant processes* and *task motivation.*

Creativity is a domain specific construct (Amabile, 1983; Ford, 1996). Familiarity with *domain-relevant skills*, such as workers' knowledge of the procedures to operate a machine or potential methods to solve a problem, is crucial for employees to generate creative ideas or solutions (Amabile, 1996; Weisberg, 1999). The more familiar one is with the task skills, the more likely he or she would be creative at work.

Creative-relevant processes are associated with divergent thinking and application of heuristics for the exploration of new pathways (Amabile, 1996). Having *creativity-relevant processes*, one may be able to explore different cognitive pathways and pay attention to specific aspects of problems, which lead to successful resolutions to problems. Contextual factors (e.g. supervisor's behaviour, reward or job design) may influence employee creativity through their impact on employees' work-related knowledge and skills or skills relevant to creative thinking processes.

Task motivation refers to "a general and pervasive orientation toward one's work" (Amabile, 1996: 116). *Task motivation* influences employee creativity by increasing individual levels of persistency in and focus on problem-solving (Amabile, 1996). Indeed, of the three components, Amabile (1983, 1996) considers task motivation to be central to creativity. This is because, apart from its direct impact on creativity, *task motivation* also influences the other two components (i.e. *domain-relevant skills* and *creative-relevant processes* (Amabile, 1983, 1996). Consequently, task motivation is seen as an underlying psychological mechanism linking contextual factors and creativity.

A large number of creativity studies have applied Amabile's (1983, 1996) componential framework in examining context-creativity relationships in organisations (Amabile, 1988; Oldham & Cummings, 1996; Scott & Bruce, 1994; Zhou, 1998). Among them, the most influential studies have been carried out by Amabile and her associates. For instance, based on early work (Amabile, 1983), Amabile (1988) proposed a model including three broad organisational factors that influence creativity and innovation in organisations: (1) *organisational motivation to innovate* defines an organisation's general orientation towards creativity and support for creativity throughout the organisation; (2) *resources* refer to what an organisation supplies to facilitate employee creativity (e.g. sufficient time to generate ideas or employee training); and (3) *management practices* include providing autonomy or discretion, challenging tasks, clear goals and working teams with diverse perspectives and skills. This model provides the theoretical framework for KEYS, an instrument

designed to assess aspects of work environment for creativity (Amabile et al., 1996; Amabile, Hill, Hennessey, & Tighe, 1994).

Rather than examining the work environment as a whole, other researchers have investigated specific aspects of the work environment (i.e. supervisor, feedback, job attributes, rewards and etc.) (See Shalley et al., 2004 for a detailed review). Findings from this stream of research have generally supported the notion that the context in which one performs tasks can largely influence his or her creative performance. Here I summarise three contextual factors which have been shown to be positively related to employee creativity (Shalley et al., 2004).

Supportive supervisor behaviours. When supervisors are supportive they care for employees' concerns, have open interactions with employees, support employees' ideas by providing positive informational feedback and help employee skill development (Deci, Connell, & Ryan, 1989). When supervisors demonstrate supportive behaviours, employees will feel safe and are willing to provide new ideas. With some exceptions (e.g. George & Zhou, 2001; Zhou & Shalley, 2003), a large number of studies have provided supporting evidence for the positive relationship between supportive supervision and creativity (e.g. Farmer, Tierney, & Kung-McIntyre, 2003; Frese, Teng, & Wijnen, 1999; Madjar et al., 2002; Oldham & Cummings, 1996; Shalley & Gilson, 2004; Tierney & Farmer, 2002).

Supportive feedback. Supportive feedback is delivered in informational style (Zhou, 1998) and meant to help employees learn and develop skills for their tasks (Zhou & George, 2003). Supportive feedback does not impose feedback-giver's

intentions on the feedback recipient. Rather it is given in a constructive and empathetic way. For instance, in Zhou's (1998) laboratory study, participants under supportive feedback conditions received such feedback as, "You did very well. Congratulations! Keep up the good work." The positive relationship between supportive feedback and creativity has received empirical support in studies carried out in both laboratory (Shalley, 1991; Zhou, 1998) and field settings (Zhou & George, 2001). Specifically, George and Zhou (2001) reported colleagues' supportive feedback to be positively related to creativity in a study of 149 office employees from a manufacturing company.

Complex and challenging task. Complex and challenging task has been operationalised as psychological complexity of tasks (e.g. high levels of autonomy, feedback, significance, identity and variety) (Hackman & Oldham, 1980), the complexity score in the Dictionary of Occupational Titles (Roos & Treiman, 1980) or individual perceptions of complex tasks (Hatcher, Ross, & Collins, 1989). Such tasks are believed to enhance employees' interest, excitement and feeling of competence at work, which lead to creativity (Amabile, 1996). Empirical studies have provided evidence of a positive relationship between complex and challenging task and creativity (e.g. Hatcher et al., 1989; Oldham & Cummings, 1996; Tierney & Farmer, 2002). It is important to note, some complex and demanding job attributes, such as PSD has not been examined for its impact on creativity. This will be further discussed in more detail in my review of the cognitive demand-creativity relationship hereafter.

In spite of empirical support, Amabile's (1983, 1996) componential framework of creativity is limited in explicating the complex processes that characterize the relationships between the context and employee creativity. For instance, this model relies singularly on task motivation to explain the impact of the context on individuals' psychological states, which, in turn, lead to creativity. A small number of studies have tested the mediating influence of intrinsic motivation suggested by Amabile (1983) (e.g. Shalley & Perry-Smith, 2001; Shin & Zhou, 2003). The results have been inconclusive. In a laboratory study of the relationship between expected evaluation and creativity, Shalley and Perry-Smith (2001) reported that task motivation did not mediate this relationship. In a field study, however, Shin and Zhou (2003) reported that intrinsic motivation partially mediated the influence of transformational leadership on creativity. Given the lack of empirical support, scholars have argued that task motivation may not be the single important mechanism that explains the impact of context on creativity and that other psychological mechanisms, such as self-efficacy (Redmond et al., 1993) or mood states (Madjar et al., 2002), may help explain the context-creativity relationships (Ford, 1996; Shalley et al., 2004; Shin & Zhou, 2003; Zhou & Shalley, 2003). Furthermore, the framework does not consider individual differences which may function as boundary situations on the context-creativity relationship (Woodman et al., 1993). To address limitations of Amabile's componential framework of creativity, it seems necessary to incorporate two other creativity models: Ford (1996) and Woodmand et al (1993), each of which complements Amabile's work in explaining employee creativity. Specifically, Ford's (1996) model of creative individual action, offers a more in-depth insight regarding the motivational processes linking contextual factors and creativity. An interactionist model of creativity by Woodman and his coauthors (1993) addresses

the influence of individual differences on the relationship between contextual factors and creativity. I will discuss these two models in greater detail in the following sections.

A theory of creative individual action. In line with the notion that social-contextual factors influence employee creativity (Amabile, 1983, 1996; Woodman et al., 1993), Ford (1996) proposed that employee creativity should be examined in multiple social domains, such as groups, organisations, institutions and market. Furthermore, Ford (1996) suggested that creativity is an intentional choice based on one's assessment of the context or the individual's own abilities (i.e. self-confidence/ self-efficacy). There are contextual or individual situations under which one chooses to take new and creative actions rather than habitual actions (i.e. familiar or conventional ways of doing things) and vice versa. Therefore, the processes by which one chooses to take creative actions are also those that one opts to forsake habitual actions. Based on a review of empirical studies of creative performance, Ford (1996) further proposed three factors that influence one's choice of creative actions: *sensemaking*, *motivation*, and *knowledge and ability*.

Sensemaking involves information seeking and interpreting situations. Ford (1996) proposed that the way an individual processes information (when interpreting a situation or seeking information or decision-making) determines his or her choice of creative options versus routine options. There are two types of information processes: automatic and controlled processes (Fisk & Schneider, 1983). Automatic processes are fast and effortless. Individuals do not apply much cognitive resources and conscious control doing simple, easy and repetitive tasks. For example, feeding

materials to a production line involves an automatic process. Once employees grasp the skills of feeding the materials, they will do it with ease without applying much cognitive resources. In contrast, controlled processes are slow and effortful because individuals need to apply cognitive resources and conscious control when they perform tasks. For example, when a faulty item occurs on the production line, employees have to identify the problem and try to generate solutions to the problem. Because this type of incident does not happen often, employees need to search from prior experience or work-related knowledge so as to make sense of the problem and solutions. This involves a controlled process. Ford (1996) suggests that if one relies on automatic processes, he or she may tend to take routine options rather than creative options whereas if one is guided by controlled processes in making sense of a situation, he or she is likely to produce creative outcomes.

Motivation. According to Ford (1996), one's motivation to undertake certain courses of action (e.g. creative actions) is determined by a number of factors such as goals, perceived expectation (e.g. receptivity belief), perceived self-ability (i.e. self-efficacy) and emotions (e.g. interest, anxiety, pleasure or boredom).

Goals determine one's attention, efforts and strategies in accomplishing tasks (Locke, Frederick, Lee, & Bobko, 1984). When creativity is a salient goal, individuals are likely to produce creative performance (Ford, 1996). The salience of creative goals is influenced by individual preferences (Kirton, 1980, 1989), contextual influences such as leadership (Amabile & Gryskiewicz, 1989; Bailyn, 1985; Redmond et al., 1993), discretion (Amabile & Gitomer, 1984; Andrews, 1975; Andrews & Farris, 1967),

change-oriented management (Amabile & Gryskiewicz, 1987; Hage & Dewar, 1973) or simply direct instructions (from supervisors) to be creative (Shalley, 1991, 1995).

Receptivity beliefs reflect one's perception of the expectations in his or her domain/field regarding whether creativity is favoured or not. One will choose to take creative options if they perceive that being creative leads to positive consequences. Otherwise, one will refrain from being creative. Individuals' perceptions of receptivity belief are based on their previous learning and vicarious experiences, e.g. whether being creative is rewarded or punished. Effective communication networks (Simonton, 1984), equitable reward system (Amabile & Gryskiewicz, 1987), adequate resources (Amabile & Gitomer, 1984; West & Savage, 1987) and tolerance of ambiguity (D. W. MacKinnon, 1970) have been shown to lead to the belief that creativity is positively received. These beliefs, in turn, lead to creativity (Ford, 1996).

Capability beliefs refer to individuals' self-expectations regarding their abilities to successfully undertake a specific behaviour (e.g. creative action). It is also termed as self-efficacy (Bandura, 1986). In line with social cognitive theory (Bandura, 1986, 1997), Ford (1996) proposed that individuals with strong rather than low capability beliefs (i.e. self-efficacy) are more likely to take creative actions. A number of empirical studies have provided supporting evidence for the link between capability beliefs (self-efficacy) and creativity (e.g. K. James, Chen, & Goldberg, 1992; D. W. MacKinnon, 1962; Redmond et al., 1993; Tierney & Farmer, 2002).

Individuals' *emotional experiences* (e.g. pleasure, excitement, fear, or resentment) also play an important role in one's motivational processes leading to creative

performance. According to Ford (1996), emotions are typically elicited by one's expectations (i.e. goals, receptivity beliefs and capability beliefs) relating to future events, such as taking a creative action. Individuals with positive expectations of creative actions are likely to feel emotionally expressive (Simonton, 1977), energetic (D. W. MacKinnon, 1962), or to experience pleasure, interest or excitement about taking creative actions (Amabile & Gryskiewicz, 1987). These emotional experiences help individuals feel motivated to take creative actions (Ford, 1996).

Knowledge and ability include domain-relevant knowledge, behavioural abilities (e.g. communication skills, social net-working skills) and creative-thinking abilities. Empirical studies have provided support for the positive influences of domain-relevant knowledge (Keller & Holland, 1978; Simonton, 1983), behavioural abilities (Gardner, 1993; Perry-Smith, 2006) and creativity abilities (Amabile & Gitomer, 1984; D. W. MacKinnon, 1970) on creativity.

According to Ford (1996), although each of these factors (i.e. sensemaking, motivation, and knowledge and ability) may contribute to one's creative performance individually, they need to be considered simultaneously. He argued that this is because a deficit in one factor (e.g. creative abilities) may thwart the positive effects of other factors (e.g. motivation and/or sensemaking). Ford (1996) further posited that this model of individual creative action needs to be studied in multiple social domains, i.e. taking account of the influences from groups, organisations, institutional environments and markets. So far, however, empirical studies have not examined this model as a whole. This probably has been due to the complexity of the model.

Ford's (1996) theory of individual creativity has some similarities with that of Amabile (1983, 1988, 1996). Both emphasise contextual influences on employee creativity and the important roles of motivation, domain-relevant knowledge and creativity-related ability and skills. However, Ford's (1996) theory can be distinguished from Amabile's in a number of ways. The most important difference between Ford (1996) and Amabile (1983, 1988, 1996) is that he (Ford) expands the motivational process that influences individual creativity. Specifically, he includes goals, receptivity belief, capability beliefs (i.e. self-efficacy) and emotions as key elements in the motivational process that leads to creativity. Of these key elements, self-efficacy has attracted considerable research attention. Self-efficacy reflects one's evaluation of self rather than the external factors emphasised in Amabile's model (1983, 1988, 1996). Ford (1996) argues that in addition to the evaluation of the external environment, one may also evaluate him/herself (whether he or she is capable of being creative), to decide whether or not to engage in creative activities. Only those who are confident about their capabilities (i.e. high in self-efficacy) will take creative rather than habitual options. Therefore, self-efficacy constitutes an indispensable dimension of the motivational process leading to individual creativity (Ford, 1996).

Ford's (1996) suggestion is in line with social cognitive theory (Bandura, 1986, 1997), which posits that self-efficacy is a central self-regulatory mechanism inherent in the motivational process. The levels of self-efficacy determine one's direction, effort and persistence in the face of challenges (Bandura, 1997), which are crucial for creative performance (Amabile, 1988). Tierney and Farmer (2002) went further to develop the construct of creative self-efficacy (i.e. one's belief in his or her creative

capabilities), which is relevant in a creativity context. Furthermore, in a study of 140 R&D employees, Tierney and Farmer (2004) reported that creative self-efficacy mediated the relationship between leader's expectation of creativity and employee creativity. The finding confirms Ford's (1996) notion that creative self-efficacy can work as a psychological mechanism linking contextual factors and creativity. In the current research, I will examine the mediating influence of creative self-efficacy on the relationship between PSD and creativity. Another creativity model that supplements Amabile's (1983, 1996) work is an interactionist model of creativity proposed by Woodman and his coauthors (1993).

An interactionist model of creativity. This model finds its roots in the interactionist psychology literature (Schneider, 1983; Terborg, 1981), which posits that individual behaviour is a function of the interactions between individual characteristics (e.g. cognitive, affective, motivational, and ability) and the context that provides "psychological meaning" and "behaviour potential" to individuals (Terborg, 1981: 572). Accordingly, Woodman and Schoenfeldt (1990: 279) explained that "from an interactionist perspective, the behaviour of an organism at any point in time is a complex interaction of the situation and something else-this something else is the nature of the organism itself." To apply this perspective in creativity research, Woodman and his colleagues (1993) propose that creativity at the individual level is influenced not only by social/contextual factors emphasised by many theorists (Amabile, 1983, 1988, 1996; Ford, 1996) but also by individual factors, such as personality, cognitive style/ability, knowledge and motivation. Indeed, individual creativity is a product of the interactions between individuals and the given social context. Therefore, to fully understand contextual factors that foster or hinder

employee creativity, one needs to take into account not only the impact of contextual factors but also individual differences in responding to these contextual factors.

In their interactionist model, Woodman and his coauthors (1993) suggest that individual differences such as biographical variables, cognitive style and ability, personality factors (e.g. self-esteem, locus of control), relevant knowledge, and intrinsic motivation interact with contextual and social factors (e.g. rewards, physical environment, task and time constraints) to influence individual creativity. Accordingly, many researchers have adopted an interactionist perspective in employee creativity studies (e.g. Baer, Oldham, & Cummings, 2003; George & Zhou, 2001; Madjar et al., 2002; Oldham & Cummings, 1996; Tierney et al., 1999; Zhou, 2003; Zhou & George, 2001). Findings from this line of research suggest that the relationships between contextual factors (e.g. task attributes, leadership behaviours, social support) and creativity are contingent on individual differences (e.g. CPS, cognitive styles, values) (see Shalley et al., 2004 for a detailed review). For instance, in a study of 171 manufacturing employees, Oldham and Cummings (1996) reported that contextual factors such as supportive, non-controlling supervision and task complexity were more likely to lead to creative performance for individuals with high rather than low creative potential (i.e. CPS). Similarly, in a study of 123 hospital employees, Zhou (2003) reported that the joint influences of close monitoring and presence of creative co-worker on creativity was moderated by individual differences, i.e. levels of CPS. Specifically, individuals with low CPS demonstrated higher creativity in the presence of creative co-worker when supervisory monitoring was low.

However, the research of the moderating influence of individual factors on the relationship between contextual factors and creativity has been limited. As Shalley and her colleagues (2004) suggested, although some individual differences (e.g. CPS, cognitive styles) have been found to influence the relationships between contextual factors and creativity, more research is needed. One of their suggestions was to examine individual factors other than those that have been examined. An important individual difference that has not been examined is intrinsic motivation. Intrinsic motivation has been related to employee creativity (Amabile, 1983; 1996). Unfortunately, research has yet to empirically examine the moderating effects of intrinsic motivation. Intrinsic motivation has been related to one's persistence in the face of difficulties and failures (Meyer, Becker, & Vandenberghe, 2004) and better learning outcomes (Button, Mathieu, & Zajac, 1996). It can be seen as an important individual difference that may moderate the relationship between contextual factors and creativity. For instance, when the job situation is demanding and complex (e.g. PSD), an individual high in intrinsic motivation may be more able to deal with the demand, leading to better understanding of work-related problems and more creative ideas. Therefore, in the current research, I will examine the moderating influence of intrinsic motivation on the relationship between PSD, the focal contextual factor in this study, and creativity.

An integrative model of creative performance

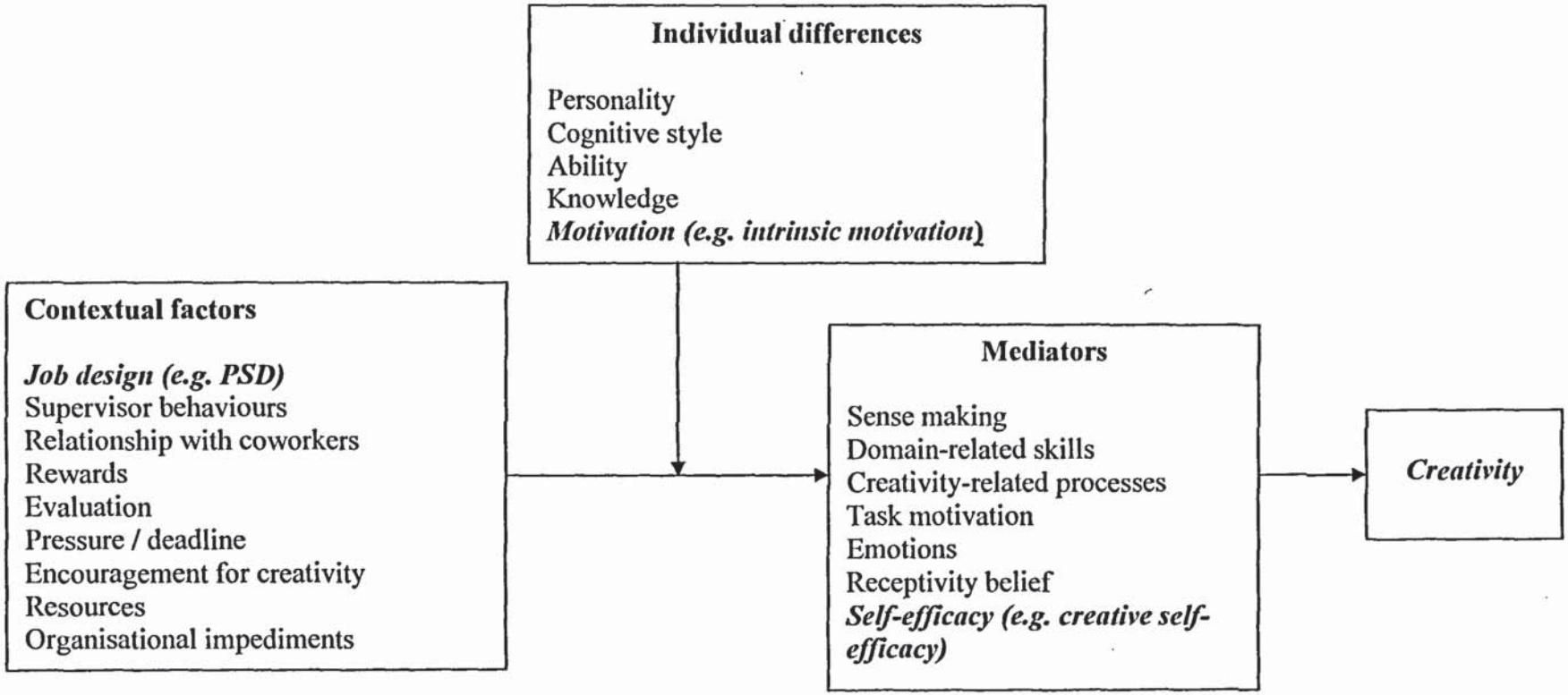
Despite the differences among the three frameworks, they are complementary and can therefore be integrated to provide a more comprehensive understanding of creative performance. This is because (i) there is a consensus among the three theoretical frameworks that creativity is influenced by various contextual factors in

organisations (Amabile, 1988; Ford, 1996; Woodman et al., 1993); (ii) the theoretical frameworks imply that creativity-enhancing contextual factors in many cases do not directly influence creativity. Rather, they foster or inhibit employee creativity through a number of intervening factors. For instance, both Amabile (1983, 1988) and Ford (1996) suggest that employees' task motivation, work-related knowledge and skills, and creativity-related skills may underpin the influence of contextual factors on creativity. More relevant to the present research and in line with social cognitive theory (Bandura, 1986, 1997), Ford (1996) proposes that self-efficacy (e.g. creative self-efficacy) play an important role in the motivational process leading to creativity; and (iii) from an interactionist psychology perspective (Terborg, 1981), Woodman and his coauthors (1993) complement the research on context-creativity relationships by taking account of individual differences (e.g. intrinsic motivation).

Figure 2 presents a schematic representation of the proposed integrative model. Based on this integrative model of creative performance, I will examine the relationship between PSD, a job design factor, and creativity. The variables examined in this study are highlighted in bold italics. Specifically, creative self-efficacy is examined for its mediating influence on the relationship between PSD and creativity. Intrinsic motivation is examined for its moderating influence on the relationship between PSD and creative self-efficacy, which, in turn, leads to creativity. Before examining the PSD-creativity relationship, however, I will review in the succeeding section empirical studies that have examined the relationships between cognitive demand (e.g. perceived job challenge, task complexity, creative goal/requirement) and creativity. This is because, as discussed in Chapter 1, this research focuses on PSD, a specific type of cognitive demand emerging in the job design literature. A review of

the cognitive demand-creativity research will help understand the link between PSD and creativity.

Figure 2: An integrative model of creative performance



Cognitive demand-creativity relationships

A considerable number of researchers have investigated the influence of cognitive demand on creativity (e.g. Amabile, 1988; Amabile et al., 1996; Oldham & Cummings, 1996; Shalley, 1991, 1995; Tierney & Farmer, 2002, 2004; Unsworth et al., 2005) in diverse research settings. Some investigated cognitive demand-creativity relationships in laboratory settings (Shalley, 1991, 1995), while others in field settings (i.e. organisations) with R&D employees (e.g. Amabile, 1988; Amabile et al., 1996; Tierney & Farmer, 2004) or employees in a general work environment (Oldham & Cummings, 1996; Tierney & Farmer, 2002; Unsworth et al., 2005).

Cognitive demand has been conceptualised in three ways: perceived job challenge (Amabile, 1988; Amabile et al., 1996), creative goal / requirement (Shalley, 1991, 1995; Unsworth et al., 2005) and task complexity (Oldham & Cummings, 1996; Tierney & Farmer, 2002). I will review these constructs individually and their respective relationship with creativity in the following sections.

Perceived job challenge

According to Amabile and her associates (Amabile, 1988; Amabile et al., 1996; Amabile & Gryskiewicz, 1989), when jobs present a positive pressure, which is "intellectually challenging", employees will be motivated and are likely to be creative. Amabile (1988: 147) defines this positive pressure as job challenge, "a sense of challenge arising from the intriguing nature of the problem itself or its importance to the organization (internalized by the individual as a personal sense of challenge)."

Therefore, job challenge constitutes a cognitive demand that employees may experience at work.

Based on qualitative data collected from R&D employees, Amabile and her associates found perceived job challenge to be a creativity-enhancing factor in the work environment (Amabile, 1988; Amabile & Gryskiewicz, 1989). The positive relationship between perceived job challenge and creativity was further supported in a field study with 2796 participants from 21 different organisations in a number of industries (e.g. high technology, electronics, chemicals, pharmaceuticals, manufacturing, banking and consumer products). Of the five dimensions (i.e. challenge, organisation encouragement, work group supports, supervisory encouragement and organisational impediments), that constitute a creativity work environment, challenge was reported to be one of the most dominant influences on employee creativity (Amabile et al., 1996). To explain the positive relationship between perceived job challenge and creativity, Amabile and her coauthors (1996) suggested that perceived job challenge promoted employees' task motivation, which consequently led to creativity.

Creative goal/ requirement

Creative goal/requirement refers to job conditions under which employees are instructed formally or informally to provide creative outcomes. It has been investigated either in a laboratory setting where participants are asked to provide creative solutions to a problem (e.g. Shalley, 1991; Shalley, 1995), or in a field setting where employees perceive that their jobs require them to generate ideas regarding internal operations or products (e.g. Axtell, Holman, Unsworth, Wall, & Waterson,

2000; Unsworth, 2001). The influence of creative goals on creativity has been largely examined in laboratory settings. For instance, Shalley (1991) examined the relationship between creative goals and creative performance in a laboratory setting. Two hundred and seventy participants were asked to generate solutions to memos presented to them. The memos involved a series of problems presented to the personnel director of a steel manufacturing company. Meanwhile, participants were assigned to different goal situations (i.e. no creativity goal, do-your-best creativity goal and difficult creativity goal). Three experts (i.e. graduate students with experience in personnel management) rated the generated solutions on a 7-point scale (1= not all creative; 7=extremely creative). It was found that individuals were more creative in creativity goal situations (i.e. 'do-your-best' creativity goal and difficult creativity goal) than in no creativity goal situation. In other words, compared with no creativity goal, creative goals, regardless of whether they are 'do-your-best' or difficult creativity goal, can significantly improve creativity. This is in line with goal-setting theory (Locke et al., 1984; Locke, Shaw, Saari, & Latham, 1981), which posits that goals affect individuals' motivational process (effort, direction, and persistence) as well as cognitive process (strategy development). In the case of creativity, goals that imply creativity requirements serve to "prime individuals to focus their attention and effort on being creative" (Locke et al., 1981: 183).

Similarly, but in a field setting, Unsworth and her co-authors (2005) investigated the relationship between creative requirement and creativity with data obtained from 1,180 employees from a UK hospital. Creative requirement was measured by individuals' perceptions of whether they are expected to provide work-related ideas

(Axtell et al., 2000). They found that creative requirement was positively related to creativity rated by individual self-evaluation.

Task complexity

While creative goal is more relevant to the context where creativity is an expected outcome, task complexity is a job attribute that presents complex and challenging job conditions to employees in a general work environment. It normally refers to an overall index of the levels of complexity of one's tasks (e.g. Hackman & Oldham, 1980; Roos & Treiman, 1980). To date, a number of studies have included task complexity in creativity studies (e.g. Baer & Oldham, 2006; Oldham & Cummings, 1996; Tierney & Farmer, 2002, 2004). These studies have conceptualised task complexity in three ways: psychological complexity, objective complexity and perceived complexity.

Psychological complexity. Oldham and Cummings (1996) conceptualised task complexity as a psychological construct (Campbell, 1988). It was assumed that when tasks have high autonomy, feedback, variety, identity and significance, employees will experience psychological complexity. Measured by MPS (Motivation Potential Score) (Hackman & Oldham, 1980), psychological complexity covers five factors: task autonomy, task variety, task feedback, task identity and task significance (see below).

$$MPS = \frac{Skill\ Variety + Task\ Identity + Task\ Significantce}{3} \times Autonomy \times Feedback$$

High MPS indicates high levels of psychological complexity.

In a study of 171 employees in a manufacturing setting, Oldham and Cummings (1996) reported MPS was positively related to creativity rated by supervisors but not other creativity indicators (i.e. patents and suggestions). Furthermore, Oldham and Cummings (1996) observed that the relationship between MPS and creativity measured by suggestions was moderated by levels of creative personalities (i.e. CPS). Specifically, the relationship between MPS and creativity was positive for individuals who score high in creative personalities. However, this relationship was negative for those who score low in creative personalities. Their findings highlight the role of individual differences in reaction to job demands.

Objective complexity. Tierney and Farmer (2002, 2004) measured task complexity by complexity score of the DOT (Dictionary of Occupational Titles) ((Roos & Treiman, 1980), which also includes various dimensions of tasks. Based on information on 46 occupational characteristics of 12,099 occupations, Roos and Treiman (1980) identified four dimensions of job attributes: substantive complexity, motor skills, physical demands, and undesirable working conditions. Among them substantive complexity has been frequently used as a measurement of task complexity. According to Roos and Treiman (1980), the score for substantive complexity constitutes a summary indicator of eight areas: (1) complexity of the function in relation to data, (2) general educational development, (3) specific vocational preparation, (4) intelligence, (5) verbal aptitude, (6) numerical aptitude, (7) abstract and creative versus routine, concrete activities, and (8) repetitive or continuous processes. High DOT complexity score indicates high levels of task complexity.

With a manufacturing sample of 584 employees, Tierney and Farmer (2002) observed a positive relationship between task complexity (i.e. DOT) and creativity, similar to Oldham and Cumming's (1996) findings. In contrast, in the same study however, with a non-manufacturing sample (i.e. mostly white collar employees) of 158 employees, they found task complexity did not have a significant relationship with creativity. Furthermore, this non-significant relationship replicated in a study of 140 R&D employees (Tierney & Farmer, 2004).

Perceived complexity. A number of studies have measured task complexity by using individual perceptions (Baer & Oldham, 2006; Frese et al., 1999; Hatcher et al., 1989). For instance, in a recent study of 170 manufacturing employees, Baer and Oldham (2006) measured complexity by asking supervisors whether employees' tasks are complex and employees need training to do the tasks. The results showed that task complexity was positively related to creativity rated by supervisors. Differently, Frese and his colleagues (1999) measured complexity by asking employees the difficulty levels of their tasks. Furthermore, they combined task complexity and autonomy to form an index of job content. Autonomy was highly correlated with task complexity ($r=.53$, $p<.01$). Contrary to the authors' prediction, job content was negatively related to creativity (measured by the perception of having creative ideas by employees themselves).

As revealed above, the relationship between task complexity and creativity have been found to be inconclusive. A possible explanation may have to do with the context of the research. The mixed findings may have been due to differences among the samples. Specifically, task complexity was consistently related to creativity for

manufacturing but not for non-manufacturing samples. As Tierney and Farmer (2002: 1146) suggested, the prominence of job complexity in relation to creativity among these employees (i.e. employees in manufacturing setting) reinforces the potency of job design as a means of eliciting creativity in settings in which such activities are neither traditionally required nor expected."

However, I argue that the conceptualisation of cognitive demand, i.e. task complexity may also be one of the reasons. In general prior research has adopted a global measurement of cognitive demand, i.e. specific types of cognitive demand have not been examined. This approach has attracted much criticism (Jackson, Wall, Martin, & Davids, 1993; Parker & Wall, 2001; Roberts & Glick, 1981; Shalley et al., 2000). One of the key issues is that these global constructs may tap only some but not all relevant aspects of cognitive demand. For instance, problem-solving demand is an important element of task complexity (Campbell, 1988; Dean & Snell, 1991), explaining some variance in task complexity (Wall, Jackson, & Mullarkey, 1995). However, neither MPS, DOT nor perceived complexity captures the problem-solving aspect of task complexity.

Another important reason may be the neglect of the boundary conditions (e.g. individual differences) that may moderate the relationship between cognitive demand and creativity. Informed by the integrative model of creative performance I proposed earlier, the influences of contextual factors on creativity may be contingent on individual differences, such as intrinsic motivation (Woodman et al., 1993). Apart from Oldham and Cummings' (1996) initial attempt to test the moderating effect of an individual difference (i.e. CPS) on the relationship between task complexity and

creativity, research to explore the boundary conditions on task complexity-creativity relationships has been limited.

In sum, although prior research has established the positive relationship between some type of cognitive demand (e.g. perceived job challenge and creative goal/requirement) and creativity, a number of issues have remained unaddressed. First, the relationship between task complexity, an important type of cognitive demand, and creativity has been inconclusive. A closer review of the inconclusive relationship suggests that it is necessary to examine a specific type of cognitive demand rather applying a global construct such as MPS, DOT or perceived complexity. To date, empirical studies that have examined the relationship between a specific type of cognitive demand and creativity have been rare.

Second, according to the integrative framework I proposed earlier, the processes that link contextual factors and creativity have been understudied. For instance, in explaining the positive relationship between perceived job challenge, Amabile and her coauthors (1996) suggested that perceived job challenge promoted individuals' interest (i.e. motivation) in the task, leading to creativity. However, the theorized mediating influence of task motivation has not been empirically tested. Meanwhile, potential moderating effects of individual on the relationship between perceived job challenge and creativity differences have not been taken into account. It is possible that employees may respond differentially to the challenge at work resulting in different levels creativity. Similarly, both Shalley (1991) and Unsworth et al. (2005) reported a positive relationship between creative goal/requirement and creativity in their respective study. However, limited explanations have been provided to depict

the processes linking creative goal/requirement and creativity. Specifically, it is not clear what psychological mechanisms mediate the impact of creative goal/requirement on creativity and what are contingent conditions that may moderate the creative goal/requirement-creativity relationship. While some researchers have paid attention to the moderating influence of individual factors on task complexity-creativity relationship (e.g Oldham & Cummings, 1996), so far, only one individual factor (i.e. CPS) has been examined.

In light of the limitations in the extant literature, this research therefore aims to examine a specific aspect of cognitive demand, problem-solving demand (PSD), in relation to creativity. Following the integrative model discussed earlier, this research will not only examine the main effect of PSD on creativity, but also the processes through which PSD may influence creativity.

This research focuses on PSD for two reasons. First, PSD taps a specific aspect of job demand, covering distinctive job contents that are problem-preventing, problem-identification, problem-analysis and problem-solving (Wall, Corbett, Martin, Clegg, & Jackson, 1990). By examining this specific type of cognitive demand, this research overcomes the limitation of global constructs used in prior research.

Second, cognitive demand is an emerging job dimension that has increasingly attracted both practitioner and academic attention (Parker, Wall, & Cordery, 2001). This reflects a trend in modern organisations that employees' cognitive resources rather than physical resources are more important (Parker et al., 2001). Consequently, developing a more finely-tuned understanding of how and why cognitive demand may

promote creativity has become imperative (Parker et al., 2001). Such an understanding will enable organizations to design jobs in order to maximize employees' creative potential. As an important form of cognitive demand, PSD requires employees to actively utilise work-related knowledge and skills to "diagnose and solve problems" at work (Wall, Corbett, Clegg et al., 1990: 208). By examining the processes through which PSD influences creativity, this research attempts to address the 'black box' in the cognitive demand-creativity relationship.

Hypotheses

Drawing on prior research on the cognitive demand-creativity relationship, PSD constitutes a challenging and demanding job condition. Informed by the integrative model of creative performance, the influence of PSD on creativity, however, may not be direct. In light of the social learning perspective (e.g. Bandura, 1986; Davis & Luthans, 1980; Sims, 1983; Wood & Bandura, 1989), it is possible that PSD, as a complex and demanding job attribute, provides opportunities for one to fully apply cognitive resources (e.g. work-related knowledge and skills, analytical skills, problem-solving skills). Learning from this work experience, one is likely to develop a strong belief that he or she is able to generate creative ideas regarding productions, products/services, and problems (i.e. creative self-efficacy) (Tierney & Farmer, 2002). This belief, in turn, leads to creativity (Bandura, 1997; Ford, 1996). Thus, PSD may be indirectly related to creativity through the psychological mechanism of creative self-efficacy. Furthermore, it is plausible that PSD will be beneficial for some individuals but not for others. Therefore, it is necessary to identify the related individual difference that moderates the effectiveness of PSD in promoting employee creative self-efficacy. According to P-J fit theory (Edwards, 1991) individual

resources, such as intrinsic motivation, are important for demanding job conditions in relation to employee outcomes. I further argue that the relationship between PSD and creative self-efficacy may be moderated by the individual difference variable of intrinsic motivation.

Consequently, I hypothesize that PSD is positively related to creativity but indirectly through the psychological mechanism of creative self-efficacy. Additionally, intrinsic motivation is hypothesized to moderate the relationship between PSD and creative self-efficacy. Below, I review the pertinent literature and formally hypothesize the relationships between PSD, creative self-efficacy, intrinsic motivation and creativity. First, I will define PSD. Then, the relationship between PSD and creativity will be discussed. The mediating influence of creative self-efficacy will then be discussed. Finally, I will discuss the moderating influence of intrinsic motivation.

PSD as a job attribute

Jobs have undergone drastic changes since Hackman and Oldham (1975) proposed their job characteristics model (Parker & Wall, 2001). One of the most important changes has been the involvement of employees in the process of decision-making and operational management (Cotton, 1993). The related participative management practices are aimed to "use the entire capacity of workers" and "to encourage employee commitment to organizational success" (Lawler & Mohrman, 1989 :26). As a result, employees are given more responsibilities in the workplace, such as participating in problem-solving activities (e.g. anticipating and diagnosing problems, provide solutions, etc.). Against this background, PSD has emerged as a

job condition that has attracted increased research attention (Dean & Snell, 1991; Wall, Corbett, Clegg et al., 1990).

PSD represents one of the key cognitive demands that employees increasingly encounter at work (Holman & Wall, 2002; Jackson et al., 1993; Parker & Wall, 2001; Wall, Corbett, Clegg et al., 1990). Conceptually, PSD is different from explicit creative requirement (Unsworth et al., 2005), which serves as creative goals for employees (Shalley, 1995). Rather, it requires employees to apply their cognitive resources such as work-related knowledge and analytical skills in identifying problems at work and generating solutions to these problems.

PSD was first examined in research on autonomous (Wall, Kemp, Jackson, & Clegg, 1986) or self-regulating groups (Cummings, 1978). Employees in these groups have a high degree of self-determination in the management of issues related to their day-to-day operations. One of the key elements of autonomous / self-regulating groups is the requirement that employees solve problems in their production areas. For instance, when a machine breaks down, it is up to the machine operator to find out how to solve the problem rather than to wait for specialists or management. Thus, employees are required to apply and develop work-related knowledge and skills in order to solve problems successfully. In a quasi-experimental study, Wall and his colleagues (1986) reported that employees who were responsible for their local problems (i.e. having PSD) were found to have a higher level of job satisfaction than those relying on experts to solve their problems (i.e. having no PSD). In these studies, PSD, as a job attribute, was only implied in the job design of autonomous or self-regulating groups rather than directly measured. However, the

findings of these studies provide preliminary evidence of the influence of PSD on employee outcomes.

The application of advanced manufacturing technology (AMT) has precipitated a large amount of research on the impact of PSD on employee outcomes (e.g. performance, psychological well-being) (e.g. Clegg & Wall, 1987; Wall, Clegg, Davies, Kemp, & Mueller, 1987). From a job design perspective, Wall and his colleagues (1990) proposed a framework explicating the relationship between AMT and job design and its impact on employees. According to this framework, AMT is related to a number of job attributes: control (timing control, method control, and boundary control), cognitive demand (monitoring demand and PSD), production responsibility, social interaction (social contact and social support). These job attributes are proposed to be differentially related to employee performance, job-related strain, and job satisfaction (see Wall, Corbett, Clegg et al., 1990 for detailed discussion). Here I focus on two forms of cognitive demand. Wall and his coauthors (1990) suggest that monitoring demand requires 'close and constant' attention from employees whereas problem-solving demand requires employees' to use knowledge to intellectually respond to work-related problems. Though both demands require cognitive resources, it is important to distinguish these two types of demand because they may have differential impact on employees. Monitoring demand is seen to be a source of job-related strain. In contrast, problem-solving demand may contribute to employee job satisfaction because it engenders challenge and opportunities to apply individual capabilities (Parker et al., 2001; Wall, Corbett, Clegg et al., 1990).

Jackson and his co-authors (1993) developed a measure of PSD together with other emerging job attributes (e.g. method control, time control, monitoring demand and production responsibility). PSD is believed to increase when "many alternative solutions" (to the problem) are available, "the problems encountered were novel", and "advanced knowledge is required to achieve effective solutions". This measure was further improved and validated in another study by Wall and his co-authors (1995).

The development of a measure of PSD has given a fillip to research on the impact of PSD on its outcomes. For instance, some researchers have examined the relationship between PSD and employee skill utilisation (Holman & Wall, 2002) while others have examined the impact of PSD on employees' production ownership and job strain (Parker & Sprigg, 1999). As a challenging and cognitively demanding job attribute, PSD constitutes a potential contextual factor promoting employee creativity (Shalley et al., 2004).

PSD and creativity

PSD has long been theoretically linked to creativity. For instance, a stream of research has related problem-solving to creativity (Mumford, Reiter-Palmon, & Redmond, 1994; Runco & Chand, 1994) and suggested that problem solving constitutes a precondition for individuals to produce creative performance. Specifically, it has been argued that where individuals become engaged in problem solving activities, creativity is an outcome one would naturally expect to find (Mumford et al., 1994). Reiter-Palmon and Illies (2004) provide another relevant discussion of PSD-creativity relationship. They suggest that leaders can enhance employee creativity by leading employees to succeed in problem-solving activities

(e.g. problem construction, information seeking, generating alternative solutions and idea evaluation). Empirically, Redmond and his colleagues (1993) observed in an experimental study that individuals demonstrated high creativity when problems were salient and well-constructed. The relationship between PSD, as a job attribute and creativity, however, has not been empirically examined.

The relationship between PSD and creativity can be explained from two perspectives: (1) Amabile's motivational framework (1983, 1988, 1996); and (2) sensemaking process in Ford's model (1996).

According to Amabile (1996), when tasks are complex and demanding, employees will experience task motivation, manifested as "interest, involvement, curiosity, satisfaction, or positive challenge" (p.115). Task motivation not only directly promotes creativity but also leads employees to develop task-relevant skills and creativity-relevant skills important for creativity (Amabile, 1983, 1996). Based on Amabile's (1983, 1996) framework, some researchers have provided evidence that complex and demanding job attributes (e.g. task complexity) are positively related to employee creativity (e.g. Amabile et al., 1996; Oldham & Cummings, 1996). PSD involves complex activities such as problem construction, information seeking, idea generation and evaluation (Reiter-Palmon & Illies, 2004). It also requires employees to apply intellectual skills and discretionary decision-making in these activities. I argue that PSD constitutes a complex and demanding job condition favourable for employee creativity. In high PSD situations, employees will experience increased task motivation and sense of challenge leading to creative performance.

As discussed in Ford's (1996) model, both individual preferences and contextual factors may influence one's sensemaking processes, which, in turn, affect creativity. Some researchers have provided evidence that job attributes influence one's sensemaking processes (Ackerman, 1987). Ackerman (1987) reported that while simple and easy tasks were related to automatic sensemaking process, novel and complex tasks were associated with controlled sensemaking process. Therefore, it is possible that complex and challenging job attributes, such as PSD, facilitates a controlled sensemaking process. In this process, employees seek information for the problems, compare and contrast different perspectives and evaluate potential solutions. These cognitive activities are likely to lead to creative ideas (Ford, 1996). Taken together, I propose:

Hypothesis 1: PSD is positively related to creativity.

The mediating influence of creative self-efficacy

Having discussed the positive influence of PSD on creativity and based on social cognitive theory (Bandura, 1986), I investigated the mediating influence of creative self-efficacy on the PSD-creativity relationship. Creative self-efficacy is derived from social cognitive theory and its related construct, self-efficacy (Bandura, 1986). Before discussing creative self-efficacy as a mediator of the PSD-creativity relationship, I provide a brief overview of social cognitive theory and self-efficacy.

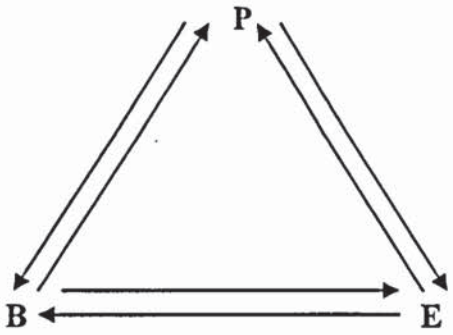
Social cognitive theory. In explaining individual behaviours, some scholars have adopted a person-oriented approach, i.e. individual attributes, such as personality, motivation, and attitudes account for behaviours (e.g. Locke, 1968; Maslow, 1954;

Vroom, 1964). Another group of scholars posits that one's behaviour is determined by the environment in which one operates (Luthans & Kreitner, 1975; Miller, 1978; Skinner, 1953). A third group of scholars argues that behaviour is a function of the person and the environment. This was initiated by Kurt Lewin (1951) in his famous field theory and has been well accepted among organisational behaviour researchers. For instance, Porter and Lawler (1968) suggest that individual (Mischel, 1973; Staats, 1975) behaviours (e.g. performance) are influenced by internal cognitive variables and external environmental variables.

Social learning theory, however, posits that the person, the environment and the behaviour do not function unidirectionally as suggested in the aforementioned models. Rather, the three factors affect each other in a reciprocal manner. Many theorists have contributed to the development of social learning theory (e.g. Bandura, 1977; Mahoney, 1974; Meichenbaum, 1977). One of the most influential theories is social cognitive theory, which has evolved from social learning theory (Bandura, 1977).

Like other social learning theories, social cognitive theory posits that individuals act within a triadic reciprocal framework. As shown in Figure 3, there are three determinants in this triadic reciprocal framework. B represents behaviour; P the internal personal factors in the form of cognitive, affective, and biological events; and E the external environment (Bandura, 1986).

Figure 3: The triadic reciprocal framework



In these complex and dynamic interactions, personal factors encompass "cognitive, vicarious, self-regulatory, and self-reflective processes", which have significant implications for organisational behaviour research (Wood & Bandura, 1989: 362). Specifically, Wood and Bandura (1989) relate these personal aspects of social cognitive theory to organisational management: (1) the development of individuals' competences through mastery modelling; (2) the cultivation of individuals' beliefs in their capabilities (self-efficacy) so that they will use their talents effectively; and (3) the enhancement of people's motivation through goal systems. The present research focuses on their notion of self-efficacy.

Self-efficacy refers to one's belief in his or her capabilities (Bandura, 1977). It plays a central part in regulating individuals' cognitive resources, motivation and determining one's courses of action (Wood & Bandura, 1989). As a regulatory mechanism, self-efficacy has been related to goal level and goal commitment, choice of activities, coping strategies, and effort (Locke et al., 1984; Meyer et al., 2004) in operating tasks. Gist and Mitchell (1992) concluded that "self-efficacy is an important motivational construct. It influences individual choices, goals, emotional

reactions, effort, coping, and persistence. Self-efficacy also changes as a result of learning, experience, and feedback (p.186)".

Based on social cognitive theory and the conceptualisation of self-efficacy, researchers have examined the mediating influence of self-efficacy on the relationships between contextual factors and individual outcomes (e.g. Burr & Cordery, 2001; Frese, Kring, Soose, & Zempel, 1996; Redmond et al., 1993; Speier & Frese, 1997). In an experimental setting, Redmond and his colleagues (1993) manipulated individual self-efficacy by leader's intervention, i.e. telling individuals that they were good at their tasks. The increased self-efficacy was reported to lead to a high level of creativity. Their study implies that self-efficacy may function as a mechanism that mediates the impact of external factors (i.e. leader's behaviour) on creativity.

However, one's judgment of capability is domain specific (Bandura, 1997), creative self-efficacy, i.e. "the belief that one has the ability to produce creative outcomes" (Tierney & Farmer, 2002: 1138) is different from other types of self-efficacy, e.g. job efficacy (belief in one's general work abilities) or general self-efficacy (i.e. overall belief in one's capability) (Chen, Gully, & Eden, 2001). For instance, Tierney & Farmer (2002) reported creative self-efficacy influenced creativity beyond the impact of job self-efficacy. The present research therefore focuses on creative self-efficacy, which is more relevant to the creativity context (Tierney & Farmer, 2002).

To date, only one study has examined the mediating effects of creative self-efficacy on the relationship between contextual factors and creativity. Based on a field study in an R&D setting, Tierney and Farmer (2004) reported supervisors' expectations of creative performance had indirect effects on employee creativity through employee's creative self-efficacy. The mediating role of creative self-efficacy in the relationship between supervisor's expectation of creative performance and creativity was premised on the notion that creative self-efficacy reflects one's self-evaluation of his or her ability to be creative, and that self-efficacy evaluation is derived from cues provided by external factors (e.g. job attributes, individual work experience) (Gist & Mitchell, 1992). The same notion provides a basis for examining the mediating influence of creative self-efficacy on the relationship between PSD and employee creativity. PSD provides a job condition for one to apply, exercise and acquire problem-solving skills. I argue that individuals can derive important cues to form creative self-efficacy by dealing with PSD at work.

PSD and creative self-efficacy. According to social cognitive theory, individuals develop self-efficacy through their experience of interacting with the environment (Bandura, 1986). There are four sources of self-efficacy: enactive mastery experiences, vicarious experiences by observing the performance of others, verbal persuasion, and physiological and affective states (e.g. desire, anxiety). Laboratory studies have found that individuals' mastery experiences are the most influential source for their efficacy judgment (Bandura, 1977). Bandura (1997: 80) reasons that compared with the cues one derives from other sources, one's previous experiences provide "the most authentic evidence" of one's capabilities. He also stresses that success with easy tasks in the long run will damage self-efficacy. In contrast,

overcoming difficulties and obstacles can help one develop a strong belief in his or her capabilities (Speier & Frese, 1997; Tierney & Farmer, 2002). As Wood and Bandura (1989: 364) note, "[t]o gain a resilient sense of efficacy, people must have experience in overcoming obstacles through perseverant effort".

Tierney and Farmer (2002) identified four determinants of creative self-efficacy. Two are external determinants: task complexity and supervisor behaviour and the other two are individual determinants (job knowledge and job self-efficacy). Based on data obtained from 584 blue-collar and 158 white-collar employees, Tierney and Farmer (2002) found job self-efficacy was the strongest predictor of creative self-efficacy. Job self-efficacy taps an individual's beliefs in his or her job-relevant capabilities. It is a factor relevant to mastery of skills and knowledge at work. Following Tierney and Farmer's (2002) study, it can be concluded that employees' learning and development at work in terms of work-relevant skills and knowledge and divergent skills are crucial for employees' creative self-efficacy. Factors that lead to the development of self-belief in 'domain-relevant skills' and 'creativity-relevant skills' are likely to result in increased creative self-efficacy.

PSD provides a goal for employees to direct their effort, attention and strategies (Locke et al., 1984) to construct a problem, to seek relevant information, and to generate alternative solutions. In particular, a number of researchers have linked PSD with employees' application of their skills at work (Holman & Wall, 2002; D. Morrison, Cordery, Girardi, & Payne, 2005). Being able to apply their skills and knowledge at work will enable employees to derive important cues to judge their work abilities (Gist & Mitchell, 1992).

Furthermore, PSD may enhance individuals' learning experience, which leads to self-efficacy. Organisational learning researchers have suggested that effective individual learning in organisations will not occur if information is easily understood, information is repetitive and information is restricted to a narrowed job role (M. E. Adams, Day, & Dougherty, 1998). When PSD is high, employees do not have an easy access to solutions. Rather, employees need to undergo extended searches to obtain relevant information. They may need to get to know the operations of other work areas in order to diagnose and generate solutions to problems that occur in their work area. PSD, therefore, engenders useful learning experience which eventually leads to individuals' belief in their work abilities.

PSD is particularly useful in facilitating one's belief in his or her creative ability (i.e. creative self-efficacy). Compared with low PSD tasks, high PSD tasks require employees to adopt heuristic thinking processes rather than follow established methods. Since these processes reflect one's ability to be flexible in analysing and creative in identifying solutions, employees working in high PSD situations will be more likely to experience increased creative self-efficacy.

Hypothesis 2a: PSD is positively related to creative self-efficacy.

Creative self-efficacy and creativity. As noted earlier, self-efficacy constitutes a critical dimension of the motivational process important for individual creativity (Bandura, 1997; Ford, 1996). In Bandura's words, "effective personal functioning is not simply a matter of knowing what to do and be motivated to do" (1997: 36).

Rather, one needs to have efficacy beliefs which "activate cognitive, motivational and affective processes that govern the translation of knowledge and abilities into proficient action." Only when individuals are confident about their ability to be creative will they engage in the activities leading to creative performance (Bandura, 1997; Ford, 1996).

Tierney and Farmer (2002) provided two reasons why creative self-efficacy may be related to employee creativity. First, they argue that creative self-efficacy constitutes a motivational mechanism important for creativity. Creative performance involves challenges, risks and potential failures. It is important for one to be persistent in the face of difficulties (Amabile, 1983). When individuals have high levels of creative self-efficacy, they hold a strong belief in their ability to be successful in spite of difficulties. This belief will help them to set creative goals, to be persistent and to put in more effort in creative endeavours (Bandura, 1997). Second, creative self-efficacy serves as a cognitive mechanism important for creativity. As mentioned earlier, creativity requires creativity-relevant processes as well as domain-relevant knowledge (Amabile, 1983, 1996). When individuals have high levels of creative self-efficacy, they will put in sustained effort to seek work-related information (Bandura, 1997). This process is likely to lead to a better understanding of work-related problems. Furthermore, for individuals who hold a strong belief in their creative abilities, they will not be satisfied with ordinary and routine ideas or solutions (Ford, 1996). Rather, they will put in more effort to use cognitive resources (e.g. knowledge, memory, analytic skills) to come up with original and new ideas. This is consistent with the notions of "divergent thinking" and breaking "mental set", which are inherent in creativity-relevant processes

(Amabile, 1983). Empirical studies have provided evidence that creative self-efficacy is positively related to creativity (Tierney & Farmer, 2002, 2004).

As discussed, PSD propels employees to substantially apply both task-related and creativity-related skills to deal with work-related problems. The resulting attainments or mastery experiences will lead to elevated creative self-efficacy. Since creative self-efficacy is related to creativity (Tierney & Farmer, 2002, 2004), it constitutes an underlying motivational mechanism through which PSD is related to creativity. Based on this logic, I propose that:

Hypothesis 2b: Creative self-efficacy partially mediates the relationship between PSD and creativity.

The moderating influence of intrinsic motivation

Informed by the interactionist perspective, the relationship between PSD and creative self-efficacy may be moderated by individual differences, i.e. some individuals may be more likely than others to benefit from PSD situations and experience high levels of creative self-efficacy.

Empirically, a number of studies have provided evidence that individual factors, such as achievement motivation (Mathieu, Martineau, & Tannenbaum, 1993), knowledge (Tierney & Farmer, 2002), cognitive ability and conscientiousness (Chen, Casper, & Cortina, 2001), and learning orientation (Bell & Kozlowski, 2002) are positively related to self-efficacy. These findings support the notion that there are links between personal characteristics and self-efficacy development (Gist &

Mitchell, 1992). However, with the exception of Tierney and Farmer (2002), little research has examined the interactions between contextual and individual factors in affecting self-efficacy. In addition to examining both contextual factors (i.e. supervisor's support and task complexity) and individual factors (knowledge and job efficacy) as antecedents of creative self-efficacy, Tierney and Farmer (2002) examined the interaction between job tenure (an indicator of work-related knowledge) and task complexity in affecting creative self-efficacy. They reported that for employees with longer job tenure, the relationship between task complexity and creative self-efficacy was stronger. Their findings provide support for the interactionist perspective in examining the antecedents of creative self-efficacy (Gist & Mitchell, 1992; Tierney & Farmer, 2002).

According to P-J fit theory (Edwards, 1991), it is important for employees to possess matching levels of resources that meet the requirements of demanding job conditions. Consequently, fit between job demand and job resources will lead to positive outcomes such as performance and job satisfaction. On the other hand, misfit will lead to negative outcomes such as strain or poor performance. Therefore, I argue that whether PSD will lead to high levels of creative self-efficacy is contingent on the level of resources one possesses. Individuals whose resources meet the requirements of PSD are likely to benefit from PSD and experience increased creative self-efficacy while those who lack the necessary resources may not develop creative self-efficacy in PSD situations.

Researchers in the stress literature have provided useful definitions for resources in the context of demanding situations like PSD. For instance, Hobföll (1989 :516)

defines resources as "those objects, personal characteristics, conditions, or energies" that are valued by the individual or that serve as a means for attainment of these objects, personal characteristics, conditions, or energies. Similarly, Sonnentag and Frese (2003) defined resources in work context as those conditions within the work situation or personal characteristics that can be used to attain goals. Here I focus on personal characteristics which are more relevant to this research. Hobföll (1989) further explained that one's characteristics can be seen as resources in so far as these characteristics help one buffer the stress entailed by demanding situations. These personal characteristics may make a potentially stressful situation less threatening as this enables one to cope with the situation.

In line with the definitions of individual resources (Hobföll, 1989), intrinsic motivation is seen as an important resource which may moderate one's experience of PSD situations. Therefore, the relationship between PSD and creative self-efficacy may be contingent on one's intrinsic motivation levels. Although intrinsic motivation has been conceptualised as a state shaped by environment (Amabile, 1983; Hackman & Oldham, 1980), I followed other creativity researchers and conceptualised it as a stable personality trait (Amabile et al., 1994; Tierney et al., 1999). As Amabile and her co-authors (1994: 951) noted, a number of researchers (e.g. deCharms, 1968; Deci & Ryan, 1985; Harter, 1981) "...have treated extrinsic-intrinsic motivation orientations (and related constructs) as variables that are, to some extent, trait like, that is as enduring individual-differences characteristics that are relatively stable across time and across situations". Amabile et al further suggested that the examination of intrinsic motivation as an individual difference may bear important implications for creativity research. Consequently, the present research

conceptualised intrinsic motivation as individuals' enduring motivation at work derived from their dispositional tendency to learn, achieve things and experience excitements (Vallerand, 1997). Intrinsic motivation is conceptually similar to other stable personality traits, such as learning goal orientation (Dweck & Leggett, 1988) and mastery orientation (Kagan, 1972). Individuals high in intrinsic motivation are motivated to pursue accomplishments through their personal efforts, persistently and vigorously. They anticipate obstacles and see them as opportunities for achievement. Rather than being threatened by obstacles (i.e. problems), they learn and develop strategies to overcome them (McClelland, 1985).

To date, no study has examined the moderating influence of intrinsic motivation on the relationship between demanding job attributes (e.g. PSD) and individual outcomes. However, there is strong evidence that individuals who are driven by internal needs of learning, achievement and positive experience are more likely to accept difficult tasks or goals (cf. Meyer et al., 2004), be persistent at the tasks (Vallerand & Bissonnette, 1992) and to have better learning outcomes (Button et al., 1996; Phillips & Gully, 1997). They are also less likely to be affected by failure and difficulties (Button et al., 1996; Kozlowski et al., 2001). I argue that the relationship between PSD and creative self-efficacy may be a function of an individual's intrinsic motivation: those with higher levels of intrinsic motivation will respond more favourably to PSD situations. Individuals high in intrinsic motivation are more likely to accept difficult problems and be persistent when they encounter difficulties and challenges in looking for solutions.

Furthermore, individuals high in intrinsic motivation are likely to see PSD as significant opportunities for them to fully apply capabilities and develop better problem-solving skills. The positive attitudes they adopt towards PSD will help them achieve better learning outcomes and higher creative self-efficacy. In contrast, low intrinsic motivation individuals may feel threatened by PSD situations. Instead of trying to overcome problem situations and develop problem-solving skills, low intrinsic motivation individuals are likely to avoid problems or not take advantage of opportunities to apply and develop their knowledge and skills. Consequently, it is less likely for low intrinsic motivation individuals to experience increased creative self-efficacy. On the basis of these arguments, I propose:

Hypothesis 3a: Intrinsic motivation will moderate the relationship between PSD and creative self-efficacy such that the relationship between PSD and creative self-efficacy will be stronger for individuals with high rather than low intrinsic motivation.

Moderated mediation

If the impact of PSD on creative self-efficacy is dependent on intrinsic motivation as predicted in Hypothesis 3a, and creative self-efficacy mediates the relationship between PSD and creativity as predicted in Hypothesis 2, it is likely that creative self-efficacy will mediate the relationship between the interaction term of PSD and intrinsic motivation and creativity. This effect pattern is referred to as moderated mediation (R. M. Baron & Kenny, 1986; L. R. James, Demaree, & Wolf, 1984).

Hypothesis 3b: Creative self-efficacy mediates the influence of the interaction term of PSD and intrinsic motivation on creativity.

Summary

This chapter has examined the relationship between PSD and creativity. Based on a model that integrates three creativity theories, i.e. Amabile's (1983, 1996) social psychology of creativity, Woodman and his colleagues' (1993) interactionist model of creativity, and Ford's (1996) theory of creative individual action, I propose a model which explains not only the main effect that PSD has on creativity, but also the mediating influence of creative self-efficacy, and the moderating influence of intrinsic motivation. Given the impact of PSD on creative self-efficacy and consequent creative performance, I examine factors that may lead to PSD perceptions. Antecedents of PSD will be discussed in the next chapter.

Chapter 3: Antecedents of PSD

Introduction

In this study, PSD is hypothesized to be related to creativity through creative self-efficacy. Consequently, it is necessary to understand the situations that foster PSD. Theorists have provided different perspectives on investigating antecedents of job perceptions, which include the influence of objective characteristics of the job (e.g. Hackman & Oldham, 1976), social-contextual factors (e.g. Griffin, 1981; Salancik & Pfeffer, 1978), and an individual's active role in shaping job attributes (e.g. Wrzesniewski & Dutton, 2001).

In this study, I focus on the social-contextual and individual factors that may be associated with PSD. This is because PSD, as a specific job attribute, may stem from different problem situations, i.e. presented, discovered and created problem situations (Getzels, 1982). These situations are either socially-constructed (e.g. presented problem situation) or individually-constructed (e.g. discovered and created problem situations). I argue that social-contextual and individual factors may individually or jointly contribute to these problem situations leading to perceptions of PSD. Consequently, two contextual factors (i.e. supervisor developmental feedback and job autonomy) and one individual factor (i.e. proactive personality) are identified as antecedents of PSD. I hypothesize that supervisor developmental feedback, job autonomy, and proactive personality are positively related to PSD. I further hypothesized that proactive personality will interact with supervisor developmental feedback and job autonomy to affect one's PSD perceptions.

Theorizing antecedents of job perception

Three perspectives have been adopted in explaining antecedents of one's job perceptions: (i) job attributes are objectively constructed; (ii) job attributes are socially constructed; and (iii) job attributes are individually constructed, i.e. individuals shape or craft the attributes of the job. The objectively-constructed perspective posits that the "elements of the task itself, working conditions, mechanical or technological aspects of the work process and formal policies and procedures" determine one's perceptions of job attributes (Griffin, 1983: 185). For instance, job characteristics theory (Hackman & Oldham, 1976) suggests individuals' perceptions of job attributes are largely affected by objective characteristics (e.g. variety, autonomy, feedback, identity and significance) of the job. Additionally, researchers adopting the objectively-constructed perspective have also examined the impact of technology (i.e. how the work processes are designed) on job perceptions (e.g. Hayes, Wheelwright, & Clarke, 1988; Jackson & Martin, 1996; Parker, 2003; Pierce, 1984; Rousseau, 1977). The objectively-constructed perspective has been extensively tested in both laboratory and field studies (e.g. Farh & Scott, 1983; O'Connor, Arnold, & Bhagat, 1981; O'Reilly & Caldwell, 1979; Terborg & Davis, 1982; White & Mitchell, 1979). The results have, to some extent, supported the influence of objective characteristics on job perceptions (e.g. Griffin, 1983; Parker, 2003; White & Mitchell, 1979).

However, researchers operating within the socially-constructed perspective have questioned the equivalence between objective and perceived job attributes and criticised the objectively-constructed approach for failing to take account of the social context in which work is performed (O'Reilly, 1977; Salancik & Pfeffer, 1978, 1980).

As a reaction to the limitation of the objectively-constructed perspective, the socially-constructed perspective emphasises the social influences on one's job perceptions. By examining the impact of social factors, researchers intend to address variances in one's job perceptions that cannot be explained by objective job elements (e.g. Blau & Katerberg, 1982; Griffin, 1983; Griffin, Bateman, Wayne, & Head, 1987; Weick, 1977). This perspective is also known as *social informational processing* (SIP) (Salancik & Pfeffer, 1977, 1978).

Social informational processing perspective. The SIP perspective proceeds on the assumption that, "...individuals, as adaptive organisms, adapt attitudes, behaviour, and beliefs to their social context and to the reality of their own past and present behaviour and situation..." Consequently, "one can learn most about individual behaviour by studying the informational and social environment within which that behaviour occurs and to which it adapts" (Salancik & Pfeffer, 1978: 226). Salancik and Pfeffer (1978) further proposed a model explicating how social information influences individual *attitudes*, *behaviours* and *perceptions of job attributes* and the interactions among them. Here, I focus on their discussion on *perceptions of job attributes.*

According to SIP, how one perceives his or her job attributes is underpinned by individual and social processes (Salancik & Pfeffer, 1978). Specifically, one forms his or her interpretation of the job by getting social information from the immediate environment, as "...the individual's social environment may provide cues as to which dimensions might be used to characterize the work environment" (Pfeffer, 1981: 10). Given the complexity of the work environment, employees may encounter various

information cues regarding the job. Salancik and Pfeffer (1978) posit that two conditions need to be satisfied for social cues to influence job perceptions: salience and relevance. Salience means individuals should be aware of the information cues. Relevance means individuals can judge the information cues as more or less related to their job perceptions. Therefore, only those information cues that are salient and relevant to employees will influence their perceptions of the job.

In explaining the sources of information cues, there is consensus among researchers that supervisors and co-workers constitute the main sources of information cues about the job (Griffin, 1983; Salancik & Pfeffer, 1978). Salancik and Pfeffer (1978) suggest that one can derive salient and relevant information cues from co-workers through the process of social comparison (Festinger, 1954). By communicating with relevant others (i.e. co-workers), one develops "stable, socially derived interpretations of events and their meaning". The impact of co-worker on one's job perceptions have been tested in a number of laboratory studies (O'Reilly & Caldwell, 1979; Weiss & Shaw, 1979; White & Mitchell, 1979). The findings have generally provided support for the links between information cues from co-workers and one's job perception.

Compared with co-worker influence, supervisor influence on one's job perceptions has attracted more research attention, particularly in field studies (e.g. Griffin, 1981, 1983; Piccolo & Colquitt, 2006). Griffin (1983) noted that supervisors can influence one's job perceptions through (i) comments or facial expressions; (ii) task-related cues; and (iii) manipulating the objective work environment by redefining tasks. Empirical studies have provided supporting evidence for the influence of

supervisors on how one perceives his or her job. For instance, in a longitudinal study, Griffin (1981) examined the relationship between supervisor behaviours and core job characteristics (i.e. job autonomy, variety, feedback, importance and identity). Managers reported their intentions to influence employees' perceptions of core job characteristics. Three months later, employees reported higher ratings of perceived job characteristics when managers' intentions were high. In a more recent study, Piccolo and Colquitt (2006) examined the relationship between transformational leadership and core job characteristics with a sample of 283 employees and their supervisors. They reported transformational leadership to be positively related to employees' perceptions of core job characteristics. Piccolo and Colquitt (2006: 334) explained the results by suggesting that transformational leaders use "language and imagery to frame follower's job experiences". In another words, supervisor's transformational behaviours provide salient and relevant information cues for employees' to perceive dimensions of their job. Although prior research has focused primarily on supervisors' influence on the perceptions of core job characteristics, it is intuitive plausible that such influence can be extended to other job characteristics such as PSD.

In addition to information cues, the SIP model also notes the active role played by individuals in forming job attribute perceptions. Specifically, Salancik and Pfeffer (1978) suggested that "individuals also use their own behaviour to construct reality". This is labelled as 'enactment process' which describes situations where individuals participate in creating the environment they subsequently enact. However, the SIP model does not elaborate on the social factors that facilitate the 'enactment processes'

and how. Another job design theory, *job crafting model*, instead, provides a complementary explanation.

The job crafting model. Similar to Salancik and Pfeffer's (1978) notion of enactment process, the job crafting model (Wrzesniewski & Dutton, 2001: 179) suggests that "individuals have latitude to define and enact the job..." As "job crafters", employees can make "physical and cognitive changes in the task..." To explain the influence of the work environment, Wrzesniewski and Dutton (2001) proposed that contextual factors that contribute to a sense of control or discretion (e.g. task interdependence, job autonomy and supervisor monitoring styles) will affect one's perceived opportunities to craft a job. Those who feel high levels of control or discretion are more likely to see the opportunities to enact or craft the job. This, in turn, results in high levels of job crafting. Studies on the relationship between job control and personal initiative in the work place can serve as supportive evidence. In a number of studies, Frese and his colleagues (e.g. Frese & Fay, 2001; Frese et al., 1996) reported that having job control is important for personal initiative (i.e. self-starting, proactive behaviours towards work and organisational issues) (Frese, Garst, & Fay, 2007), which, in turn, may lead to individuals' shaping of work characteristics, such as PSD.

A more fundamental element of the job crafting model that distinguishes it from the other two perspectives (i.e. job characteristics are objectively- or socially-constructed) is the notion that individuals are internally motivated to shape job attributes, i.e. job crafting. Wrzesniewski and Dutton (2001) posited three individual needs as the driving forces for job crafting: (1) the need for control over job and work

meaning; (2) the need for positive self-image; and (3) the need for human connection with others. However, Wrzesniewski and Dutton (2001: 183) also noted that, "Not all employees are motivated to fulfil needs for control, positive image, and connection at work". The differences may be due to the influence of the context (e.g. having or not having job control), as mentioned earlier. They may also depend on individual differences regarding motivation orientation. Specifically, individuals who are intrinsically oriented (i.e. those who are interested in the job and seeking for achievement or improvement at work) are likely to engage in job crafting. For instance, they may problematize seemly smooth operations and seek for better ways of doing things. By so doing, they shape their job by adding a demand for problem-solving, i.e. PSD. In contrast, those who are extrinsically oriented (i.e. controlled by the factors other than the work itself) are less likely to change the scope or the boundaries of their task. Their job is shaped by external factors (e.g. supervisors) rather than by themselves.

The notion that individual differences influence one's job perceptions, however, is not new. Researchers have long suggested that individual differences (e.g. need for achievement) play a role in the social construction of job attributes (e.g. Blau & Katerberg, 1982; Griffin, 1981, 1983). Empirical studies have reported that individual differences (e.g. self-esteem, field dependence; need for autonomy, achievement) affect social construction of job attributes (e.g. O'Connor & Barrett, 1980; O'Reilly & Caldwell, 1979; Weiss & Shaw, 1979). Furthermore, researchers have reported individual traits such as proactive personality to be positively related to role breadth self-efficacy and flexible role orientations (Parker & Sprigg, 1999; Parker, Williams, & Turner, 2006), indicating that individual differences may

influence one's attitudes towards job crafting, which consequently affect his or her perceptions of the job (e.g. PSD).

Apart from having main effects on job perceptions, individual differences are also believed to interact with contextual factors in affecting job perceptions. Researchers from both the SIP (Salancik & Pfeffer, 1978) and the job crafting (Wrzesniewski & Dutton, 2001) perspectives advocate an interactionist approach in explaining antecedents of job perceptions.

An interactionist approach in job perception. The interactionist perspective was initiated by Kurt Lewin (1951), who posited that both individual factors and contextual factors determine one's behaviour. Influenced by Lewin's work, researchers in organisational behaviour have applied an interactionist perspective to understand individual behaviours in organisational contexts (Schneider, 1983; Terborg, 1981). As Terborg (1981: 575) noted, "the characteristics of people and of situations should be studied as joint determiners of individual attitudes, cognitions, and behaviours". People characteristics include one's "cognitive, affective, motivational factors and individual ability". Situation characteristics include not only physical work environment but also socially-constructed situations. Therefore, social information cues (Salancik & Pfeffer, 1978) that one derives from the work environment constitute situational factors, interacting with individual characteristics to determine individual outcomes (i.e. attitudes, cognitions, and behaviours). The interactionist perspective has been widely adopted in understanding individual outcomes in organisations, such as employee performance and job satisfaction

(Hackman & Oldham, 1976, 1980), stress (Karasek, 1979), and creativity (Woodman et al., 1993).

Salancik and Pfeffer (1978) did not include individual differences as moderating variables in their SIP model. However, predicated on the assumption that individuals may be different in terms of "susceptibility to social cues/ influences", Blau and Katerberg (1982) suggested that individual differences should be taken into account in explaining the influence of social information cues on individual job perceptions. Empirical studies have found that individual differences do moderate the relationships between social information cues and job perceptions. For instance, in a laboratory study of 88 undergraduate students, Weiss and Shaw (1979) reported that self-esteem moderated the relationship between social cues (provided by co-workers) and job attributes. Individuals with low self-esteem were found to be more susceptible to social cues in constructing job perceptions. They further reported that for individuals who tend to rely on field (i.e. social context) rather than self as the primary referent for behaviour (i.e. field-independent), the relationship between social cues and job perceptions was stronger.

In the job crafting model, Wrzesniewski and Dutton (2001) suggested that individuals' job crafting practices are determined by both individual factors (e.g. motivation to take control over the job) and contextual factors (e.g. perceived opportunity to job craft). They further proposed that when conditions are favourable for job crafting, individuals with high motivation to craft the job are more likely to craft the job, leading to change of job perceptions. By contrast, when the opportunities are limited, low motivation individuals are less likely to engage in job

crafting than high motivation individuals. Wrzesniewski and Dutton's (2001) discussion implies that it is important to adopt an interactionist approach in identifying antecedents of job perceptions (e.g. PSD).

Following the preceding discussion, there are two sources of job perceptions: social-contextual information cues and individual differences. Individual characteristics affect job perceptions in two ways. First, they may directly influence how a job is perceived because individuals with certain characteristics may have a tendency to craft or change the environment, including job attributes. Second, they may moderate the impact of social context on job perceptions. Consequently, I examine antecedents of PSD by taking account of the influences of social-contextual and individual factors and their interactions.

Social and personal construction of PSD

As a job attribute, PSD implies that problem prevention, problem diagnosis, and solution seeking are aspects of task requirements. PSD may therefore be seen as the perceived demand that arises from various problem situations employees experience at work. Problem situations may be presented, discovered or created by employees (Getzels, 1982). Social-contextual and individual factors associated with these problem situations constitute antecedents of PSD examined in this study. Before proceeding to discuss antecedents of PSD, I apply Getzels' (1982) framework of problem situations to disentangle the circumstances that foster PSD and the related social-contextual and individual factors.

Problem situations. A problem has been defined in two ways. One view considers a problem as an "undesired situation, difficulty, or obstacle that one wish to avoid or mitigate" (Jay & Perkins, 1997). For instance, Maier (1970) notes that, "A problem exists when a response to a given situation is blocked" (p. 203). McDermott (1978) sees a problem as a "difficult action" (p.71). The other view holds that a problem can be "a desirable situation that one strives to find or create" (Getzels, 1982). Getzels (1982) states, "as human beings, we not only sense problems as obstacles standing in our way but also go out of our way to discover and create new problems (p.42)". Based on these two perspectives, Getzels (1982) posits three problem situations: *presented problem situations*, *discovered problem situations*, and *created problem situations*.

In *presented problem situations*, others present the problems to the problem solver. In a work context, the person who presents problems may be supervisors, peers, or customers. However, the problems presented by a supervisor are relatively more salient and relevant to employees. Supervisors provide employees with a focus of attention (Smircich & Morgan, 1982), drawing employees' attention to problems (Reiter-Palmon & Illies, 2004). In line with the SIP perspective, supervisors can present problems (i.e. social cues) to employees through a number of processes. For instance, they can simply tell employees what the problems are or direct employees' attention to where the problems are, e.g. areas for development. Because feedback is the most frequent intervention tool that supervisors employ (Ilgen, Fisher, & Taylor, 1979), it is possible that supervisory feedback may lead to a presented problem situation. In this study, I examine an important form of supervisory feedback, supervisor developmental feedback as an antecedent of PSD.

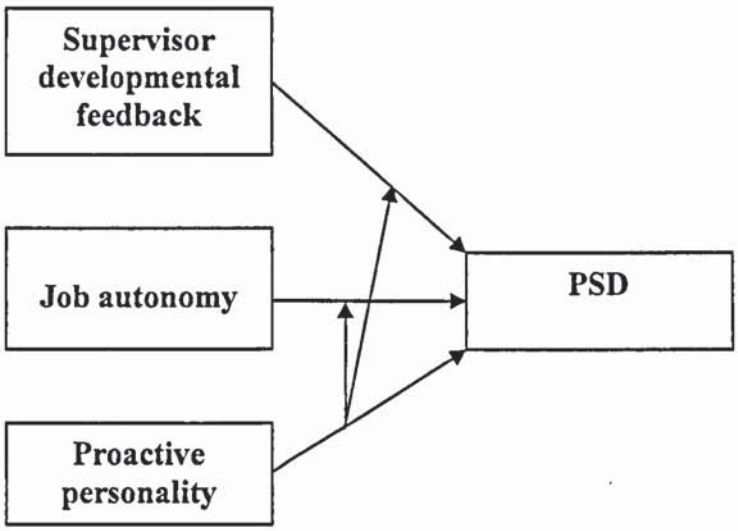
In *discovered problem situations*, there is no external agent who presents the problems to employees. Rather, problems exist but it is the problem solver who identifies it. For example, a machine operator detects a production error without being told about it. These situations are in line with the notion that employees enact the work condition in which they are working (Salancik & Pfeffer, 1978). By discovering problems at work, employees construct a problem situation that requires a solution. According to the job crafting model, employees' enactment requires an important contextual condition, which enables employees to have "the sense of freedom or discretion... in what they do in their job and how they do it" (Wrzesniewski & Dutton, 2001 : 183). Job autonomy defines the extent to which employees can decide how and when to carry out tasks, and what to achieve (Breaugh, 1985). It constitutes a critical contextual factor that may influence employees' enactment, in this case, discovering problems at work. Consequently, I examine job autonomy as another antecedent of PSD.

In *created problem situations*, a problem does not exist until the problem solver defines and creates a problem situation. For example, a problem solver wants to find a new way to do his/her routine tasks, even though the existing method is still working properly. In *presented problem situations* or *discovered problem situations*, problems may be "undesired", therefore, should be mitigated or avoided. By contrast, in created problem situations, rather than avoid problems, individuals may create and construct "deeper questions" about seemingly smooth operations. Created problem situations reflect an instance of *proactive behaviour*. Crant (2000) defines proactive behaviour as "taking initiative in improving current circumstances or creating new ones; it involves challenging the status quo rather than passively

adapting to present conditions (p.436)." Proactive behaviour has been conceptualised in varied proactive activities, e.g. active socialisation (e.g. organisational participation, information seeking) of new employees (Ashford & Black, 1996; Fisher, 1986; E. W. Morrison, 1993), employee proactive feedback seeking (Ashford & Cummings, 1985), selling ideas to colleagues (Howell & Higgins, 1990) and individual career management (career planning, skill development and seeking advice and help and networking) (Claes & Ruiz-Quintanilla, 1998). Similarly, in created problem situations, individuals exhibit proactive behaviours by creating problems, leading to consequent better performance. Jay and Perkins (1997) suggest the driving force or impetus for created problem situations is mainly from individuals. Proactive personality, as a personal factor, has been related to one's proactive behaviour (Bateman & Crant, 1993; Crant, 2000). Therefore, proactive personality is examined as a third antecedent of PSD.

From an interactionist perspective and in line with the SIP perspective (Blau & Katerberg, 1982) and the job crafting model (Wrzesniewski & Dutton, 2001), I examine the moderating influence of proactive personality on the impact of supervisor developmental feedback and job autonomy on PSD perceptions. As shown in Figure 4, I propose a model to examine antecedents of PSD. In this model, I hypothesize that supervisor developmental feedback, job autonomy and proactive personality are positively related to PSD and proactive personality interacts with supervisor developmental feedback and job autonomy to influence PSD. I discuss and formally hypothesize these relationships in the following sections.

Figure 4: A model of antecedents of PSD



Supervisor developmental feedback and PSD

Feedback has been seen as an important intervention in the workplace to regulate employee motivation (Hackman & Oldham, 1980) and / or learning (Frese & Zapf, 1994). As an intervention, feedback has been defined as "actions taken by (an) external agent(s) to provide information regarding some aspect(s) of one's task performance". The function of feedback is to draw individuals' attention to the gap between actual and desired performance, which is believed to lead to "behaviour regulation" (Kluger & DeNisi, 1996 : 255). By definition, the key element of feedback is to provide information cues. As a special type of feedback, supervisor developmental feedback refers to "the extent to which supervisors provide their employees with helpful or valuable information that enables them to learn, develop, and make improvements on the job" (Zhou, 2003: 415). From the SIP perspective,

supervisor developmental feedback constitutes a source of social cues that influence one's perceptions of the work environment (e.g. perception of PSD).

First, given the generally complex nature of a work environment, employees may receive a multitude of information cues. Perceptions of information cues regarding work-related problems are particularly complicated. Mumford and his coauthors (1994) suggested that the perception of problems is characterized by a complicated cognitive process. This process not only involves environmental triggers, information representation, selection and re-organisation but also individuals' attention and memory. Thus, not all the information cues regarding problems at work will appear salient or relevant to employees. Feedback by supervisors serves as an effective intervention to direct employees' attention to relevant problems (Mumford et al., 1994; Redmond et al., 1993). It provides clear and focused information cues on the expected levels of performance and organisational goals. By providing feedback, supervisors highlight the areas (i.e. problems) for improvements or actions. Supervisors may also impose challenges (problems) on employees which will serve as goals to achieve. For instance, supervisors may problemise the current situation by requesting employees to think about a problem from multiple perspectives.

However, not all supervisory feedback is well-accepted or effective in achieving its aims. The valence and the style of feedback may influence feedback acceptance (Kluger & DeNisi, 1996). For instance, if the feedback is negative or controlling, employees may reject the information cues in the feedback (e.g. R. A. Baron, 1988;

Leung, Su, & Morris, 2001). Rather the feedback recipient may view the feedback giver as biased or insensitive (Argyris, 1985, 1991), or question supervisor's real intentions or motives for the feedback (Kluger & DeNisi, 1996). On the contrary, when the feedback is delivered in a developmental way and meant to enhance performance and individual development (i.e. developmental feedback), employees will be more likely to accept the informational cues (Zhou, 1998, 2003).

In supervisor developmental feedback, the information cues are about the problems (i.e. areas for development) that employees need to attend to at work. Since these information cues are from a significant other (i.e. supervisors) and related to performance improvement or individual development, employees are more likely to pay attention to the information cues and to be alert to the problems. In other words, they are more likely to perceive PSD. By contrast, when supervisor developmental feedback is absent, employees may either be oblivious to or reject information cues regarding problems at work. Thus, they are less likely to perceive PSD.

Hypothesis 4a: Supervisor developmental feedback is positively related to PSD.

Job autonomy and PSD

As discussed earlier, the job crafting model suggests that job autonomy provides opportunities for employees to actively design or craft the job. In line with this view, the impact of job autonomy on PSD may be due to two specific reasons. First, job autonomy is related to employees' experience of sense of responsibility (Hackman & Oldham, 1980), which alerts them to problem situations. Second, job autonomy

provides learning opportunities for one to accumulate knowledge on where problems will happen and how to prevent them (Leach, Wall, & Jackson, 2003).

According to Hackman and Oldham (1975), when employees have freedom and discretion regarding task operations, they will experience a sense of responsibility for task outcomes. This critical psychological state will make employees alert to problems and consider it as their responsibility to prevent or solve work-related problems. In a review of 200 empirical studies, Fried and Ferris (1987) noted that the positive relationship between job autonomy and sense of responsibility have received empirical support. Some recent studies have also provided support for this relationship. For instance, in a study of 871 employees, Morgeson, Delaney-Klinger and Hemingway (2005) found that job autonomy was positively related to role breath (i.e. the extent of perceived job requirement). This finding implies that under high job autonomy employees will go beyond formal job requirements to take more responsibilities. Similarly, Parker and her colleagues have also provided evidence linking job autonomy to employees' belief of taking broader role at work (i.e. role breath self-efficacy) (Parker, 1998) and adopting a responsible orientation towards production (i.e. ownership orientation towards production (Parker & Sprigg, 1999). When employees experience high levels sense of responsibility, they are likely to be attentive to tasks (Frink & Ferris, 1998) and feel obligated 'to bring out constructive change' (E. W. Morrison & Phelps, 1999: 407). Consequently, when problems occur in the work environment, employees with high sense of responsibility are more likely to identify the problem, resulting in PSD perceptions.

Meanwhile, given control at work, employees are likely to develop a better understanding of their work (Frese & Zapf, 1994). This is because job autonomy provides space and flexibility for employees to try different ways of doing things, prioritise tasks and set goals for achievement. Consequently, they develop an understanding of the work environment and are therefore able to anticipate, identify and diagnose problems in the work environment. Empirical studies have provided evidence that job autonomy influences employee learning and development outcomes (Parker et al., 2001). In particular, Leach and his colleagues (2003) reported a positive relationship between job autonomy and knowledge of problems at work. Using 100 shop floor employees, Leach and his colleagues (2003) examined the change in employee knowledge and attitudes following an empowerment initiative (job autonomy). They observed a marked increase in job knowledge (conceptualised as fault knowledge, including fault recognition, fault understanding, faulty correction, fault categorization and fault principles). The resulting knowledge, especially knowledge about where problems are likely to occur leads employees to appreciate problem demands at work.

Taken together, in high job autonomy situations, employees are likely to feel responsible for their tasks (Hackman & Oldham, 1975, 1980). They may even go beyond the defined role breath (Morgeson et al., 2005; Parker, 1998) to take on more responsibilities. Thus, they are more likely to give much attention to their work and notice problems when they occur. Meanwhile, increased job autonomy provides an opportunity for employees to get a better understanding of their work and be able to recognise and understand problems at work (Leach et al., 2003).

Hypothesis 4b: Job autonomy is positively related to PSD

Proactive personality and PSD

There is a recognition that individuals play an active rather than a passive role in interactions with their environment (Bandura, 1977; Buss, 1987; Diener, Larsen, & Emmons, 1984; Salancik & Pfeffer, 1978). Bateman and Crant (1993), however, went further to introduce an individual disposition, which defines the differences among people in the tendency or willingness to engage in proactive activities to control and manipulate their environments. This individual disposition is known as proactive personality, which is premised on people's needs to manipulate and control the environment (Bateman & Crant, 1993 :104). According to them (Bateman & Crant, 1993), individuals high in proactive personality are not constrained by their current situations. Rather, they take initiatives to effect environmental change and persevere until meaningful change occurs. In contrast, individuals low in proactive personality tend to react passively to the external environment. Rather than changing things around them, they tend to accept and adapt to their environment.

Past research has shown that proactive personality is related to a number of outcomes, such as sales performance (Crant, 1995), entrepreneurial intentions (Crant, 1996), objective and subjective career success (Seibert, Crant, & Kraimer, 1999), charismatic leadership (Crant & Bateman, 2000) and organisational innovation (Parker, 1998). Additionally, researchers have found a link between proactive personality and individuals' motivation to learn and self-development initiatives (Major, Turner, & Fletcher, 2006; Parker & Sprigg, 1999). In a study of 300 employees, Major and her associates (Major et al., 2006) reported that proactive

personality was positively related to individuals' motivation to learn (i.e. the desire to engage in training and development activities) and the eventual development activities (i.e. attending training programmes).

These findings imply that proactive individuals have a tendency to change the status quo (for better individual or organisational performance) than less proactive people. From a job crafting perspective, proactive individuals are highly motivated to craft their job, driven by a need for control at work, positive self-image and connection with others (Wrzesniewski & Dutton, 2001). Given their orientation toward better performance and individual achievements, proactive individuals are likely to engage in seeking and creating opportunities to shape the job to meet their individual desires. They may challenge what have been accepted, question existing practices, or seek ways to improve the current situation. All these serve as an impetus for proactive individuals to create problems and act on them. In contrast, individuals low in proactive personality are passive and submissive to environmental constraints. They are less likely to change the status quo or to create problems. Consequently, compared with less proactive individuals, proactive people are more likely to perceive PSD.

Hypothesis 4c: Proactive personality is positively related to PSD.

The moderating effect of proactive personality

Drawing on an interactionist perspective (Schneider, 1983; Terborg, 1981), Crant (2000: 455) noted that proactive personality, though stable and consistent over time,

"may be constrained or prompted through managing context." He further called for the investigation of the interactions between proactive personality and contextual factors, e.g. job autonomy or supervisor support in affecting individual outcomes. Indeed, some researchers have provided evidence for the moderating effect of proactive personality on the relationships between contextual factors and individual outcomes (Fuller, Marler, & Hester, 2006; Parker, 2003). For instance, Fuller, Marler and Hester (2006) found that proactive personality interacted with contextual factors (e.g. access to resources, access to information) in influencing employees' felt responsibility for constructive change. Specifically, having high access to resources (e.g. equipment, material, time, funding etc.) or high access to strategy-related information (e.g. where the company is going), proactive rather than passive individuals reported increased levels of responsibility for constructive change (e.g. to bring about change or improvement in the workplace). In this study, I examine the moderating influence of proactive personality on the relationships between two contextual factors (i.e. supervisor developmental feedback and job autonomy) and PSD perceptions.

The moderating effect of proactive personality on the relationship between supervisor developmental feedback and PSD can be explained by both the SIP perspective (Blau & Katerberg, 1982) and the job crafting model (Wrzesniewski & Dutton, 2001). However, the effect patterns are different.

As discussed earlier, supervisor developmental feedback constitutes a social information cue for PSD. When supervisors indicate that there are work-related problems, individuals will pay attention to the problems, leading to increased PSD

perceptions. Since individuals differ in susceptibility to social cues (Blau & Katerberg, 1982), the relationship between supervisor developmental feedback and PSD may be contingent on individual differences. Prior research has shown that individuals who are externally-controlled (e.g. low self-esteem, field-dependent) rather than internally-controlled (e.g. high self-esteem, field independent) are likely to be affected by social information cues (e.g. Weiss & Shaw, 1979). Therefore, information cues provided by supervisors may be effective in promotion PSD for externally-controlled rather than for internally-controlled individuals. I propose that proactive personality levels may determine one's susceptibility to the information cues provided by supervisor developmental feedback. Compared with low proactive people, high proactive people are more internally-controlled, driven by their internal needs to have an impact on the external world. Regardless of the levels of supervisor developmental feedback, high proactive individuals will engage in proactive behaviours at work, e.g. creating problems in order to improve products and/or services resulting in increased PSD perceptions. In contrast, individuals low in proactive personality are 'passive and reactive, preferring to adapt to circumstances rather than change them' (Crant, 2000: 439). For low proactive individuals, the information cues conveyed by supervisor developmental feedback may effectively direct their attention to problems at work, thus foster their perceptions of PSD.

Hypothesis 5a: The relationship between supervisor developmental feedback and PSD will be moderated by proactive personality such that the effect will be stronger for individuals low rather than high in proactive personality.

The job crafting model (Wrzesniewski & Dutton, 2001) also support the moderating influence of proactive personality on the positive relationship between supervisor developmental feedback and PSD. Supervisor developmental feedback encourages individuals to reassess current situations (e.g. performance) and to look for opportunities for individual learning and development (Zhou, 2003). Since supervisor developmental feedback may include information on resources and directions for future development, it constitutes a favourable work context in which proactive people see opportunities to craft the job. Therefore, for individual high in proactive personality, supervisor developmental feedback is likely to prompt them to engage in proactive activities and assume more responsibility in the workplace. Consequently, compared with low proactive individuals, high proactive individuals are more likely to be involved in problem-seeking, problem-diagnosing, and problem-anticipating, leading to high perceptions of PSD. Therefore, contrary to Hypothesis 5a,

Hypothesis 5b: The relationship between supervisor developmental feedback and PSD will be moderated by proactive personality such that the effect will be stronger for individuals high rather than low in proactive personality.

The moderating effect of proactive personality on the relationship between job autonomy and PSD can be explained by the job crafting model (Wrzesniewski & Dutton, 2001). Job autonomy offers a working context in which employees have opportunities to craft their job characteristics, such as PSD. However, individuals differ in their response to such opportunities, depending on their internal needs to

craft their work environment (Wrzesniewski & Dutton, 2001). Specifically, individuals high in proactive personality will find high job autonomy situations appealing because their needs to exercise control of environment are satisfied under such job conditions. Given autonomy at work, individuals high in proactive are more likely to take initiatives to analyse current practices, identify areas that need improvements (i.e. problems), and to seek solutions to problems. In contrast, individuals low in proactive personality have a low need to shape or change the external environment, such as job attributes, accepting what are presented to them. To them, high job autonomy does not constitute an opportunity as it is to those high in proactive personality. Therefore, compared with individuals low in proactive personality, those high in proactive personality are more likely to capitalise on high job autonomy situations to craft the job according to their own needs or desires. For instance, Parker and Sprigg (1999) reported that proactive personality interacted with enriched job conditions (i.e. high job control and high job demand) to affect employees' role orientation of their job. Specifically, for individuals high in proactive personality, highly enriched job conditions are likely to induce them to adopt a wide role breath and high levels of ownership of production (e.g. feeling concerned about production problems). In the same vein, I argue that, for individuals high in proactive personality, autonomy at work is more likely to encourage them to identify job-related problems and take responsibility to solve these problems, leading to increased PSD perceptions.

Hypothesis 5c: The relationship between job autonomy and PSD will be moderated by proactive personality such that the effect will be stronger for high rather than low proactive individuals.

Summary

In this chapter I investigate antecedents of PSD. Based on the social information processing perspective(Salancik & Pfeffer, 1978) and the job crafting model (Wrzesniewski & Dutton, 2001), I developed a model for examining antecedents of PSD. Specifically, supervisor developmental feedback, job autonomy, proactive personality and their interactions are hypothesized to lead to PSD perceptions. The methodology used to test hypotheses derived from this model and those in the preceding chapter are described in the next chapter.

Chapter 4: Research design and method

Introduction

To test the hypotheses proposed in Chapters 2 and 3, an empirical study was conducted with a sample of 270 employees and 60 supervisors from three organisations in China. Before reporting the results, this chapter provides a detailed account of how the study was designed and conducted. This chapter is organised into 2 main sections: (1) paradigms and research settings, and (2) research design. The former discusses the selection of research paradigm and setting while the latter provides a detailed description of participating organisations, data collection procedures, characteristics of the sample, measures, and related ethical and translation issues.

Research paradigm

Paradigm is "a set of linked assumptions about the world which is shared by a community of scientists investigating the world" (Deshpande, 1983 : 101). Paradigm provides a framework for researchers to describe and explain complex social phenomena. A paradigm has three elements: (1) ontology; (2) epistemology; and (3) methodology. Ontology refers to the nature of reality. Epistemology refers to researchers' position in relation to the reality they want to describe and explain. Methodology is the techniques that researchers can use to investigate the reality (Burrel & Morgan, 1979).

The *positivist* paradigm posits that there is a unified scientific language for all scientific disciplines. The methods used to study the social sciences should be the same as the methods used to study the natural sciences. Therefore, within the *positivist* paradigm, the ontological assumption is that reality is external and objective. Driven by this belief, the epistemological approach for positivist researchers is to observe the reality that is independent of those who observe. Therefore, the knowledge of the reality is sought based on the observations of researchers, however, free from researchers' personal, ethical, moral, social or cultural values (Crotty, 1998). Consequently, the reality should be measured through objective methods, e.g. concepts need to be operationalised so that facts can be measured quantitatively. Positivists are concerned with hypotheses testing. Researchers establish hypotheses deduced from existing knowledge relevant to research questions. The understanding of reality is through testing these hypotheses with scientific experiments or surveys.

The *interpretivist* paradigm constitutes a reaction to positivism. Many scholars have attempted to establish a 'historical, human, cultural and social sciences' independently of the natural sciences (see Delanty & Strydom, 2003). Within the *interpretivist* paradigm, it is believed that there is no objective social reality. By contrast to positivism, reality is socially constructed and determined by people. The aim of research is to understand what is going on in a specific context rather than to explain the reality. Specifically, researchers need to appreciate the different social reality constructed by individuals or the collectivists. By paying attention to how people feel, think and communicate with each other, researchers try to understand and explain why people have different constructions or experience of reality (Bryman, 1988). Qualitative methodology techniques such as participant observation and

unstructured, in-depth interviewing are mostly involved. Using these observations and interviews, researchers develop theories. Positivism and interpretivism represent two potential paradigms for the current research question. The following sections will compare positivist and interpretivist approaches in relation to the current research.

Positivism versus interpretivism in creativity research

Both positivism and interpretivism have been adopted in creativity research. For instance, before the 1950s, creativity studies were dominated by the interpretivist paradigm with two dominant research approaches: case study and historiometric study. Both case study and historiometric research base the research on the examination of creative individuals whose status as creators is well-recognised, such as Tolstoy, Leonard da Vinci, Beethoven, and Einstein. Case study is concerned with such questions as: what do creators do when they are creative? How do they employ available resources (Gruber & Wallace, 1999)? By answering these questions, researchers developed qualitative descriptions of the nature of creativity (e.g. cognitive processes leading to a creative solution or uniqueness of a creative person). Differently, historiometric researchers quantify the biographical and historical record of eminent creators and their creative output in order to tease out the personal traits and social circumstances that have contributed to creativity (cf. Simonton, 1999).

Case study and historiometric research have made and continue to make significant contributions to the creativity research. However, these approaches have been criticized for a number of reasons, particularly the focus on eminent creators. Addressing the APA (American Psychological Association) conference in 1950, Guilford noted that the rarity of eminent creators has limited research on creativity.

He suggested that creativity could be studied with everyday subjects (non-eminent people) and a research design that facilitates the testing of hypotheses. His suggestion has had a tremendous influence on creativity research, as evident in the development of psychometric (e.g. Torrance, 1974), experimental (e.g. Harrington, 1975; Hyman, 1961) and cognitive (e.g. Finke, Ward, & Smith, 1992) approaches in creativity research, signalling a shift from the interpretivist to the positivist paradigm.

Different from case study and historiometric research, these above-mentioned approaches (i.e. psychometric, experimental and cognitive) employ quantitative methodology. For instance, quantitative measurements, such as creative personal traits (e.g. Gough, 1979), cognitive processes leading to creativity (Torrance, 1974), expert rating of creative products (D. W. MacKinnon, 1962), and creativity-related contextual factors (e.g. Amabile, 1983) are used in creativity research. Furthermore, these quantitative approaches allow researchers to extensively examine relationships between creativity and personal and organisational factors that contribute to or inhibit creative outcomes (e.g. creative thinking or creative ideas), such as personality traits (Feist, 1998), cognitive style (Kirton, 1994), reward (e.g. Amabile et al., 1996; Eisenberger, 1992), evaluation (e.g. Shalley, 1995), and job attributes (Amabile & Gryskiewicz, 1989; Oldham & Cummings, 1996). Consequently, the present research adopts a positivist orientation paradigm to examine the relationship between a job attribute, PSD and creativity.

Research setting

Creativity studies have been carried out in both laboratory and field settings (Zhou & Shalley, 2003). To reach a decision on an appropriate setting for the present research, it is necessary to compare the strengths and the limitations of these two.

Creativity is a complex phenomenon, which is subject to diverse influences: social, educational cognitive, cultural and emotional (Amabile, 1983; Mumford & Gustafson, 1988). A laboratory setting provides an opportunity to apply manipulation and control to reduce the complexity of creativity to a "manageable level" (Runco & Sakamoto, 1999). By so doing, the influential effects from the compounding and nuisance factors can be controlled or minimized, which enhance demonstration of the causal status of the relationship between creativity and its antecedents.

However, research in laboratory settings has been challenged for its external validity (Runco & Sakamoto, 1999; Zhou & Shalley, 2003) and content validity (Runco & Sakamoto, 1999). While external validity is an inherent trade-off of laboratory studies, the problem of content validity has been raised because individual laboratory studies cannot adequately examine the complexity of creativity. Rather only limited aspects of creativity can be examined and these aspects are examined not because they are important but because they are "the easiest to justify, operationalise, and test" (Runco & Sakamoto, 1999: 63). For instance, in many experimental studies, researchers have used problem-solving tasks in studying creativity. These tasks are close to real-life situations, e.g. generating solutions to problems as a human resource manager (Shalley, 1991, 1995; Zhou, 1998) or giving solutions to marketing problems (Redmond et al., 1993). However, these presented problem tasks may not fully

capture PSD as experienced in a general work environment, which may include not only presented problems, but also problems discovered and created by individuals (Getzels, 1982). Therefore, this research did not examine the PSD-creativity relationship in a laboratory setting.

In field studies, researchers use surveys to collect quantitative data to test a model developed from the literature. Field studies in organisations can overcome the problem of external validity encountered in laboratory studies. The theory or the model tested within one working context is likely to be generalised to other similar working contexts. Consequently, this study was conducted in a field setting for two reasons. First, survey design provides an effective and economical way to collect quantitative data on all the variables included in the theorized model, which would be difficult to achieve in a laboratory setting. Second, the key variable in the model, PSD, is a complex construct (as discussed in Chapter 2 and 3). It may not be fully replicated in a laboratory setting. However, with a field study questionnaire, a validated measure of PSD can better tap employees' perception of PSD. It should be noted that because of 'noises' in the real-life environment the internal validity (i.e. validity of the causal inferences) of field studies may be compromised. This problem is especially a concern when the field study is cross-sectional in nature. This weakness can be addressed if a longitudinal design is adopted. In a longitudinal design, the data are collected at more than one point in time and therefore enables researchers to observe the change and development over a certain period of time (G. Adams & Schvaneveldt, 1991). Thus a causal relationship can be better established. However, longitudinal design is challenging for creativity researchers because of the extent of resources required, such as accesses to organisations, time and costs (Zhou

& Shalley, 2003). Given the limited resources available for this project, I adopted a cross-sectional design. The details of the research design will be discussed in the following sections.

Research design

This section provides a detailed description of how this study was designed and implemented. It includes data collection procedures, characteristics of the sample and measures of the study variables.

Research context

Three issues were considered in the selection of participating organisations. First, this study aims to examine creativity in an environment where the requirements for creativity are not salient. This is different from creativity studies that focus on research and development (R&D) teams, where creativity is the expected outcome (e.g. Amabile et al., 1996; Scott & Bruce, 1994; Tierney et al., 1999). Second, it is important to have participants from different functional groups. By so doing, a representative sample (of a general work environment) can be achieved. Lastly, like many other creativity studies, supervisor ratings were used to measure employee creativity. Therefore, it is important to identify supervisor-subordinate dyads, whereby supervisor is in an appropriate position to observe subordinates' creative performance.

Three organisations located in the city of Wuxi, the People's Republic of China that satisfied the preceding requirements were invited to participate in this study.

These organisations varied in size and ownership types. The largest company (Company B) has about 6000 employees. The second largest company (Company C) has about 200 employees and the smallest company (Company A) has about 40 employees. While the smallest company is a privately-owned company, the other two are foreign-invested companies. The largest company is a joint venture between China and Japan while the second largest is a German company. The organisations were also different in production lines and targeted markets. Company A manufactures products for power supply equipments mainly for the market in China. Company B manufactures such electronic products as liquid crystal display (LCD) and electronic components for computers, televisions and digital camera. Their products are for either household or industrial use. Company C manufactures vacuum power switches for power plants. Company B and C have their product markets both in China and overseas. Despite the differences in ownership, size, products and product markets, the three companies share some similarities. First, they were all relatively new companies. Company A was established in 2000, Company B in 1996 and Company C in 1997. Second, employees of the three companies were mainly from local and nearby towns. In meetings with Human Resources (HR) managers of each of the companies, I explained the aims of the study and asked them to identify individual work units within the company for possible participation in the research. No particular interest was expressed in work units where high creative performance was expected. As a result of negotiation, the largest company agreed that employees and their immediate supervisors from three departments (technology support, finance, and production and material management) would participate in the study while the other two smaller companies agreed to have all employees across the company and their immediate supervisors participate in the survey. Table 1 outlines the details of

the companies and the number of employees and supervisors from each company that participated in the study.

Table 1: Details of participating companies and participants

Company	Size (approximate)	Industry	Ownership	Management	Number of employees	Number of supervisors
A	40	Electronics (for industrial use)	Private Limited	Chinese managers	32	6
B	6000	Electronics (for both industrial and household use)	Joint Venture (China-Japan)	Chinese and Japanese managers	163	40
C	200	Electronics (for industrial use)	Foreign direct investment (Germany)	German and Chinese managers	128	19

Data collection procedure

After the meeting with the HR manager and General Manager of each company, a survey facilitator from the HR department of the respective companies was assigned to help me to carry out the data collection. The HR department in each participating organisation sent an introductory letter drafted by the researcher to the identified teams (including supervisors and subordinates), informing them of this survey. The content of the letter included the purpose of the study, the benefits and the time required to complete the questionnaire (about 20 minutes). The participants were also informed that this survey is voluntary and were assured of confidentiality of their responses. For those who wanted to know more about the survey in order to make a decision to participate, the letter also included the contact details of the researcher. The survey facilitators provided a name list of the participating supervisors and their subordinates. Each subordinate and supervisor was given a code number, which was only known to the researcher.

Separate questionnaires were administered to subordinates and supervisors. Subordinate questionnaires were distributed to 323 employees while supervisor questionnaires were distributed to 65 immediate supervisors of the subordinates. Employees completed a questionnaire that included measures of PSD, creative self-efficacy, intrinsic motivation, supervisor developmental feedback, job autonomy, and proactive personality. Separately, each supervisor was asked to rate the creativity of an average of five subordinates. A cover letter attached to each of the questionnaires informed respondents of the objective of the survey, which was to examine the relationship between HR practices and employee performance. Respondents were assured of the confidentiality of their responses. They were also assured that their

personal ID (provided at the top right hand corner of the questionnaire) would only be used to match their responses to the ratings provided by their supervisors.

Ethical issues

According to the ethical framework set by Aston University, ethical issues need to be addressed in all research involving human participants. The ethical principles promulgated by the University include beneficence ('to do positive good') & non-malfeasance ('to do no harm'), informed consent, and confidentiality/anonymity. The meaning of each principle and how it was integrated into the procedures are outlined below:

Beneficence ('to do positive good') & Non-Malfeasance ('to do no harm')

This principle holds that researchers need to ensure their study is beneficial not malevolent. Risk analysis should be conducted and measures should be taken to eliminate or minimize the risk or harm to the participants. For this study, the respondents might have concerns that the questionnaire would be an assessment of their performance and might feel uneasy filling the survey. To reduce this concern, the objective of this survey and its benefits, were communicated to the participants through the organisation's HR department before the survey and in the cover letter (see appendix) that prefaced the questionnaire.

Informed consent means respondents needed to be fully informed of the objective, the procedures, the potential benefits and other relevant information (e.g. information that is deemed important to respondents) of the survey. Researchers should also ensure respondents take part in the survey out of their own free will or voluntarily. When

there are questions and concerns regarding the survey, researchers need to provide sufficient information to ensure respondents understand the nature and objectives of the survey. To achieve this end, I took a number of steps. First, as mentioned earlier, the HR department of each organisation was requested to inform the participants of the survey a week before the questionnaires were distributed. Second, the cover letter informed participants of the objective of the survey, the time it may take them to answer the survey. Participants were also told that their participation is voluntary and their confidentiality/anonymity is protected. Third, the cover letter also provided my contact details so that participants can contact me if they have any enquiries.

The principle of *confidentiality/anonymity* requires that identifiable individual and company details should not be divulged to anyone who is not involved in the research unless consent is given by the party concerned. It also requires that the use of data and the storage of questionnaires should meet the regulations relating to data protection. In this study, participants' names were replaced with codes. Only the researcher (myself) knows the link between the name and the code. After the survey, I entered the data and stored the returned questionnaires in a place where no one other than myself would have access to them.

Sample

Completed and usable questionnaires from 270 supervisor-subordinate dyads were received. This represented a response rate of 84% for subordinates and 90% for supervisors. Of the 270 respondents, 66% were male. Respondents reported an average age of 28.35 years (SD=5.25) and average job tenure of 2.93 years (SD=3.03). In terms of highest level of education achieved, 23% (62) respondents had completed high school (12 years of education), 50% (135) college degree (15 years of education), 25.2% (68) Bachelor's degree (16 years of education), and 1.9% (5) Master's degree (19 years of education). Participants were from different functions of the companies: administration and HR (88 respondents, 33.1%), production (78 respondents, 29.3%), finance/accounting department and quality control (57 respondents, 21.4%), logistics (20 respondents, 7.5%) and sales & marketing and others accounted for 23 respondents (8.7%). Four respondents did not indicate their job function. Table 2 provides a breakdown of the demographic composition of the sample and the response rate for each company.

Table 2: A breakdown of the demographic composition of the sample and the response rate of each company

	Gender		Age		Job tenure		Education				Supervisor response rate	Employee response rate
	Female	Male	Mean	S.E.*	Mean	S.E.	1**	2	3	4		
Company A	6 (24%)	19 (76%)	28.44	4.09	2.48	1.53	1 (4%)	8 (32%)	13 (52%)	3 (12%)	6 (100%)	25 (78%)
Company B	66 (46.2%)	77 (53.8%)	27.94	4.85	2.67	2.69	15 (10.5%)	88 (61.5%)	40 (28%)	--	37 (93%)	143 (88%)
Company C	18 (17.6%)	84 (82.4%)	28.89	5.98	3.41	3.65	46 (45.1%)	39 (38.2%)	15 (14.7%)	2 (2%)	16 (88.89%)	102 (68%)
Overall	90 (33.33%)	180 (66.67%)	28.35	5.25	2.93	3.03	62 (23%)	135 (50%)	68 (25.2%)	5 (1.9%)	59 (90%)	270 (84%)

* S.E.= Standard deviation.

** 1= High school (12 years of education), 2= College degree (15 years of education), 3= Bachelor's degree (16 years of education), and 4=Master's degree (19 years of education).

Measures

Following procedures suggested by Brislin (1980), the questionnaire was developed originally in English and translated into Chinese by myself. The Chinese version of the questionnaire was back translated into English by a bilingual of English and Chinese[1]. A third person, an English native speaker[1] compared the original version with the back translation. Based on his comments, a few items were reworded to ensure clarity. For instance, one of the items for intrinsic motivation was, "Because I feel a lot of personal satisfaction while mastering certain difficult job skills". The back translation of this item was, "Because I feel satisfied with myself when I manage a piece of work of some level of difficulty". Comparing these two sentences, the native speaker suggested that these two sentences were not the same. He commented, "... managing a difficult piece of work and mastering a difficult job skill are not the same. You can use simple and already mastered skills to perform a difficult task." Accordingly, I changed the wording of the translation so that its meaning was closer to mastering or learning difficult job skills rather than managing difficult tasks. Questionnaires are presented in appendixes: Appendix 1 (questionnaire for employee in English), Appendix 2 (questionnaire for supervisor in English), Appendix 3 (questionnaire for employee in Chinese) and Appendix 4 (questionnaire for supervisor in Chinese).

PSD

I used a 5-item scale originally developed by Jackson and his colleagues (1993), and later improved and validated by Wall and his colleagues (1995) to measure PSD.

[1] I would like to thank my friends, Janis Chng and Louis Dennis for their generous help and insightful comments in this translation and back-translation exercise. Janis Chng is a bilinguist of English and Chinese with a Master's degree in work psychology. Louis Dennis is an American lawyer.

Sample items are "To what extent does your job require you to deal with problems which are difficult to solve?" and "To what extent do you have to solve problems which have no obvious correct answer?" Response options ranged from (1) 'not at all' to (5) 'a great deal'. The scale's alpha reliability in this study was .76.

Creative self-efficacy

I used a 3-item scale developed by Tierney and Farmer (2002) to measure creative self-efficacy. Sample items are "I have confidence in my ability to solve problems creatively" and "I feel that I am good at generating novel ideas". Response options ranged from (1) 'strongly disagree' to (7) 'strongly agree'. The scale's alpha reliability in this study was .87.

Intrinsic motivation

I used a 12-item scale to measure intrinsic motivation. This measure was originally developed by Vallerand and his colleagues (Vallerand & Bissonnette, 1992; Vallerand et al., 1993) in an academic context and later adapted by Van Yperen and Hagedoorn (2003) to a work context. It represents three types of intrinsic motivation: intrinsic motivation to know (item 1-4), to accomplish things (items 5-8), and to experience stimulation (item 9-12). In line with prior research (Van Yperen & Hagedoorn, 2003) and considering the high correlations between the three subscales (r's >.67), I combined the three subscales to create a composite index for intrinsic motivation. Respondents were asked, "Why do you do this job?" Sample items are: "for the pleasure it gives me to know more about my job" (intrinsic motivation to know); "because I feel a lot of personal satisfaction while mastering certain difficult job skills" (intrinsic motivation to accomplish things); "for the excitement I feel when I

am really involved in my job" (intrinsic motivation to experience stimulation). Response options ranged from (1) 'strongly disagree' to (7) 'strongly agree'. The scale's alpha reliability in this study was .95.

Creativity

I used a 13-item scale developed by Zhou and George (2001) to measure creativity. Supervisor rating has been widely used in creativity research (e.g. George & Zhou, 2001, 2002; Tierney & Farmer, 2002, 2004). Supervisors are asked to rate the creative performance of their subordinates based on their observations. It is emphasized that those who are invited to provide ratings should be in a good position to observe and are familiar with the work behaviours of the target employee (e.g. George & Zhou, 2002). Normally, these are the immediate supervisors of employees. It has been reported that supervisor ratings are convergent with objective measures to some extent. For instance, Tierney and her colleagues (1999) used supervisor ratings, research reports and invention disclosures as creative indicators for research & development (R&D) employees. They reported supervisor-rated creativity to be positively related to: 1) invention disclosure ($r = .29$, $p < .001$); and 2) research report ($r = .28$, $p < .001$). Similarly, Scott and Bruce (1994), in a study of R&D employees, also reported supervisor-rated creativity to be highly correlated with number of invention disclosures ($r = .33$, $p < .001$). Thus, consistent with previous creativity research (George & Zhou, 2001, 2002; Madjar et al., 2002; Tierney & Farmer, 2002, 2004), this study used supervisor ratings to measure employee creativity. Supervisors rated the creative performance for each of their subordinates who participated in the survey. Sample items are: "This employee is a good source of creative ideas" and "This employee often has a fresh approach to a problem". Response options ranged

from (1) 'not at all' to (5) 'to a great extent'. The scale's alpha reliability in this study was .96. Since supervisors rated more than one employee, there was a risk that the creativity rating scores received by individual employees were dependent of rater identity. Following Dansereau and Yammarino (F. Dansereau & Yammarino, 2000), I conducted within and between analysis (WABA) (F. Dansereau, Alutto, & Yammarino, 1984) to test the assumption of independence of creativity ratings that each supervisor provided for multiple subordinates. The E ratio (tests of practical significance) for creativity was .96, less than 1.0 and therefore indicated that the variation within groups was significantly greater than the variation between groups. Furthermore, corrected F-test (tests of statistical significance) was statistically nonsignificant (1/F = .28). Together, these WABA results supported the assumption of independence for creativity and the appropriateness of conducting the analysis at the individual rather than the group level.

Supervisor developmental feedback

I used a 3-item scale developed by Zhou (2003) to measure supervisor developmental feedback. Response options ranged from (1) "strongly disagree" to (7) "strongly agree". Sample items are: "While giving me feedback, my supervisor focuses on helping me to learn and improve" and "My supervisor provides me with useful information on how to improve my job performance". The scale's alpha reliability in this study was .82.

Job autonomy

I used a 9-item scale developed by Breaugh (1985) to measure job autonomy. It represents three aspects of job autonomy: method autonomy (regarding how to carry

out tasks) (items 1-3), schedule autonomy (regarding when to do what tasks) (items 4-6), and criteria autonomy (regarding what to achieve) (items 7-9). In line with prior research (Langfred, 2004) and considering the high correlations between the three subscales (r's >.53.), I combined the three subscales to create a composite index for job autonomy. Sample items are "I am allowed to decide how to go about getting my job done" (method autonomy); "My job is such that I can decide when to do particular work activities" (schedule autonomy); "My job allows me to modify the normal way we are evaluated so that I can emphasize some aspects of my job and play down others" (criteria autonomy). Response options ranged from (1) 'strongly disagree' to (7) 'strongly agree'. The scale's alpha reliability in this study was .89.

Proactive personality

I used a 4-item scale originally developed by Bateman and Crant (1993) and later adapted by Parker and Sprigg (1999) to measure proactive personality. Responses options ranged from (1) 'strongly disagree' to (5) 'strongly agree'. Sample items are "No matter what the odds, if I believe in something I will make it happen" and "I am excellent at identifying opportunities." The scale's alpha reliability in this study was .75.

Control variables

I controlled for education level and job tenure, because both reflect individual knowledge level (cf. Tierney & Farmer, 2002), which has been shown to be related to individual creativity (Amabile, 1983; Woodman et al., 1993). Education level was measured on a four-point scale (1= "high school and below", 2= "college degree", 3= "the Bachelor's degree" 4= "the Master's degree"). Job tenure was measured in

years. *Age* has been associated with creativity (Amabile, 1983) and self-efficacy (Bandura, 1997). There are *gender* differences in perception of capabilities of doing a certain type of job. For instance, compared with men, women generally perceive themselves less efficacious in doing some types of jobs, such as scientific jobs (Matsui & Tsukamoto, 1991). Consequently, I also controlled for age and gender. Two dummy variables (org 1 and org 2) were created to control for the difference in creativity receptivity or perceived expectation for creativity (Ford, 1996) that might exist among organisations. Company C was used as the reference. Among the three organisations, only Company C has a suggestion system that encourages employees to submit new and useful ideas to improve products, production process and problem-solving. Therefore, employees from Company C may be more likely to perceive high levels of creativity receptivity (Ford, 1996) than those in Company A and B.

Summary

This chapter has discussed the choices of research paradigm and research setting. It has also provided a detailed description of the research design and methodology used to implement the study, including research context, data collection procedure, sample and measures. Data analysis and the results are reported in the next chapter.

Chapter 5: Data analysis and results

Introduction

A number of data analysis techniques were employed to test the study's hypotheses. First, I conducted a CFA (confirmatory factor analysis) to examine the distinctiveness of variables in the study. Second, to test the hypothesized positive relationship between PSD and creativity, the positive relationship between PSD and creative self-efficacy, and the mediating effect of creative self-efficacy (Hypotheses 1, 2a & 2b), I followed the procedures recommended by Baron and Kenny (1986). This was supplemented by a test suggested by Sobel (1982) to examine the significance of the indirect effect that the independent variable (PSD) has on the dependent variable (creativity). Third, following Aiken and West (1991), I used moderated multiple regression to test: (1) the interaction term of PSD and intrinsic motivation on creative self-efficacy (Hypothesis 3a); (2) the interaction term of supervisor developmental feedback and proactive personality on PSD perceptions (Hypothesis 5a and 5b); and (3) the interaction term of job autonomy and proactive personality on PSD perceptions (Hypothesis 5c). Simple slope analysis was also conducted to interpret the meaningfulness of the interactions. Fourth, I tested the hypothesized moderated mediation (Hypothesis 3b) following procedures outlined by Muller, Judd and Yzerbyt (2005). Finally, I applied hierarchical regression to test the hypothesized antecedents of PSD (Hypotheses 4a, 4b, 4c, 5a, 5b and 5c).

Confirmatory Factor Analysis (CFA)

As data on the study variables (with the exception of creativity) were based on self-reports, common method variance could potentially influence the relationships

examined (Podasakoff, MacKenzie, Lee, & Podsakoff, 2003). Consequently, I performed a CFA using AMOS 6.0 to examine the distinctiveness of the study variables. I compared a hypothesized 7-factor model (whereby PSD, creative self-efficacy, intrinsic motivation, creativity, supervisor developmental feedback, job autonomy and proactive personality were treated as seven independent factors) to a series of intuitively plausible alternative nested models: (1) a 6-factor model, (combining creativity and creative self-efficacy); (2) a 5-factor model_1, (combining three contextual factors: supervisor developmental feedback, job autonomy and problem-solving demand); (3) a 5-factor model_2, (combining three individual factors: proactive personality, creative self-efficacy and intrinsic motivation); (4) a 3-factor model, (combining three contextual factors: supervisor's developmental factor, job autonomy and problem-solving demand to one factor, and combining three individual factors: proactive personality, creative self-efficacy and intrinsic motivation to another); (5) a 2-factor model, (combining all variables except for creativity); and (6) a 1-factor Model, (combining all variables).

CFA employs structural equation modelling (SEM) to "represent a series of hypotheses about how variables in the analysis are generated and related" (Chou & Bentler, 1995: 38). A crucial step in conducting SEM is to select an appropriate estimation procedure to ensure the estimates are adequate. Of the many estimation methods (e.g generalized least squares, asymptotic distribution free), maximum likelihood (ML) is the most commonly used approach in SEM. Many studies have shown that ML is relatively more robust to the violation of normality (when the data are not normally distributed) than other estimation techniques (Chou & Bentler, 1995). Therefore, in this study, I used ML estimation.

There are a number of fit indices to evaluate model fit. Based on different approaches in testing overall fit, fit indices are divided into three categories: (1) absolute fit indices such as chi-square (χ^2); (2) comparative or relative fit indices, such as the Tucker-Lewis index) (TLI, Tucker & Lewis, 1973), the incremental fit index, (IFI, Bollen, 1989), the comparative fit index (CFI, Bentler, 1990); and (3) fit indices derived from model comparison such as the root mean square error of approximation (RMSEA, Browne & Cudeck, 1993). Comparing advantages and disadvantages of different fit indices, Hoyle and Panter (1995) suggested that a combination of indices from different categories should be used to test overall model fit. Consequently, I used chi-square, IFI, TLI, CFI and RMSEA as key indicators of overall model fit (Hoyle & Panter, 1995). For IFI, TLI and CFI, a value of .90 is seen as a reasonable minimum for model acceptance (Bentler & Bonett, 1980), whereas for RMSEA, a value of .08 or less is indicative of a good model fit (Browne & Cudeck, 1993).

Sample size is important for estimation and fit indices. In CFA, the more parameters are estimated the more cases are required. Otherwise, it is difficult to achieve a stable solution. Bentler and Chou (1987) recommend a ratio of five observations per parameter in order to achieve a reasonably stable solution. The sample size of the present study is 270 observations. The proposed structural model includes 7 latent variables with 49 observed variables. Apart from these variables, CFA will also estimate other parameters such as residuals (error terms), thus making it impossible to achieve the recommended ratio of five cases to one parameter. Consequently, I employed item parceling procedures (Bagozzi & Heatherton, 1994; Bandalos & Finney, 2001) to handle the problem of sample size requirement.

In item parceling, two or more items are summed or averaged to form a parcel score, which takes the place of item scores in a CFA analysis (Bandalos, 2002; Cattell & Burdsall, 1975). Little, Cunningham, Shahar, and Widaman (2002) summarized three functions of item parceling: (a) to improve reliability of the indicators; (b) to improve overall structural equation model fit; and (c) to reduce the ratio of model indicators to observations.

Normally, the use of item parcels is recommended when the number comprising the observed variable is relatively large (Sass & Smith, 2006). In testing the effects of parceling for unidimensional scales, Sass and Smith (2006) observed that such scales will maintain the same model-relevant variance regardless of how items are parceled. According to Little and his coauthors (2002: 165), this method involves assigning each item, "randomly and without replacement, to one of the parcel groups". The number of parcels depends on the number of items. As a result of random assignment of items to parcels, the parcels should "contain roughly equal common factor variance". As shown in Table 3, I applied item-parcelling for constructs with more than three items, i.e. PSD, proactive personality and creativity. Following Landis, Beal and Tesluk's (2000) suggestion, I randomly assigned the items to each parcel. If there were an odd number of items, such as in PSD and creativity, I placed the extra item into a parcel randomly.

However, two scales are multi-dimensional constructs (i.e. intrinsic motivation and job autonomy) each containing three first-order factors. For such constructs, there are two types of parceling: isolated parceling and distributed parceling. An

isolated parceling process involves averaging or summing all the items with secondary loadings into the same parcel. In contrast, in a distributed parceling process, items with secondary loadings are put into parcels with items that do not share the influence of the secondary factor (Bandalos, 2002). For example, job autonomy has three dimensions (method autonomy, schedule autonomy and criteria autonomy), each of which has three indicators. Based on isolated parcelling, each dimension of job autonomy forms a parcel with its three indicators. Under distributed parcelling, however, each parcel should contain an item from each of the three dimensions. Based on two simulation studies, Bandalos (2002) reported that isolated parceling was less biased than distributed parceling for constructs with secondary factors. Consequently, I used isolated parceling for job autonomy and intrinsic motivation. Specifically, for job autonomy, I created three parcels, i.e. method autonomy (including the following items: autometh1, autometh2, and autometh3), schedule autonomy (including the following items: autosche1, autosche2, and autosche3), and criteria autonomy (including the following items: autcrit1, autocrit2, and autocrit3). For intrinsic motivation, I also created three parcels, i.e. motivation for knowledge (including the following items: motknow1, motknow2, and motknow3), motivation for accountability (including motacco1, motacco2, and motacco3), and motivation for experience (including the following items: motexpe1, motexpe2, and motexpe3). As mentioned earlier, the main justification for employing a parcelling procedure is to improve the variable to sample size ratio. As shown in Table 3, items are aggregated to form parcels. By employing this procedure, the number of variables is reduced and hence, the model's degree of freedom is kept reasonable.

Consequently, as shown in Figure 5, the measurement model included 20 indicators: 2 indicators (i.e. 2 parcels) for PSD, 3 indicators (i.e. 3 items) for creative self-efficacy, 2 indicators (i.e. 2 parcels) for proactive personality, 3 indicators (i.e. 3 items) for developmental feedback, 3 indicators (i.e. 3 parcels), for intrinsic motivation, 3 indicators (i.e. 3 parcels) for job autonomy and 4 indicators (i.e. 4 parcels) for creativity. Based on this model I ran CFA for the fitness of the proposed model. The results will be reported in next chapter.

Table 3: example Parceling for confirmatory factor analyses (CFA)

Scale		Indicators (Items)
PSD		AgPsd1[a] = psd1, psd5, psd3 AgPsd2[a] = psd2, psd4
Creative self-efficacy		cse1 cse2 cse3
Intrinsic motivation	Motivation for knowledge Motivation for accountability Motivation for experience	Motknow[a] = motknow1, motknow2, motknow3 Motacco[a] = motacco1, motacco2, motacco3 Motexpr[a] = motexpr1, motexpr2, motexpr3
Job autonomy	Method autonomy Schedule autonomy Criteria autonomy	Autometh[a] = autometh1, autometh2, autometh3 Autosche[a] = autosche1, autosche2, autosche3 Autocrit[a] = autcrit1, autocrit2, autocrit3
Supervisor developmental feedback		fdback1 fdback2 fdback3
Proactive personality		AgPap1[a] = pap1, pap3 AgPap2[a] = pap2, pap4
Creativity		AgCrea1[a] = crea1, crea5, crea9 AgCrea2[a] = crea2, crea6, crea10 AgCrea3[a] = crea3, crea7, crea11 AgCrea4[a] = crea4, crea8, crea12, Crea13

Note: 1: [a]: item parcel

2. psd1-5: items for PSD; cse1-3: items for creative self-efficacy; motknow1-3: items for motivation to knowledge and learning; motacco1-3: items for motivation to accountability; motexpe1-3: items for motivation to experience; autometh1-3: items for method autonomy, autosche1-3: items for schedule autonomy; autocrit1-3: items for criteria autonomy; fdback1-3: items for supervisor developmental feedback; pap1-4: items for proactive personality; crea1-crea13: items for individual creativity.

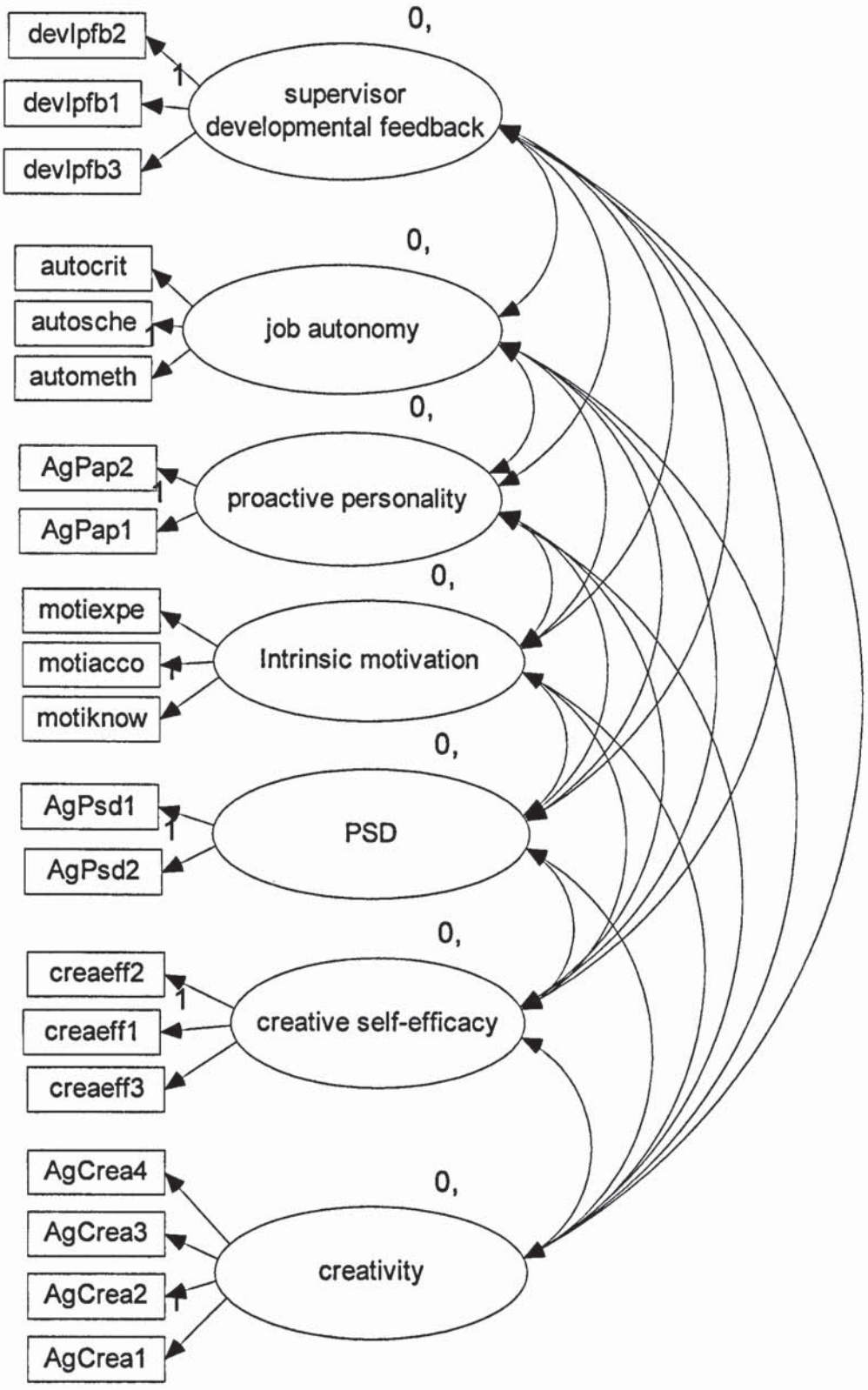


Figure 5: Measurement model with item parcels

Testing for mediation

Mediation refers to situations whereby the impact of an independent variable on a dependent variable is transmitted by a mediator (Baron & Kenny, 1986; James & Brett, 1984). James, Mulaik and Brett (2006) noted that two approaches to testing for mediation are prominent in the psychology research literature: the Baron and Kenny (1986) approach and the structural equation modelling (SEM) (L. R. James & Brett, 1984). Baron and Kenny (1986) posited the following conditions that must be satisfied to statistically establish mediation: (1) the independent variable must be related to the dependent variable; (2) the independent variable must be related to the mediator; (3) the mediator should be related to the dependent variable when the mediator is held constant; and (4) the independent variable must have no effect on the dependent variable (full mediation) or the effect should become significantly smaller (partial mediation). These conditions were reiterated by Kenny and his colleagues (Kenny, Kashy, & Bolger, 1998). SEM approach adopts a confirmatory approach in which the hypothesized paths from the independent variable to the mediator and from the mediator to the dependent variable are tested simultaneously. To support either a full or partial mediation hypothesis, parameter estimate for each path should be significant. For full mediation, the hypothesized lack of direct effect from the independent variable to the dependent variable can be ascertained by conducting goodness-of-fit tests (James & Brett, 1984; James et al., 2006).

According to James and his colleagues (2006), for partial mediation model, the two approaches do not differ significantly. Indeed, the key difference of the two approaches lies in testing the full mediation model. Specifically, the third step in Baron and Kenny's (1986) approach requires that the mediator should be related to

the dependent variable when the independent variable is controlled for. James et al argued that it is not necessary to control for the independent variable if the model is full mediation. James and his colleagues (2006) noted that the difference of the two approaches stems from different assumptions of the baseline model. For instance, Baron and Kenny's (1986) approach adopts a partial mediation model as the baseline model. They (Baron & Kenny, 1986) reasoned that the partial mediation model is the most frequent model in psychology. In contrast, SEM approach uses a full mediation model as the baseline model. The rationale for this approach is that a full mediation model is the most parsimonious model. Parsimonious models should be used as base line model because they are the easiest to reject (James et al., 2006). Consequently, James et al (2006) suggest testing for full mediation when theory or research is not sufficient to hypothesize a full or partial mediation model. However, if a partial mediation is hypothesized, either approach is appropriate. As discussed earlier, creative self-efficacy may be one of many psychological mechanisms underline the relationship between PSD and creativity, the mediated relationship under examination in this study was considered to be partial mediation. Therefore, I followed Baron and Kenny's approach in testing for mediation.

Consequently, I assessed the following conditions to test the hypothesis that creative self-efficacy mediates the relationship between PSD and creativity: (1) PSD must be related to creativity; (2) PSD must be related to creative self-efficacy; (3) creative self-efficacy must be related to creativity when PSD is controlled for; and (4) PSD must have no effect on creativity when creative self-efficacy is held constant (full mediation) or should become significantly smaller (partial mediation).

Preacher and Hayes (2004) highlighted a number of limitations inherent in their approach. Specifically, they argued that the procedures fail to test for the significance of indirect effects. Sobel test (Sobel, 1982) provides a direct test of the significance of indirect effects (R. M. Baron & Kenny, 1986; Preacher & Hayes, 2004). Thus, prior to the regression analysis, I tested for the significance of indirect effects by conducting a Sobel test with "Calculation for the Sobel Test" provided by Preacher and Leonardelli (2004).

Testing for moderation

When the direction or the strength of the relationship between two variables is dependent on a third variable moderation is said to occur (Baron & Kenny, 1986). The moderator interacts with the independent variable to affect the dependent variable. Three hypothesized moderated relationships were tested in this study: (1) the interaction effect of PSD and intrinsic motivation on creative self-efficacy (Hypothesis 3a); (2) the interaction effect of supervisor developmental feedback and proactive personality on PSD perception (Hypothesis 5a and 5b); and (3) the interaction effect of job autonomy and proactive personality on PSD perception (Hypothesis 5c). A number of researchers have discussed approaches to test for moderation effect (Aiken & West, 1991; Cohen & Cohen, 1983). A well-accepted approach is moderated regression, which involves two key steps. In the first step, the dependent variable is regressed on the main effects of both the independent variable and the moderator. This step partials out the variance in the dependent variable explained by the additive effects of the independent variable and the moderator. In the second step, the product of the independent variable and the moderator is entered into the regression equation. When the coefficient variance of the product term is

significant in this step, it indicates a significant moderated effect. In other words, the independent variable interacts with the moderator to influence the dependent variable.

However, Aiken and West (1991) went further by suggesting a procedure to plot the significant interaction in order to interpret the meaningfulness of the significant interaction. This procedure involves three steps: (1) centre the variables involved in the interaction (i.e. the independent variable and the moderator) (i.e. put in deviation score so that their means are zero) and form the interaction term by multiplying the centred independent and the centred moderator; (2) calculate the regression equations for the relationship between the independent variable and the dependent variable at certain values of the moderator. Cohen and Cohen (1983) recommended the values to be one standard deviation above and below the mean of the moderator; and (3) plot the equations to display the interaction.

For example, to test for the moderating influence of intrinsic motivation on the relationship between PSD and creative self-efficacy, I entered the controls in the first step. In the second step, I entered centred PSD and centred intrinsic motivation and in the final step, I entered their interaction term. To plot the significant interaction, I calculated the coefficient equations for the relationship between PSD and creative self-efficacy at high and low levels of intrinsic motivation, i.e. one standard deviation above and below the mean of intrinsic motivation (Cohen & Cohen, 1983). Following the same procedure, I tested for the moderating influence of proactive personality on the relationship between supervisor developmental feedback and PSD and the relationship between job autonomy and PSD.

Increasingly, simple slope test is conducted to interpret significant interactions (e.g. Joireman, Kamdar, Daniels, & Duell, 2006; Siegel, Post, Brockner, Fishman, & Garden, 2005). The aim of the test is to probe whether the regression of the dependent variable on the independent variable (i.e. the slope of the simple regression line) is significantly different from 0 for specified values of the mediator (e.g. one standard deviation above and below the mean of the mediator). Following the work of other researchers (Darlington, 1990; Friedrich, 1982; Jaccard, Turrisi, & Wan, 1990), Aiken and West (1991) propose that slope significance test involves two steps: (1) the calculation of the standard errors of the simple slopes of simple regression equations; and (2) t-tests for the significance of the simple slopes. Consequently, for each significant interaction effect observed in the moderated regression analysis, I plotted the significant interaction effects and conducted simple slope analyses (Aiken & West, 1991).

Testing for moderated mediation

Moderated mediation refers to the situation whereby the mediating process that transmits the influence of an independent variable on a dependent variable depends on the value of a moderator variable (Baron & Kenny; James & Brett, 1984; Muller et al., 2005). In this study, it is hypothesized that the influence of the interaction between PSD and intrinsic motivation on creativity will be mediated by creative self-efficacy.

To test for moderated mediation, I followed procedures suggested by Muller and his colleagues (2005). According to Muller and his coauthors (2005), three conditions should be met in order to demonstrate moderated mediation: (1) the independent

variable should have a significant impact on the dependent variable; (2) an overall moderation should not be found between the independent variable and the dependent variable; and (3) at least one of the two indirect effects, from the independent variable through the mediator to the dependent variable (i.e. the independent variable → the mediator → the dependent variable), should be significantly moderated, while the other indirect effect should be significant on average.

Consequently, I assessed the following conditions to test the hypothesis that creative self-efficacy mediates the influence of the interaction term of PSD and intrinsic motivation on creativity: (1) PSD should have a significant impact on the dependent variable, creativity; (2) an overall moderation should not be found between PSD and creativity; and (3) at least one of the two indirect effects, from PSD through creative self-efficacy to creativity (i.e. PSD→ creative self-efficacy and creative self-efficacy → creativity), should be significantly moderated, while the other indirect effect should be significant on average. In the context of this study, the relationship between PSD and creative self-efficacy should be significantly moderated by intrinsic motivation while creative self-efficacy should be positively related to creativity.

Results

CFA results

Results of the CFA that compared the fit of the hypothesized 7-factor model to 6 other nested alternative models are presented in Table 4. The fit indices indicate that the hypothesized 7-factor model (IFI=.99, TLI=.99, CFI=.99, RMSEA=.03) fit the data better than the 6-factor model (IFI=.88, TLI=.83, CFI=.87, RMSEA=.10), the 5-factor model_1 (IFI=.87, TLI=.83, CFI=.87, RMSEA=.10), the 5-factor model_2 (IFI=.85, TLI=.80, CFI=.85, RMSEA=.11), the 3-factor model (IFI=.73, TLI=.66, CFI=.73, RMSEA=.14), the 2-factor model (IFI=.65, TLI=.56, CFI=.64, RMSEA=.16), and the 1-factor model (IFI=.24, TLI=.05, CFI=.23, RMSEA=.23). Furthermore, the chi-square difference test showed that the hypothesized 7-factor model fit the data significantly better than the 6-factor model ($\Delta \chi^2$=372.22, Δ df=6, $p < .001$), the 5-factor model_1 ($\Delta \chi^2$=395.68, Δ df=11, $p < .001$), the 5-factor model_2 ($\Delta \chi^2$=469.78, Δ df=11, $p < .001$), the 3-factor model ($\Delta \chi^2$=849.37, Δ df=18, $p < .001$), the 2-factor model ($\Delta \chi^2$=1106.73, Δ df=20, $p < .001$) and the 1-factor model ($\Delta \chi^2$=2397.74, Δ df=21, $p < .001$). The CFA results indicate support for the hypothesized 7-factor model and therefore, the distinctiveness of the variables in this study.

Table 4: Results of confirmatory factor analysis (CFA)

	Model	χ^2	$\Delta\chi^2$	df	Δ df	χ^2/df	IFI	TLI	CFI	RMSEA
1.	7-factor model	175.43**	--	149	--	1.18	.99	.99	.99	.03
2.	6-factor model	547.65**	372.22***	155	6	3.53	.88	.83	.87	.10
3.	5-factor model_1	571.11**	395.68***	160	11	3.57	.87	.83	.87	.10
4.	5-factor model_2	645.21**	469.78***	160	11	4.03	.85	.80	.85	.11
5.	3-factor model	1024.80**	849.37***	167	18	6.14	.73	.66	.73	.14
6.	2-factor model	1282.16**	1106.73***	169	20	7.59	.65	.56	.64	.16
7.	1-factor model	2573.17**	2397.74***	170	21	15.14	.24	.05	.23	.23

Note 1: IFI, incremental fit index; TLI, Tucker-Lewis index; CFI, comparative fit index; RMSEA, root mean square error of approximation.

** $p < .01$; *** $p < .001$

Zero-order correlations

Descriptive statistics and zero-order correlations are presented in Table 5. All variable scales exhibit acceptable reliability ($\alpha > .70$). PSD was significantly and positively correlated with creativity ($r = .20$, $p < .01$) and creative self-efficacy ($r = .32$, $p < .01$) while creative self-efficacy was significantly and positively correlated with creativity ($r = .20$, $p < .01$), indicating preliminary support for the relationships suggested in Hypothesis 1, 2a and 2b. Additionally, supervisor developmental feedback ($r = .17$, $p < .01$), job autonomy ($r = .26$, $p < .01$) and proactive personality ($r = .18$, $p < .01$) were positively related to PSD, providing preliminary support for the relationships suggested in Hypotheses 4a, 4b and 4c.

Of the control variables, job tenure ($r = .18$, $p < .01$) was positively correlated with creativity; gender ($r = .17$, $p < .01$) was positively correlated with creative self-efficacy. Both gender ($r = .20$, $p < .01$) and education ($r = .15$, $p < .05$) were positively correlated with PSD. One of the dummy variables (i.e. org2) was positively correlated with PSD ($r = .13$, $p < .01$).

Main effect and Mediation (Hypotheses 1, 2a and 2b):

Table 6 presents the results of the regression analysis that examined the main effect of PSD on creative self-efficacy and creativity and the mediating effect of creative self-efficacy on the relationship between PSD and creativity. As shown in model 1, PSD ($\beta = .31$, $p < .01$) was significantly related to creative self-efficacy, satisfying the condition that the independent variable must be related to the mediator. In model 2, PSD ($\beta = .19$, $p < .01$) was shown to be significantly related to creativity,

which also satisfied the condition that the independent variable must be related to the dependent variable. Thus, Hypotheses 1 and 2a were supported. As shown in model 3, creative self-efficacy ($\beta = .14$, $p < .05$) was significantly related to creativity, when the control variables and PSD were held constant. The coefficient for PSD decreased but remained significant ($\beta = .14$, $p < .05$), indicating that creative self-efficacy partially mediated the effects of PSD on creativity.

I conducted Sobel test (Sobel, 1982) for indirect effects by using the calculator presented at http://www.unc.edu/~preacher/sobel/sobel.htm (accessed October 20, 2006). Following this procedure, regression was conducted to generate the following: 1) unstandardized regression coefficient for the association between PSD and creative self-efficacy (a) and its standard error (Sa). 2) unstandardized regression coefficient for the association between creative self-efficacy and creativity when PSD was controlled (b) and its standard error (Sb). The results were: a=.505; Sa=.104; b=.10; Sb=.042. I inserted these numbers into the corresponding boxes in the calculation tool to compute Sobel test equation: z-value = $a*b/\text{SQRT}(b^2*s_a^2 + a^2*s_b^2)$ (SQRT refers to square root). The results revealed that PSD had significant indirect effects on creativity through creative self-efficacy (Sobel = 2.46, $p < .05$). Thus, Hypothesis 2b was supported.

Table 5: Means, standard deviations, and intercorrelations

		α	Mean	S.D.	1	2	3	4	5	6	7	8	9	10	11	12	13
1	Org 1[b]	--	--														
2	Org 2[b]	--	--	--	-.89**												
3	Gender[c]	--	--	--	.28**	-.30**	--										
4	Education	--	--	--	-.39**	.32**	-.22**	--									
5	Age	--	28.35	5.25	.01	-.03	-.08	-.01	--								
6	Job tenure	--	2.93	3.03	.39**	-.05	-.13*	-.05	.39**	--							
7	Developmental feedback	.82	5.28	1.20	.07	-.12	.15*	-.06	.02	-.12	--						
8	Autonomy	.89	4.40	1.17	-.32**	.27**	-.02	.17**	-.04	-.03	.25**	--					
9	Proactive personality	.75	3.28	.80	.10	-.03	.13*	-.09	-.02	-.02	.00	.18**	--				
10	Creative self-efficacy	.87	5.00	1.03	.12	-.12	.17**	.09	.01	-.01	.02	.23**	.40**	--			
11	Intrinsic motivation	.95	5.45	1.14	.09	-.12	.08	-.08	.00	-.17**	.37**	.27**	.27**	27**	--		
12	PSD	.72	3.03	0.60	-.15	.13*	.20**	.15*	.01	.05	.17**	.26**	.18**	.32**	.22**		
13	Creativity	.96	2.97	0.66	.06	-.03	.06	.03	.10	.18**	.04	.10	.06	.20**	.01	.20**	--

a: N= 244; b: Dummy variable; c: Female=1, Male=2

* p< .05 ** p< .01 (two-tailed)

Table 6: Results of hierarchical regression analysis for mediation[a]

Independent variables	Creative Self-efficacy Model 1	Creativity Model 2	Creativity Model 3
Step1			
Org 1[b]	.18	.18	.15
Org 2[b]	-.02	.09	.10
Gender[c]	.08	.03	.02
Age	.02	.04	.04
Education	.13*	.06	.04
Tenure	-.02	.16*	.16*
R^2	.061	.048	.048
ΔF	2.582*	2.011*	2.011*
ΔR^2	.061	.048	.048
Step 2			
Problem solving demand	.31**	.19**	.14*
R^2	.148	.080	.065
ΔF	24.056**	8.098**	4.390*
ΔR^2	.087	.032	.017
Step 3			
Creative self-efficacy	--	--	.14*
R^2	--	--	.096
ΔF	--	--	8.066*
ΔR^2	--	--	.031

a: Standardized Beta weights are reported for the final step in each model (n=244).

b: Dummy variable; c: Female=1, Male=2

* $p < .05$ ** $p < .01$ (two-tailed)

Moderation (Hypothesis 3a)

Table 7 displays the regression results for testing the moderating effect of intrinsic motivation on the relationship between PSD and creative self-efficacy (Hypothesis 3a). Following Aiken and West (1991), I centred the two variables used in the interaction analysis (i.e. PSD and intrinsic motivation). Creative self-efficacy was regressed on the control variables at Step 1, PSD and intrinsic motivation at Step 2 and the interaction term of PSD and intrinsic motivation at Step 3. In support of Hypothesis 3a, the change in the multiple squared correlation coefficient (ΔR^2) for the interaction term of PSD and intrinsic motivation was statistically significant, explaining a significant amount of variance in creative self-efficacy (ΔR^2=.02, $p<.05$).

Because PSD and intrinsic motivation were intercorrelated (see Table 5), it is necessary to check whether multicollinearity existed between these two variables. High levels of multicollinearity are evidenced by high Variance Inflation Factors (VIFs), which are commonly used in regression as diagnostics for multicollinearity. VIF is a statistic which indicates for a specific regression coefficient, the strength of the relationship between the independent variable and all other independent variables in a multiple regression model. Values of VIF above a certain level indicate serious multicollinearity problems (Mendenhall & Sincich, 1996). As shown in Table 7, the test of VIF revealed that multicollinearity was not an issue because the values ranged from 1.20 to 4.63, far below the cut-off point of 5.3 suggested by Hair, Black, Bain, Andersen, and Tatham (2006).

To interpret the nature of the interaction, I calculated regression equations for the relationship between PSD and creative self-efficacy at high and low levels of intrinsic

motivation. Following Cohen and Cohen (1983), I defined high and low values as plus and minus one standard deviation from the mean. Figure 6 shows that the form of the interaction was as predicted in that the relationship between PSD and creative self-efficacy was stronger for individuals high rather than low in intrinsic motivation. Collaborating the results of the moderated regression analysis and as shown in Table 8, the results of simple slope analysis suggested that when intrinsic motivation was high (i.e. one standard deviation above the mean), the slope was significant and the relationship between PSD and creative self-efficacy was positive (simple slope = .66, s.e. =.14, $p < .001$). However, when intrinsic motivation was low (i.e. one standard deviation below the mean), the slope was nonsignificant (slope = .23, s.e. = .14, p = ns), indicating the relationship between PSD and creative self-efficacy became nonsignificant when intrinsic motivation was low. Thus, Hypothesis 3a was supported.

Table 7: Results of moderated regression analysis

Variables	Creative self-efficacy	
	β^a	VIF
Step1 (controls)		
Org 1[b]	.19	4.66
Org 2[b]	.03	4.52
Gender[c]	.09	1.25
Age	.01	1.20
Education	.15*	1.25
Tenure	.02	1.28
R^2	.061	
ΔF	2.582*	
ΔR^2	.061	
Step 2 (main effects)		
PSD	.26***	1.21
Intrinsic motivation	.28***	1.35
R^2	.189	
ΔF	18.53**	
ΔR^2	.128	
Step 3 (moderation effects)		
PSD X Intrinsic motivation	.16*	1.24
R^2	.209	
ΔF	5.90**	
ΔR^2	.020	

a: Standardized Beta weights are reported for the final step in each model (n=244)

b: Dummy variable; c: Female=1, Male=2

* $p < .05$ ** $p < .01$ *** $p < .001$ (two-tailed)

Figure 6: PSD-intrinsic motivation interaction on creative self-efficacy

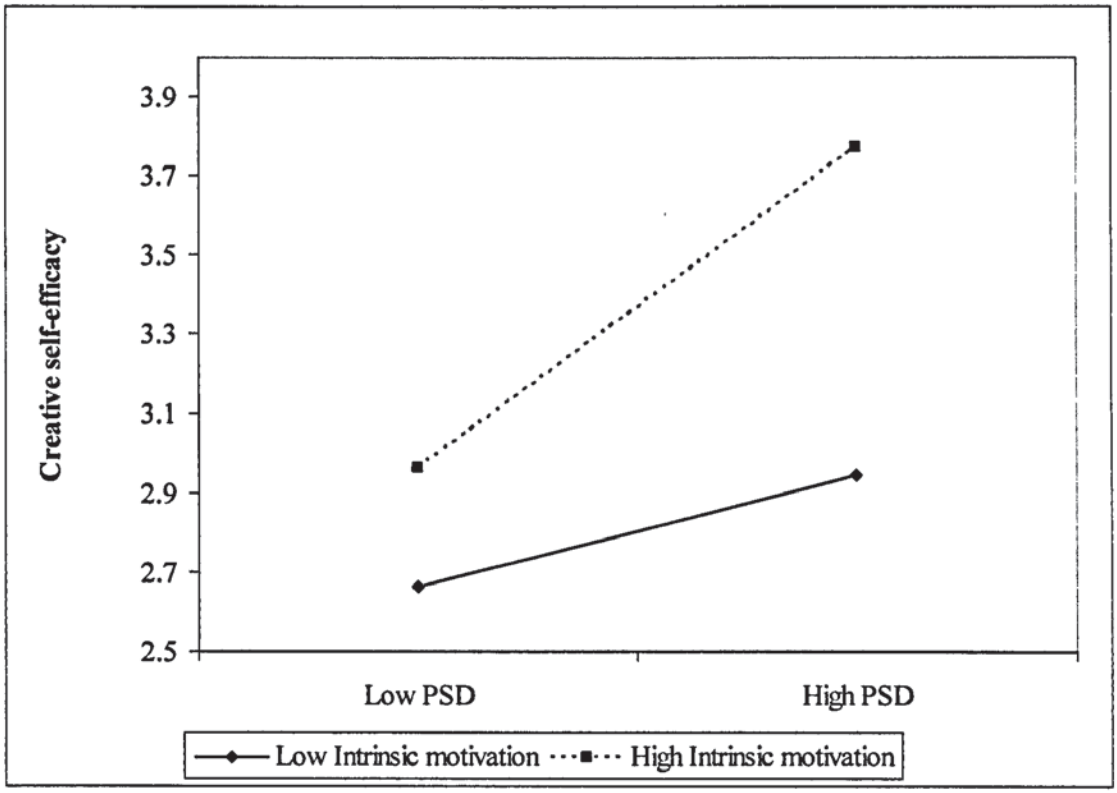


Table 8: Simple slope analysis for PSD-intrinsic motivation interactive effect on creative self-efficacy

	B	s.e	T-test	Sig.
PSD at low intrinsic motivation	.23	.14	1.64	ns
PSD at high intrinsic motivation	.66	.14	4.61	<.001

Moderated mediation (Hypothesis 3b)

Table 9 presents results of the test for the hypothesized moderated mediation model or more specifically, Hypotheses 3b. In model 1, I regressed creativity on the controls, PSD, intrinsic motivation and the interaction term of PSD and intrinsic motivation. As shown in that model, PSD was positively related to creativity in (β=.19, p<.05), satisfying the condition that the independent variable must be related to the dependent variable. Model 1 also showed that intrinsic motivation did not moderate the relationship between PSD and creativity (β = -.06, p = ns), which satisfied the condition that an overall moderation should not be found between the independent variable and the dependent variable. In model 2, I replicated the test of Hypothesis 3a. In model 3, I regressed creativity on the controls, PSD, intrinsic motivation, the interaction term of PSD and intrinsic motivation, creative self-efficacy and the interaction term of intrinsic motivation and creative self-efficacy. As shown in model 2, the relationship between PSD and creative self-efficacy was significantly moderated by intrinsic motivation (β = .16, p < .05), and in model 3, creative self-efficacy was significantly related to creativity (β = .16, p < .05). These findings satisfied the condition that at least one of the two indirect effects, from the independent variable through the mediator to the dependent variable, should be significantly moderated, while the other indirect effect should be significant on average (Muller et al., 2005). Therefore, the interactive effect of PSD and intrinsic motivation on creativity was through the mediating influence of creative self-efficacy. Hypothesis 3b was supported.

Table 9: Results of hierarchical regression analysis for moderated mediation[a]

Predictors	Model 1 Creativity	Model 2 Creative self-efficacy (CSE)	Model 3 Creativity
Controls			
Org 1[b]	.18	.19	.15
Org 2[b]	.09	.03	.09
Gender[c]	.03	.09	.02
Age	.04	.01	.04
Education	.06	.15*	.03
Tenure	.16*	.02	.16*
Problem solving demand (PSD)	.19*	.26***	.15*
Intrinsic motivation (InMot)	-.03	.28***	-.07
PSD X *InMot*	-.06	.16*	-.07
Creative self-efficacy (CSE)	--	--	.16*
InMot X CSE	--	--	-.05

a: Standardized Beta weights are reported for the final step in each model (n=244);

b: Dummy variable; c: Female=1, Male=2.

* $p < .05$ *** $p < .001$ (two-tailed)

Antecedents of PSD (Hypothesis 4a, 4b, 4c, 5a, 5b and 5c):

Table 10 presents the results of the hierarchical regression analysis testing for antecedents of PSD. At Step 1, I entered the controls (i.e. gender, age, education and job tenure, and two dummy variables for organisations). At Step 2, I entered the three antecedents, i.e. supervisor developmental feedback, job autonomy and proactive personality and at Step 3, I entered the interaction terms of supervisor developmental feedback and proactive personality, and job autonomy and proactive personality.

As shown in the table, overall the controls explained about 8.3% of the variance in PSD, the three antecedents explained an additional 9% of the variance in PSD, and the interaction terms accounted for a significant amount of variance in PSD above and beyond the controls and the main effects of job autonomy, proactive personality and supervisor's developmental feedback ($\Delta R^2 = .08$, $p < .001$).

More specifically, supervisor developmental feedback ($\beta = .14$, $p < .05$), job autonomy ($\beta = .13$, $p < .05$) and proactive personality ($\beta = .16$, $p < .05$) were all positively related to PSD. The interaction term of job autonomy and proactive personality ($\beta = .18$, $p < .01$) was shown to be positively related to PSD whereas the interaction term of developmental feedback and proactive personality ($\beta = .01$, $p = ns$) was nonsignificant. Thus, while Hypotheses 4a, 4b, 4c and 5c were supported, Hypothesis 5a and 5b did not receive support.

To interpret the significant interaction effect of proactive personality and job autonomy on PSD perception, I plotted the interaction effect in Figure 7. As shown in the figure, the form of the interaction was as predicted in that proactive personality

moderated the relationship between job autonomy and PSD such that the relationship between job autonomy and PSD was stronger for high rather than low proactive people. Indeed, as shown in Table 11, the results of additional simple slope test revealed that when proactive personality was high (one standard deviation above the mean), the job autonomy-PSD slope was significant (simple slope =.17, s.e. = .04, p< .001), indicating the relationship between job autonomy and PSD was positive when proactive personality was high. In contrast, when proactive personality value was low (one standard deviation below the mean), the job autonomy-PSD slope was nonsignificant (simple slope = -.01, s.e. = .05, p = ns), suggesting the relationship between job autonomy and PSD became nonsignificant when proactive personality was low.

Table 10: Results of hierarchical regression analysis for antecedents of PSD

Variables	β[a]	VIF
Controls		
Org1[b]	.00	4.77
Org2[b]	.13	4.54
Gender[c]	.23***	1.19
Age	-.01	1.20
Education	.17**	1.25
Tenure	.10	1.24
R^2	.08	
ΔR^2	.08	
ΔF	5.42***	
Main effects		
Supervisor developmental feedback (SDF)	.14*	1.16
Job autonomy (JA)	.13*	1.29
Proactive personality (PAP)	.16*	1.09
R^2	.17	
ΔR^2	.09	
ΔF	8.03***	
Interaction terms		
SDF X PAP	.01	1.04
JA X PAP	.18**	1.04
R^2	.24	
ΔR^2	.08	
ΔF	7.77***	

a: Standardized Beta weights are reported for the final step in each model (n=244);

b: Dummy variable; c: Female=1, Male=2.

* $p < .05$ ** $p < .01$ *** $p < .001$ (two-tailed)

Figure 7: Job autonomy-proactive personality interaction on PSD

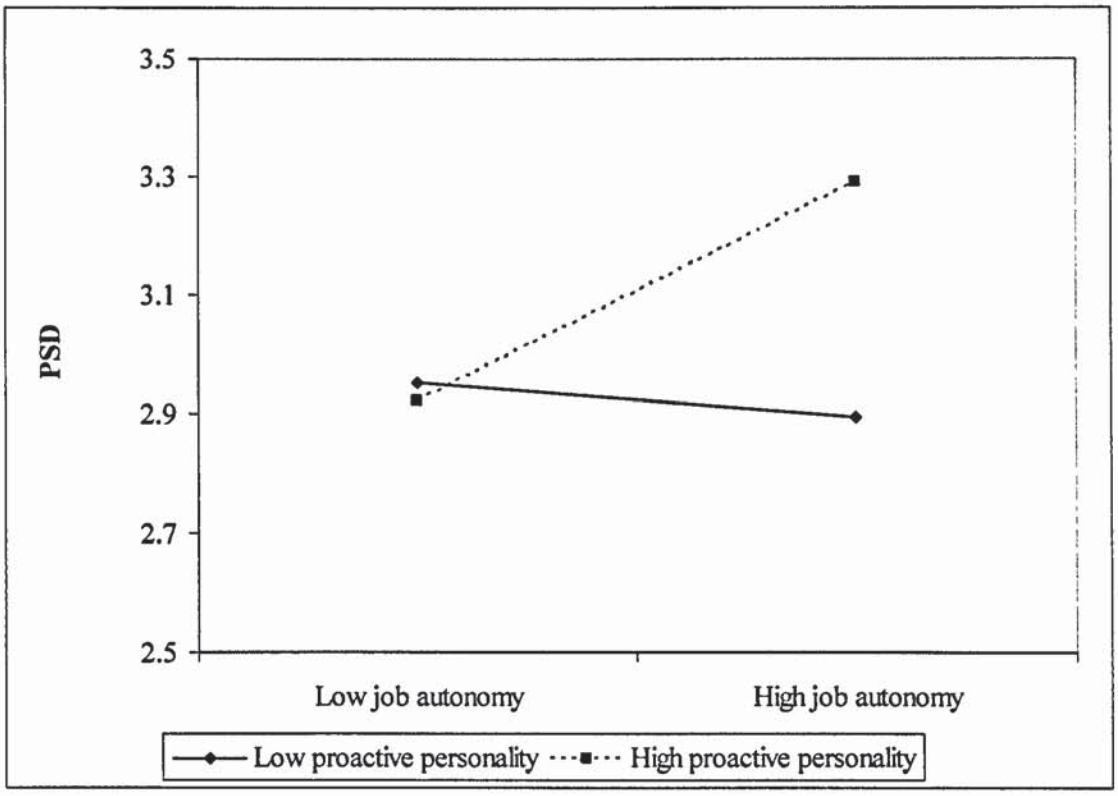


Table 11: Simple slope analysis for job autonomy-proactive personality interactive effect on PSD

	B	s.e	T-test	Sig.
Autonomy at low proactive personality	-.01	.05	-.16	ns
Autonomy at high proactive personality	.17	.04	4.22	P<.001

Summary

The results provide general support for the hypothesized model. Specifically, the positive effect of PSD on creativity was partially mediated by creative self-efficacy. Intrinsic motivation moderated the positive relationship between PSD and creative self-efficacy relationship and the interactive influence of PSD and intrinsic motivation on creativity was mediated by creative self-efficacy. Supervisor developmental feedback, job autonomy, and proactive personality were positively related to PSD perceptions. Furthermore, proactive personality interacted with job autonomy to influence PSD. The implications of these findings for theory and practice, limitations of the research and directions for future research are discussed in the next chapter.

Chapter 6: Discussion

Introduction

The research was driven by the notion that job attributes, in particular complex and demanding ones (Shalley et al., 2004), are important contextual factors that may influence employee creativity (Amabile, 1983, 1996). Therefore, an important issue for creativity research is to identify these creativity-enhancing job attributes and understand why and how they can promote creativity. Consequently, the present research sought to achieve two objectives: first, to examine the relationship between PSD, an emerging job attribute, and creativity and the processes linking them, and second, to investigate antecedents of PSD. The hypothesized relationships were tested with empirical data from 270 employees and their supervisors from 3 organisations in China. The results suggested that PSD is an important contextual factor for employee creativity. However, its impact on employee creativity was shown to be indirect through creative self-efficacy. In addition, intrinsic motivation moderated the relationship between PSD and creative self-efficacy such that only individuals high in intrinsic motivation developed high level of creative self-efficacy under PSD situations, leading to creative performance. Furthermore, the results also evidenced that two social-contextual factors (i.e. supervisor developmental feedback and job autonomy) and an individual factor (i.e. proactive personality) are influential in shaping PSD perceptions. This chapter discusses theoretical and practical implications of these findings, highlights the limitations of the study and suggests some directions for future research. A final conclusion summarising the central message of this research is provided at the end of the chapter.

Theoretical implications

In general, this research has two important implications for the creativity literature. First, it adopts an integrative model in examining the context-creativity relationship, which is lacking in prior research. As suggested in Chapter 2, theorists have provided different perspectives in explaining the relationships between organisational context and employee creativity (Amabile, 1983; Ford, 1996; Woodman et al., 1993). However, none of these three models provides a comprehensive understanding of context-creativity relationships, especially in explicating the complex processes linking contextual factors and creativity. For instance, Amabile's social psychology of creativity (Amabile, 1983; 1996) and Ford's (1996) creative model depict in detail motivational process linking contextual factors and creativity. However, these two models fail to take into account boundary conditions (e.g. individual differences) that may moderate the relationship between contextual factors and creativity. Similarly, Woodman and his coauthors (1993) suggested that contextual and individual factors interact to affect employee creativity. However, they did not explicate the psychological mechanisms that mediate the interactive effects of individual and contextual factors on creativity. Taking an alternative approach and based on these three creativity models in the extant literature, this research proposed an integrative model to examine context-creativity relationships. Specifically, this integrative model subsumes the interactionist perspective proposed by Woodman et al. (1993) as well as motivational mechanisms that are proposed to underpin the processes linking contextual factors and creativity (Amabile, 1996; Ford, 1996). The key benefit of this integrative model is that it enables an examination of how and why contextual factors are related to employee creativity.

Second, this research extends prior research by examining antecedents of creativity-enhancing factors. Extant literature has primarily focused on the creativity consequences of contextual factors (Amabile, 1983, 1996). Little attention (except for Amabile et al., 2004) has been paid to the examination of antecedents to these creativity-enhancing contextual factors. It is not clear what organisational and/or individual factors can give rise to these creativity-enhancing factors. This research extended the context-creativity research to include antecedents of PSD. Thus, the present study not only revealed the complicated processes that link PSD and creativity but also identified social-contextual and individual factors that lead to PSD perceptions. In sum, future research can enhance our understanding of the context-creativity relationships by (i) applying an integrative model to examine the processes linking contextual factors and creativity, and (ii) investigating antecedents of creativity-enhancing contextual factors.

Specifically, the findings of this research contribute to the creativity literature in the following ways. First, this is the probably earliest study to investigate the relationship between perceived demand for problem-solving (i.e. PSD), an emerging job attribute, and employee creativity. In examining the relationship between job attributes and creativity, prior research has applied multi-dimensional constructs such as task complexity (Oldham & Cummings, 1996; Tierney & Farmer, 2002) or constructs that imply direct creative goals such as creative requirements (Unsworth et al., 2005). The former encompassed different aspects of demanding and challenging job attributes, some of which may not necessarily be related to creativity. The latter only taps a job attribute common in a work environment where creativity is overtly required. Little attention, however, has been paid to PSD, a specific type of cognitive

demand, which has emerged as an important job attribute in the general work environment and may have an impact on creativity. By demonstrating a positive relationship between PSD and creativity, I identified a specific demanding and complex job attribute. Consistent with prior research (Oldham & Cummings, 1996; Tierney & Farmer, 2002; Unsworth et al., 2005), the present study contributes to the growing interest in understanding the job attributes-creativity relationships in a context where creativity is not explicitly anticipated.

Second, this research delineates processes linking PSD to creativity. Based on social cognitive theory (Bandura, 1986), I proposed that PSD provides opportunities for individuals to apply and develop their skills in problem-solving leading to increased creative self-efficacy. This, in turn, results in creativity. Creative self-efficacy was found to partially mediate the influence of PSD on creativity, providing empirical support for the notion that self-efficacy plays a crucial role in employee creative performance (Bandura, 1997; Ford, 1996). This is an important finding because the extant literature has relied primarily on task motivation to explain the link between contextual factors and creativity. Unfortunately, prior research has failed to provide conclusive evidence for the mediating effect of task motivation on the context-creativity relationship (cf. Shalley et al., 2004). Scholars have called for identifying other psychological mechanisms that link contextual factors to creativity (Shin & Zhou, 2003; Shalley et al., 2004; Zhou & Shalley, 2003). This study suggests that creative self-efficacy may be one of the alternative mechanisms. Additionally, by demonstrating the mediating effect of creative self-efficacy on the relationship between PSD and creativity, this research augments the work of Tierney

and Farmer (2004) who found a mediating effect of creative self-efficacy on the relationship between perceived leader support and employee creativity.

It should be noted, however, that creative self-efficacy only partially mediated the PSD-creativity relationship, which suggests that PSD directly and indirectly (through creative self-efficacy) influences creativity. It is possible that there are mechanisms other than creative self-efficacy that explain the relationship between PSD and creativity. For instance, Reiter-Palmon and Illies (2004) suggest that there are cognitive processes (e.g. problem construction, identification of relevant information, generation of new ideas and evaluation of these ideas) underlying individuals' creative problem solving. It is likely that cognitively demanding job attributes activate certain cognitive processes (e.g. divergent thinking, active information seeking), which, in turn, lead to creative performance. MacKinnon (2000) suggests that the relationship between independent and dependent variables may be explained by multiple mediators. Future research can further our understanding of the relationship between PSD and creativity by examining the mediating effects of these cognitive processes, together with creative self-efficacy.

Third, this study goes beyond prior research on the job attributes-creativity relationship by examining the moderating influence of intrinsic motivation. Applying J-P fit theory (Edwards, 1991), I propose that intrinsic motivation moderates the influence of PSD on creative self-efficacy leading to creativity. The findings provided support for the moderation and moderated mediation predictions, indicating that individuals high in intrinsic motivation are more likely to experience creative self-efficacy, leading to creative performance, whereas for individuals low in

intrinsic motivation, PSD may not lead to creative self-efficacy. Extant research has primarily examined antecedents and outcomes of intrinsic motivation (e.g. Shin & Zhou, 2003; Tierney et al., 1999; Van Yperen & Hagedoorn, 2003), but the possibility that intrinsic motivation can operate as a boundary condition that moderates the impact of demanding job conditions, such as PSD, on individual outcomes (e.g. creative self-efficacy) has not been previously investigated. Future research may contribute to the creativity literature by examining the moderating influence of intrinsic motivation on the relationships between other contextual factors (e.g. supervisor behaviours, reward, time pressure) and creativity.

Fourth, in uncovering a moderating effect of intrinsic motivation on the relationship between PSD and creative self-efficacy, this research contributes to the self-efficacy literature by supporting an interactionist approach in examining antecedents of self-efficacy. In line with P-J fit theory (Edwards, 1991; Kristof, 1996), this study showed that individuals high rather than low in intrinsic motivation benefited more from PSD situations in terms of creative self-efficacy. In addition to Tierney and Farmer (2002), who reported that employees' familiarity with jobs (i.e. having longer job tenure) moderated the relationship between task complexity and creative self-efficacy, this study identified another important personal factor, intrinsic motivation, which may either strengthen or weaken the relationship between a demanding job attribute, such as PSD, and creative self-efficacy. This finding, together with that of Tierney and Farmer (2002), suggest that complex and demanding job attributes, such as PSD, may not be universally beneficial for individuals in fostering creative self-efficacy. Rather, there are contingent conditions (e.g. intrinsic motivation, job tenure) whereby complex and demanding job attributes may have a

stronger or weaker impact on creative self-efficacy. Future research should further explore such contingent conditions.

Fifth, much evidence has shown that individual's perceptions of the job, especially when it is complex and challenging, have a significant impact on employee creativity (Shalley et al., 2004). However, we do not know what organisational and/or individual factors may facilitate these job perceptions. This research is an initial attempt to extend the job attributes-creativity research to examination of antecedents to a creativity-enhancing job attribute, i.e. PSD. Specifically, based on the social information processing perspective (Salancik & Pfeffer, 1978) and the job crafting model (Wrzesniewski & Dutton, 2001), this research showed that supervisor developmental feedback, job autonomy, proactive personality and the interaction between autonomy and proactive personality are antecedents of PSD. Although, these factors may not have a direct impact on creativity, their influence on PSD may indirectly lead to employee creative performance (Shalley et al., 2000). Future research can enhance our understanding of the job attributes-creativity relationship by further examining antecedents of other creativity-relevant job attributes (e.g. perceived creative requirements).

Additionally, prior research has largely attributed the emergence of PSD to objective job conditions, such as the application of advanced manufacturing technology (AMT) (Wall, Corbett, Clegg et al., 1990; Wall, Corbett, Martin et al., 1990) or the frequency of the problems that occur in one's work (Parker & Sprigg, 1999). Little attention has been paid to social-contextual and individual factors. By demonstrating the relationship between two social-contextual factors (i.e. supervisor

developmental feedback and job autonomy) and one individual factor (i.e. proactive personality), and their interaction on PSD, this research provides empirical support for examining the influence of social-contextual and individual factors in shaping individuals' perceptions of job attributes (e.g. Griffin, 1981; Piccolo & Colquitt, 2006; Salancik & Pfeffer, 1977, 1978; Wrzesniewski & Dutton, 2001).

Furthermore, the results also revealed that job autonomy, proactive personality and their interaction explained variance in PSD above and beyond supervisor's behaviours (i.e. supervisor developmental feedback). This finding complements the extant literature which has stressed singularly the important role that a supervisor plays in shaping job attribute perceptions (Griffin, 1981; Piccolo & Colquitt, 2006). Indeed, the finding reflects the notion that employees are active crafters of their work (Wrzesniewski & Dutton, 2001). Specifically, the revealed main and interactive effects of job autonomy and proactive personality on PSD perceptions provide preliminary supportive evidence for the job crafting model (Wrzesniewski & Dutton, 2001), which posits that the interactions between individual and contextual factors influence one's job crafting activities. As Wrzesniewski and Dutton (2001:185) noted, 'when job and individual features create conditions that are favourable for job crafting, more job crafting should result among employees who are motivated to job craft'. '...employees who perceive limited opportunities to job craft or who are not motivated to craft will engage in less job crafting than those who are motivated or see opportunities.' Therefore, in spite of objective characteristics of jobs and direct interventions from supervisors, employees may take initiatives to shape job attributes, in particular when they enjoy high rather than low autonomy at work, or they are high rather than low in proactive personality. The greatest number of initiatives to shape

job attributes may be taken when both job autonomy and proactive personality are both high. At a more general level, this research resonates with the emergent notion that employees can take personal initiative (Frese & Fay, 2001; Frese et al., 2007) or proactive behaviours (Crant, 2000; Parker et al., 2006) to influence their roles and consequent performance in organisations. Indeed, Rank and his coauthors (Rank, Pace, & Frese, 2004) suggested that creativity research integrated with individual initiative and proactive behaviours may represent a fruitful avenue in understanding creativity in organisations.

Practical implications

Creative performance of employees in a general work environment has become an important resource in the quest of organisations to improve the quality of products and/or services, and ultimately, create and sustain competitive advantage. This study offers a number of practical implications for organisations interested in promoting employee creativity. First, management can foster employee creativity by integrating additional challenges (e.g. PSD) into employees' job descriptions. To promote employees' perceptions of PSD to facilitate employee creativity, organisations can adopt a number of interventions. For instance, the findings revealed that developmental feedback from supervisor can effectively direct employees' attention to work-related problems leading to increased PSD perceptions. Consequently, enhancing supervisors' ability to provide developmental feedback should be integrated into management training programme. Another effective way to promote PSD perceptions is to empower employees with job autonomy. Job autonomy can enhance employees' understanding of work-related problems and sense of responsibility to solve problems at work, resulting in high PSD perceptions.

Therefore, as part of empowerment, managers should provide employees with discretion to decide how to go about their jobs, how to prioritise the tasks and set their objectives. However, management should also be aware that individuals may respond differently to job autonomy situations. Specifically, only those high rather than low in proactive personality are likely to perceive high levels of PSD under high job autonomy, seeing it as an opportunity to identify or create problems in order to improve existing practices. Therefore, when using job autonomy to facilitate PSD perceptions, management should ensure a fit between the level of job autonomy and individual difference in terms of proactive personality.

Another important practical implication stems from the finding that intrinsic motivation moderates the relationship between PSD and creative self-efficacy, such that the relationship is stronger for individuals high rather than low in intrinsic motivation. For individuals high in intrinsic motivation, PSD provides an opportunity to learn and develop problem-solving skills, resulting in personal growth and enhanced self-belief. Managers can effectively promote creative self-efficacy and creativity among individuals high in intrinsic motivation by increasing PSD. In contrast, for those low in intrinsic motivation, PSD may be a less effective intervention to promote creative self-efficacy and creativity. Therefore, when employing PSD as a managerial intervention to promote employee creativity, management needs to ensure that employees have a matching level of intrinsic motivation for the requirements entailed by the job. In other words, management should select the right person for the right job.

Limitations

While the study did make several contributions to the literature on creativity, it has some limitations. First, the cross-sectional design precludes any inference about causality. Because data were collected at one point in time, the direction of causality of the relationships examined in this study is not certain. Although, it is arguable that creativity does not constitute an antecedent to PSD, other relationships such as that between PSD and creative self-efficacy need to be interpreted with caution. The relationship between PSD and creative self-efficacy may be reciprocal (Bandura, 1986). Specifically, while PSD may be conducive to creative self-efficacy, as suggested in this study, individuals high in creative self-efficacy may be more active and better in identifying work-related problems. Similarly, while supervisor developmental feedback may lead to PSD perceptions as tested in this study, individuals having PSD at work may be more likely to seek supervisor feedback (Ashford & Cummings, 1983, 1985). To determine cause and effect requires a design assessing variables over time. Future research might use a longitudinal design to examine the causal status of the relationships examined in this study.

Second is the possibility of common method variance influencing the results. Common method variance refers to 'variance that is attributable to the measurement method rather than to the constructs the measures represent'. It may threaten the validity of the conclusions about the relationship between variables (Podasakoff et al., 2003:879). With the exception of creativity which was supervisor-rated, the study variables were obtained from employees, constituting a source of common method variance (Podasakoff et al., 2003). However, the results of CFA revealed each variable to be distinct. There was no single factor that could account for all of the

variance in the data. Furthermore, Pierce, Gardner, Dunham, and Cummings (1993) suggested that common method bias will be mitigated by applying moderated hierarchical regression analysis, which partials out common method effects along with the main effects. While the findings may not be completely attributable to common method variance, future research may improve research design by adopting a multiple method approach in collecting data. For instance, data on supervisor developmental feedback can be collected from both supervisor and employees. Job autonomy can be measured by more objectively-measured instrument, such as Factual Autonomy Scale (FAS) (Spector & Fox, 2003) as well as perceived job autonomy.

Third, PSD was measured by individuals' perceptions of the demand for problem-solving at work. However, as discussed, there are different types of problems (Getzels, 1982), each of them may have different impact on employee creativity (Shalley et al., 2004; Unsworth, 2001). Some have suggested that performance related to presented problems may be 'less creative' than that related to problems discovered or created by individuals (Jay & Perkins, 1997; Unsworth, 2001). Although this research suggests a positive relationship between PSD and creativity, future research might need to actually measure PSD of different problem situations and compare their differential influence on creativity.

Finally, the fact that this research was conducted in one single culture, China, may pose a limitation. Prior research has suggested that individuals from different cultural contexts may respond differently to organisational conditions (Anderson, Dreu, & Nijstad, 2004; England & Harpaz, 1990). It is not certain to what extent the findings observed in a single cultural context can be generalisable to other cultural

contexts. Given the multitude and complexity of cultural dimensions, it is important to identify relevant ones that may change the strength and direction of the relationships (e.g. the PSD-creativity relationship) observed in this study. For example, uncertainty avoidance may be one of the potential variables. Uncertainty avoidance refers to the extent to which a society tolerates uncertainty and ambiguity and its members feel comfortable with unstructured situations (which are novel, unknown, surprising, different from usual) (Hofstede, 1980). Some researchers argue that low uncertainty avoidance cultures (e.g. United States) are conducive to creativity because they accept uncertainty and are tolerant of different opinions. In contrast, high uncertainty avoidance cultures (e.g. France, China) avoid unstructured situations and prefer to have established rules (Shane, 1992, 1993). Accordingly, the relationship between PSD and creativity may be stronger in low uncertainty avoidance cultures than in high uncertainty avoidance cultures. Future research may seek to replicate this study in other cultural contexts, taking into account the potential influence of cultural dimensions, such as uncertainty avoidance.

Directions for future research

Several potential avenues for future research have been discussed in previous sections because they are related to specific findings of this research. Here, I discuss two additional possibilities for future investigation.

First, future research should further explore the complex processes that link cognitively demanding job attributes and creativity. As an initial attempt, this research confirms the complexity of the processes through which job attributes (e.g. PSD) influence creativity (Shalley et al., 2004). Further investigation of these

complex processes may be a fruitful avenue for future research. For instance, an important issue regarding the processes between job attributes and creativity is identification of boundary conditions that moderate the relationship between job attributes and creativity. This study examined only one boundary condition (i.e. intrinsic motivation). According to the interactionist perspective (Woodman et al., 1993), a wide range of contextual (e.g. supervisory behaviours, resources, reward, social influence, group climate) and individual factors (e.g. work-related knowledge, cognitive style, personality) may interact with job attributes to affect creativity. Further effort is needed to identify these factors and to have a clearer understanding of the complex processes that link job attributes to creativity.

Second, this research revealed that individuals high rather than low in intrinsic motivation are likely to benefit from high PSD situations. They are more likely to develop creative self-efficacy leading to creativity. However, little is known about the circumstances that may lead individuals low in intrinsic motivation to achieve mastery experience in problem-solving activities and consequent creative performance. Indeed, some researchers have raised an important practical question of how to promote creativity among individuals with less creative personalities, e.g. individuals low in openness to experience (George & Zhou, 2001), or individuals low in CPS (Zhou, 2003). Empirical studies have revealed that individuals with low creative personality can provide high levels of creative performance with support either at work or from family and friends. For instance, Zhou (2003) reported that individuals low in CPS were more creative when they were working with creative co-workers with low supervisor monitoring. Similarly, Madjar and her colleagues (Madjar et al., 2002) reported that individuals low in CPS were more likely to

demonstrate a higher level of creativity at work when they received high rather than low support from their family and friends. Thus, future research may enhance our understanding of individual creativity in organisations by investigating situations in which individuals low in intrinsic motivation experience a high level of creative self-efficacy and demonstrate creativity.

Conclusion

This research examined antecedents of PSD and processes linking PSD and employee creativity. Specifically, it investigated (1) the relationship between PSD and creativity; (2) the mediating influence of creative self-efficacy on the PSD-creativity relationship; (3) the moderating influence of intrinsic motivation on the relationship between PSD and creative self-efficacy; and (4) supervisor developmental feedback, job autonomy and proactive personality as antecedents to PSD. Overall, the findings reveal that PSD has a positive impact on employee creativity. This influence is partly through the motivational implications of creative self-efficacy. Furthermore, individuals high rather than low in intrinsic motivation are more likely to benefit from PSD to experience enhanced creative self-efficacy, which consequently results in creativity. Supervisor developmental feedback, job autonomy, and proactive personality influence individuals' PSD perceptions. Specifically, supervisor developmental feedback, job autonomy, and proactive personality are positively related to PSD. Furthermore, the relationship between job autonomy and PSD is stronger for individuals high rather than low in proactive personality.

This research and its findings have significant theoretical and practical implications. As for the creativity literature, this research exemplifies a comprehensive approach by adopting an integrative model in explicating the processes linking a contextual factor (i.e. PSD) and creativity, and examining antecedents of a creativity-enhancing factor (i.e. PSD). This approach has proved to be informative regarding how and why creativity-enhancing factors like PSD are related to creativity, and what organisational factors give rise to a creativity-enhancing factor, PSD. For instance, it helps disentangle the complex processes through which PSD is related to creativity. The revealed mediating influence of creative self-efficacy on the PSD-creativity relationship provides an insight into the psychological processes that may underpin a demanding job situation and creativity. The moderating effect of intrinsic motivation on the relationship between PSD and creative self-efficacy demonstrates a boundary condition that moderates the impact of PSD on creative self-efficacy and creativity. Furthermore, the research also shows that PSD perceptions can be promoted by providing developmental feedback or high job autonomy to employees. Based on these findings, organisations and their managers are advised to use appropriate management interventions (e.g. developmental feedback and job autonomy) to promote PSD, which will boost employee creativity. At the same time, managers are suggested to match PSD with intrinsic motivation levels as to enhance employees' creative self-efficacy, which will, in turn, lead to creativity.

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Appendix 1: Questionnaire for employee (English)

ASTON UNIVERSITY

Information & Instruction

What is this survey?
This survey is about your views of your work, your supervisor, your group and yourself. Please note that this is not a test. There is no right or wrong answer. We want to know your *personal opinions* on the issues raised in the questionnaire.

Who will see my answers?

The information you provide will not be divulged to management. Only researchers will see your answers. The data is directly collected and analysed by the researchers. The results from the survey will be presented in a way which your anonymity and confidentiality will be completely protected.

How do I fill in this survey?

Please respond to the items as accurately as you can but please do not spend too long thinking about your response to a particular item- usually you first reaction is the best one. Please answer the questions as openly and honestly as possible.

How long will it take?

The questionnaire will take about 25 minutes to complete. Once you have completed the questionnaire, please take a moment to check you have answered all the items and return to XXX with the envelope provided.

Thank you very much for your help!

A sample question is given below.

Sample Question	Strongly disagree	Disagree	Slightly disagree	Neutral	Slightly agree	Agree	Strongly agree
To what extent does your job require you to work with other people?	1	(2)	3	4	5	6	7

You are to circle the number, which is the most accurate description of your job.

You are to circle the number that is the most accurate description of this employee.
If you do not understand these instructions or other inquiries, please contact Zhou Qin at zhouq@aston.ac.uk or mobile: 13101964989.

In order to help the researchers analyse the data, it is important that I know some background information about you. This information will be used for statistical analyses only.			
Name of your group		Identity Code	
Gender	Male ☐ Female ☐	Date of birth	_____Day_____Month_____Year
Education	High school ☐ Technician school ☐ Undergraduate ☐ Postgraduate ☐ Others: _____	Job function	Administration ☐ Manufacturing ☐ Marketing ☐ Research and Development ☐ Sales ☐ Support services ☐ Others: _____
When did you start your first job?	_____Year_____Month	When did you start this job?	_____Year_____Month

Section One: Your Job
This part of the questionnaire asks you about your job.

	Not at all	Just a little	A moderate amount	Quite a lot	A great deal
Are you required to deal with problems which are difficult to solve?	1	2	3	4	5
Do you have to solve problems which have no obvious correct answer?	1	2	3	4	5
Do you need to use your knowledge to help prevent problems arising in your job?	1	2	3	4	5
Do the problems you deal with require a thorough knowledge of the work in your area?	1	2	3	4	5
Do you come across problems in your job you have not met before?	1	2	3	4	5

Please indicate to what extent you agree with the statements.

	Strongly disagree	Disagree	Slightly disagree	Neutral	Slightly agree	Agree	Strongly agree
I am allowed to decide how to go about getting my job done.	1	2	3	4	5	6	7
I am able to choose the way to go about my job.	1	2	3	4	5	6	7
I am free to choose the method(s) to use in carrying out my work.	1	2	3	4	5	6	7
I have control over the scheduling of my work.	1	2	3	4	5	6	7
I have some control over the sequencing of my work activities.	1	2	3	4	5	6	7
My job is such that I can decide when to do particular work activities.	1	2	3	4	5	6	7
My job allows me to modify the normal way we are evaluated so that I can emphasize some aspects of my job and play down others.	1	2	3	4	5	6	7
I am able to modify what my job objectives are.	1	2	3	4	5	6	7
I have some control over what I am supposed to accomplish.	1	2	3	4	5	6	7

Section Two: Leader

This section asks you about your supervisor.
My supervisor **(please refer to your direct supervisor)...**

	Strongly disagree	Disagree	Slightly Disagree	Neither disagree or agree	Slightly Agree	Agree	Strongly agree
Focuses on helping me to learn and improve while giving me feedback.	1	2	3	4	5	6	7
Never gives me development feedback.	1	2	3	4	5	6	7
Provides me with useful information on how to improve my job performance.	1	2	3	4	5	6	7

Section Three: Yourself

This section asks about you. Please indicate to what extent you agree with the statement.

	Strongly disagree	Disagree	Slightly disagree	Neither disagree or agree	Slightly agree	Agree	Strongly agree
I have confident in my ability to solve problems creatively	1	2	3	4	5	6	7
I feel that I am good at generating novel ideas	1	2	3	4	5	6	7
I have a knack for further developing the ideas of others	1	2	3	4	5	6	7
I am good at finding creative ways to solve problems	1	2	3	4	5	6	7

Please indicate to what extent you agree with the statement.

	Not true at all		Neutral		Very true
No matter what the odds, if I believe in something I will make it happen	1	2	3	4	5
I love being a champion for my ideas, even against others' opposition	1	2	3	4	5
If I believe in an idea, no obstacle will prevent me from making it happen	1	2	3	4	5
I am excellent at identifying opportunities	1	2	3	4	5

Section Four: What you feel at work?

The following section asks you about how you feel about your work. Please indicate to what extent you agree with the statement.

Why do I do this job?

	Not at all true			Neither true /nor untrue			Very true
For the pleasure it gives me to know more about my job.	1	2	3	4	5	6	7
For the pleasure of doing new things in my job	1	2	3	4	5	6	7
For the pleasure I feel while learning new things in my job	1	2	3	4	5	6	7
For the pleasure of developing new skills in my job	1	2	3	4	5	6	7
Because I feel a lot of personal satisfaction while mastering certain difficult job skills	1	2	3	4	5	6	7
For the pleasure I feel while improving some of my weak points on the job	1	2	3	4	5	6	7
For the satisfaction I experience while I am perfecting my job skills	1	2	3	4	5	6	7
For the satisfaction I feel while overcoming certain difficulties in my job	1	2	3	4	5	6	7
Because I feel pleasant in my job	1	2	3	4	5	6	7
For the excitement I feel when I am really involved in my job	1	2	3	4	5	6	7
For the intense pleasure I feel while I am doing the tasks that I like	1	2	3	4	5	6	7
Because I like the feeling of being totally immersed in my job	1	2	3	.4	5	6	7

Thank you very much!!!

Please put the questionnaire in the envelope provided, seal it and put it into the survey collection box in HR office.

ASTON UNIVERSITY

Information & Instruction

What is this survey?

This survey is about your views of the performance of your group and your subordinates. There is no right or wrong answer. We want to know your *personal opinions* on the issues raised in the questionnaire. Please answer the questions as openly and honestly as possible.

Who will see my answers?

The information you provide will not be divulged to management. Only researchers will see your answers. The data is directly collected and analysed by the researchers. The results from the survey will be presented in a way which your anonymity and confidentiality will be completely protected.

How do I fill in this survey?

Please respond to the items as accurately as you can but please do not spend too long thinking about your response to a particular item- usually you first reaction is the best one.

How long will it take?

It depends on the number of your group members. The questionnaire will take about 2 minutes for each group member. Once you have completed the questionnaire, please take a moment to check you have answered all the items and return it to XXX with the envelope provided.

Thank you very much for your help!

A sample question is given below.

Please put down the name of the subordinate and indicate how often the following statements characterize this employee:

Name: Wang Lin

Sample Question	Not at all characteristic		Neutral		Very characteristic
Suggests new ways to increase quality.	1	(2)	3	4	5

You are to circle the number that is the most accurate description of this employee.

If you do not understand these instructions or other inquiries, please contact Zhou Qin at zhouq@aston.ac.uk or mobile: 13101964989.

<table>
<tr><td colspan="4">In order to help the researchers analyse the data, it is important that they know some background information about you. This information will only be used for statistical analyses and NOT for individual identification.</td></tr>
<tr><td>Gender</td><td>Male ☐ Female ☐</td><td>Age</td><td>_____Year</td></tr>
<tr><td rowspan="2">Education</td><td rowspan="2">High school ☐
Technician school ☐
Undergraduate ☐
Postgraduate ☐
Others: _____</td><td>Name of the group</td><td></td></tr>
<tr><td>Number of group members</td><td></td></tr>
<tr><td>When did you start to be a supervisor?</td><td>_____Year_____Month</td><td>When did you start to be the supervisor of this group?</td><td>_____Year_____Month</td></tr>
</table>

Employee Creativity

The questions listed below ask you about your group member's creative performance. Please put down the name and indicate how often the following statements characterize him or her. Please fill out a form for each of your group members.

Name: _____

	Not at all characteristic		Neutral		Very characteristic
suggests new ways to achieve goals or objectives.	1	2	3	4	5
Comes up with new and practical ideas to improve performance.	1	2	3	4	5
Searches out new technologies, processes, techniques, and /or product ideas.	1	2	3	4	5
Suggests new ways to increase quality.	1	2	3	4	5
is a good source of creative ideas.	1	2	3	4	5
Is not afraid to take risks.	1	2	3	4	5
Promotes and champions ideas to others.	1	2	3	4	5
Exhibits creativity on the job when given the opportunity to.	1	2	3	4	5
Develops adequate plans and schedules for the implementation of new ideas.	1	2	3	4	5
Often has new and innovative ideas.	1	2	3	4	5
Comes up with creative solutions to problems.	1	2	3	4	5
Often has a fresh approach to problems.	1	2	3	4	5
Suggest new ways of performing work tasks.	1	2	3	4	5

Please put the questionnaire in the envelope provided, seal it and put it into the survey collection box in HR office.

Appendix 3: Questionnaire for employee (Chinese)

ASTON UNIVERSITY

企业职工工作环境调查问卷

填写说明

调查什么？

本次调查问卷是关于你对于你的工作，你的主管以及你自己的看法的调查。请注意这个调查问卷不是一次考试。我们想要了解的是你**个人**对问卷中提到的问题的看法。

谁将看到我的答案？

你提供的任何内容将**不会**透露给领导层。只有研究人员才能看到你的答案。调查人员直接采集和分析数据。分析报告中在表述分析结果时也保护个人资料的隐蔽性。问卷中你的姓名将不出现，而使用你的 3 位数工作代码。请在相应的空格内填写这个代码。

如何填写这个调查问卷？

请尽量准确回答问题。但是不要在某个问题上停留时间太长——通常你的第一个想法就是最好的答案。请尽量诚恳，诚实的回答问题。

需要多长时间？

该问卷将需要大约 25 分钟的时间完成。完成后，请用一些时间检查你是否回答了**所有**的问题。然后将问卷放在信封里，封好后交人力资源部。

例子：用以下句子描述你的工作，请指出你多大程度上同意这种说法。

例子	完全不同意	不同意	有些不同意	可否之间	有些同意	同意	非常同意
你的工作要求你和别人一起做。	1	(2)	3	4	5	6	7

请在最准确描述你的看法的数字上画圈。数字越大表明程度越大。如果你不明白这个填写说明，请提出来要求帮助（电话：13101964989；联系人：周勤）。如果请继续下面的问题。

*** *** *** *** ***

为了帮助研究人员分析数据，需要你提供一些有关于你的背景信息。这些信息仅用于统计分析，而不是用于识别身份。			
小组（即工作部门/岗位）名称：		个人代码：	
性　　别： (请在□内打√)	男 □　女 □	年　　龄：	_____岁
教育程度：	高中/职业高中 □ 大专/中专 □ 本科/大学 □ 研究生 □ 其他(请说明)_____	工作职能：	行政/管理/办公室 □ 生产 □ 市场营销/销售 □ 研究开发 □ 技术支持 □ 后勤 □ 其他(请说明)_____
何时开始工作？	_____年_____月	何时开始现在的工作？	_____年_____月

第一部分：我的工作					
用以下句子描述你在工作中遇到的情况，请指出这些情况有多经常出现。					
	完全没有	有一些	一般	相当多	非常多
工作中要求你处理不容易解决的问题。	1	2	3	4	5
工作中要求你解决一些没有明显正确答案的问题。	1	2	3	4	5
你需要使用你的工作知识来防止工作中出现问题。	1	2	3	4	5
你要处理的问题需要你对你的工作有详细的了解。	1	2	3	4	5
你在工作中遇到你从来没有遇到的问题。	1	2	3	4	5

用以下句子描述你的工作，请指出你多大程度上同意这些说法。

	完全不同意	不同意	有些不同意	可否之间	有些同意	同意	非常同意
我可以决定如何开展我的工作。	1	2	3	4	5	6	7
我可以选择工作方法或使用某个工作程序。	1	2	3	4	5	6	7
我可以自由选择开展工作的方式。	1	2	3	4	5	6	7
我可以安排我的工作日程。	1	2	3	4	5	6	7
我一定程度上掌握工作活动的日程安排（即什么时候做什么）。	1	2	3	4	5	6	7
我在工作中可以决定什么时候做什么特定的工作。	1	2	3	4	5	6	7
我的工作中允许我对通常的考评方式进行修改。这样我可以重点突出工作中的某些方面而不强调其他方面。	1	2	3	4	5	6	7
我可以修订我的工作目标。	1	2	3	4	5	6	7
我对自己在工作中应该取得的成绩（领导认定的工作目标）有一定的决定权。	1	2	3	4	5	6	7

第二部分：我的领导

用以下句子描述你的领导(指你的直接主管)给你的反馈意见，请指出你多大程度上同意这些说法。

	完全不同意	不同意	有些不同意	可否之间	有些同意	同意	完全同意
我的领导给我反馈意见时注重帮助我学习和提高。	1	2	3	4	5	6	7
我的领导从来没有给我一些帮助我发展的意见。	1	2	3	4	5	6	7
我的领导提供给我有用的信息帮助我提高工作表现。	1	2	3	4	5	6	7

第三部分：你自己

用以下句子你描述自己，请指出你多大程度上同意这些说法。

	完全不准确		一般		完全准确
不管有多大可能， 我相信的事情我都会使它发生。	1	2	3	4	5
我喜欢坚持我的想法，即使是遭到别人的反对。	1	2	3	4	5
如果我认为某个想法是正确的，任何阻碍都不会阻止我将它变为现实。	1	2	3	4	5
我很会发现机会。	1	2	3	4	5

用以下句子描述你自己，请指出你多大程度上同意这些说法。

	完全不同意	不同意	有些不同意	可否之间	有些同意	同意	完全同意
我自信自己有创造性地解决问题的能力。	1	2	3	4	5	6	7
我觉得自己善于提出新颖的点子。	1	2	3	4	5	6	7
我有进一步发展别人的点子的本领。	1	2	3	4	5	6	7

第四部分：我在工作中的感受

我为什么投入工作？用以下句子描述你投入工作的原因，请指出你多大程度上同意这些说法。

	完全不同意			可否之间			完全同意
因为能够更多地了解我的工作。	1	2	3	4	5	6	7
因为在工作中能够尝试新的事物。	1	2	3	4	5	6	7
因为在工作中能够学习新的东西。	1	2	3	4	5	6	7
因为在工作中能够发展新的技能。	1	2	3	4	5	6	7
因为在工作中能够掌握有难度的技能，使我对自己很满意。	1	2	3	4	5	6	7
因为在工作中能够改善我的薄弱环节，给我带来快乐。	1	2	3	4	5	6	7
因为在工作中能够完善我的工作技能，使我感到满意。	1	2	3	4	5	6	7
因为能够在工作中克服某种困难，使我感到满意。	1	2	3	4	5	6	7
因为我在工作中感到快乐。	1	2	3	4	5	6	7
因为当我真正投入到工作中时我感到兴奋。	1	2	3	4	5	6	7
因为做自己喜欢的工作，我感到很快乐。	1	2	3	4	5	6	7
因为我喜欢完全投入到工作中的感觉。	1	2	3	4	5	6	7

非常感谢你的合作！

请将问卷放入信封内并封口投入问卷回收信箱。

Appendix 4: Questionnaire for supervisor (Chinese)

ASTON UNIVERSITY

企业管理人员调查问卷

填写说明

调查什么？

本次调查问卷是关于你对你的小组以及小组成员工作的看法的调查。请注意这个调查问卷不是一次考试。我们想要了解的是你个人对问卷中提到的问题的看法。

谁将看到我的答案？

你提供的任何内容将不会透露给领导层。只有研究人员才能看到你的答案。调查人员直接采集和分析数据。分析报告中在表述分析结果时也保护个人资料的隐蔽性。你的姓名将不出现在问卷上，而使用你的 3 位数工作代码。请在相应的空格内填写这个代码。

如何填写这个调查问卷？

请尽量准确回答问题。但是不要在某个问题上停留时间太长——通常你的第一个想法就是最好的答案。请尽量诚恳，诚实的回答问题。

需要多长时间？

这取决于你的小组成员的人数。你需要对每一个小组成员的工作进行评估。每个成员的评估表格大约需要 2 分钟完成。完成后，请用一些时间检查你是否回答了所有的问题。然后将问卷放在信封里交人力资源部。

例子：请在横线上填写成员的姓名，并指出他/她多大程度上有以下典型特征。

姓名：李朗文

例子	完全不典型		一般		非常典型
建议新的方法提高工作质量。	1	(2)	3	4	5

请在最准确描述你的看法的数字上画圈。数字越大表明程度越大。如果你不明白这个填写说明，请提出来要求帮助（电话：13101964989；联系人：周勤）。如果没有问题请继续下面的问题。

为了帮助研究人员分析数据，需要你提供一些有关于你的背景信息。这些信息仅用于统计分析，而不是用于识别身份。			
工作小组（即工作部门）名称：		工作代码：	
性　　别： (请在☐内打√)	男 ☐　女 ☐	年　　龄：	_____岁
教育程度：	高中/职业高中 ☐ 大专/中专 ☐ 本科 ☐ 研究生 ☐ 其他(请说明) _____	小组人数：	_____人
何时开始担任小组主管的工作？	_____年_____月		

职工的创新

以下问题是关于你的小组成员的创新表现。请写下职工的姓名，指出他/她多大程度上有以下典型特征。请对每一个小组成员都填一张表。

姓名: _____

	完全不典型		一般		非常典型
提出新的方法来达到目的或目标。	1	2	3	4	5
提出新的，实际性的想法来提高工作表现。	1	2	3	4	5
寻求新的技术，程序，技能和/或有关产品新的想法。	1	2	3	4	5
提出新的方法提高工作质量。	1	2	3	4	5
是创新点子的来源。	1	2	3	4	5
不害怕冒风险。	1	2	3	4	5
提出想法并推广给其他人。	1	2	3	4	5
当得到机会时在工作中表现出创新能力。	1	2	3	4	5
制定有效的计划和日程实施新的想法。	1	2	3	4	5
经常有新的，有创新的想法。	1	2	3	4	5
对问题提出创新的解决方法。	1	2	3	4	5
对问题总是采用新颖的方法处理。	1	2	3	4	5
提出新方法做工作。	1	2	3	4	5

非常感谢你的合作！

请将问卷放入信封内并封口投入问卷回收信箱。