A HIGH-ORDER PERFORMANCE FRAMEWORK:

CONTENT, STRUCTURE AND PERSONALITY ANTECEDENTS

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ABSTRACT

Individual work performance is a central construct in industrial and organisational psychology, yet insufficient is known about it and little agreement has been achieved as to the content and structure of the performance domain. This thesis contributes to a better understanding of work performance, firstly through the establishment of a unified high-order performance taxonomy that has good content and construct validity, and second, through the identification of its personality antecedents by linking this performance taxonomy to a personality taxonomy. Additionally, this thesis draws on recent re-conceptualisations of personality, such that implications from state-level personality, in addition to trait-level personality, are considered.

In Study 1, I use an inductively developed performance taxonomy, the Great Eight framework, as a means of revealing a high-order performance structure. By using a cross-sectional survey design, performance rating data were collected from employees (N=242) and supervisors (N=158) within a Chinese organisation. In Study 2, using data collected from the same sample in two waves, I link this high-order performance structure to the Big Five personality taxonomy, so as to explore the potential for building one-to-one mapping between the two frameworks. In Study 3, I validate in a separate MBA student sample (N=98) the mapping between personality taxonomy and performance taxonomy, as identified in Study 2; additionally, I use a diary study design to measure state-level personality and to investigate whether personality – performance linkages can be further strengthened.

The findings from this thesis reveal that a four-factor model can best represent the high-order structure of the performance domain, and there is initial support for linking this taxonomy to the Big Five personality taxonomy. The results also indicate that state-level personality, especially within-person variability across time, has meaningful value in predicting performance outcomes.

DISSEMINATION FROM THIS THESIS

Book Chapter

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Conference Presentations

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CHAPTER 1: INTRODUCTION

1.1. Job Performance: A Central Construct in I/O Psychology

Job performance, particularly individual employees' job performance, is perhaps the most important construct in industrial and organisational psychology (Bommer, Johnson, Rich, Podsakoff, & MacKenzie, 1995; Borman, 2004; Campbell, 1990; Campbell, McCloy, Oppler, & Sager, 1993; K. R. Murphy & Cleveland, 1995; F. L. Schmidt & Hunter, 1992; Viswesvaran & Ones, 2000). Good performance of individual employees can accrue into organisational performance and lead to substantial economic gains for the entire firm (Campbell, 1990; Campbell et al., 1993; Kurz & Bartram, 2002; F. L. Schmidt & Hunter, 1998). Therefore, it is no surprise that individual performance takes a central role in every aspect of an organisation's human resource system encompassing employee selection, development, promotion, succession and turnover. Every organisation needs to identify and select employees based on the likelihood that they will perform well in future jobs; design training and developmental programs to enhance individuals' job performance; and use performance appraisals to identify individuals' achievement against preset performance criteria and to make compensation and placement decisions.

Although scholastic endeavour in investigating the criterion space dates back to the 1920s, most earlier studies and even some contemporary studies tend to take a simplistic approach in selecting criterion measures, such as using conveniently obtained criteria such as salary or promotion that are not performance *per se* but the outcome of performance, or using global, overall performance measures that have insufficient psychological information (Bartram, Warr, & Brown, 2010; Hough, 2001; Jenkins, 1946; Schneider & Hough, 1995; Wallace & Weitz, 1955). A commonly agreed, psychologically oriented perspective in defining and conceptualising job performance has only been established in recent decades. Even so, the content, structure and constituents of the performance construct are still under debate. Performance taxonomies with different numbers of dimensions, ranging from as few as two (e.g. Borman & Motowidlo, 1993; J. Hogan & Holland, 2003), to as many as

eight or more (e.g. Bartram, 2005; Borman & Brush, 1993; Campbell et al., 1993; Hunt, 1996; Tett, Guterman, Bleier, & Murphy, 2000; Viswesvaran, 1993), have been proposed to represent the most fundamental level of the performance structure.

Without a commonly agreed framework to conceptualise performance, we cannot move very far in understanding, measuring, explaining and predicting this domain. For instance, one of the major aims of understanding performance is to be able to make accurate predictions about it. However, rather than focusing on the criterion domain, the majority of research effort to date has been dedicated to studying the predictor domain, and striving to enhance predictive validity by refining the conceptualisation and measurement of the predictors, such as personality traits. Indeed, as pointed by several scholars, the actual problem of unsatisfactory predictions may come from the poor conceptualisation and measurement of the criterion space, rather than the predictor space (Bartram et al., 2010; Borman et al., 2001; Campbell, 1990; Campbell, McHenry, & Wise, 1990; J. W. Johnson, 2003; Morgeson et al., 2007). Hough and colleagues (Hough, 2001; Hough & Ones, 2001; Schneider & Hough, 1995) have raised the need to establish a nomological net linking all relationships between the constructs of personality and performance, and this can hardly be done without a clear and sound configuration of the performance domain in the first place.

There is also a strong practical impetus to better understand the performance domain. A clear, scientifically rigorous, and commonly agreed performance framework can provide a good reference for policy makers and organisational leaders to understand the most required performance aspects in today's workplace, and to subsequently review and refine their talent management strategies in relation to their particular organisational, occupational and social contexts. It can also inform organisations of how to comprehensively and accurately measure, monitor and facilitate employees' performance, so that appropriate training and intervention can be devised according to specific needs.

Overall, there are important theoretical and practical needs for seeking to refine and advance our understanding of the performance space. In this thesis, I intend to contribute to this understanding, by exploring two major themes as suggested by Campbell, Gasser and Oswald (1996) in studying performance: the first

theme is to identify the content and structure of performance that are applicable across all jobs, and the second theme is to delineate the causal patterns of relations between performance and its psychological antecedents, for instance, personality antecedents as studied in this thesis. To study these two themes, I conduct three empirical studies, which will be described in more detail in the next section.

1.2. Overview of Chapters

Here I briefly introduce each chapter, so as to provide an overview of the thesis.

In Chapter 2, I review the extant literature on individual performance in the workplace. By reviewing the diverse performance taxonomies developed during the past two decades, I notice that these taxonomies can be categorised into two major types, as characterised by the way these taxonomies were developed. One type of taxonomy was developed from an inductive, bottom-up approach such that models emerged from a complete collation of performance constructs; the other type of taxonomy was developed from a deductive approach such that conceptual and theoretical development was first conducted to identify performance dimensions. I also notice that these two types of taxonomy stand at a different level of generality/specificity in the performance hierarchy, and I thus propose a unifying strategy, by re-scaling them onto the same generality level. Building on this argument, I further suggest that this re-scaling can be achieved by discovering the higher-order structure of the performance taxonomies developed from the inductive approach, which tend to generate more differentiated and detailed specification about the performance domain. Drawing on conceptual and empirical evidence, I propose several high-order structures in the performance domain that can be empirically tested in this thesis.

In Chapter 3, I move to the predictor end of the predictor – criterion equation, to identify personality antecedents of individual job performance. For the purposes of identifying a nomological net that links a personality taxonomy and a performance taxonomy, I focus on evidence that relates to the well-established Big Five personality framework. I review past meta-analyses that present the validity of the

Big Five in predicting work performance, and find that only some meta-analyses tend to use performance taxonomies as the criterion. Taking a criterion-centric perspective, I then review past efforts that provide conceptual or empirical evidence about the personality trait predictors of the dimensions of various performance taxonomies. This is to identify to what extent a nomological net has been built between personality and performance constructs. Finally, considering the traditionally low to moderate validity of personality traits, I explore an alternative understanding of personality, that is, the dynamic perspective, which conceptualises personality as an interactive system, rather than fixed trait-like entities.

In Chapter 4, I describe the methodological approach to measure and assess performance and personality in the current thesis. I describe the context of the empirical research being undertaken and the samples being studied. I then discuss the advantages and disadvantages of the chosen data collection technique, the timescale of data collection, and ethical issues that have been considered in this thesis.

Chapter 5, 6 and 7 constitute the empirical section of this thesis. An overview of these studies is presented in Figure 1.1. Chapter 5 focuses on the criterion domain and explores its content and structure. Specifically, I intend to discover the high-order performance structure by using an inductively derived Great Eight performance taxonomy. I also link this high-order structure to a deductively derived performance taxonomy so as to identify whether agreement can be made between taxonomies developed from different approaches. Such investigation can help establish a content- and construct-valid, widely applicable performance model. Chapter 6 extends to the predictor domain by drawing a one-to-one linkage between factors in the high-order performance taxonomy and factors in the Big Five personality taxonomy. Besides, I examine the intermediate position of the performance taxonomy in the process of personality traits predicting global-level performance outcomes. Chapter 7 uses a different sample to validate the one-to-one linkage between the Big Five personality and high-order performance taxonomy, while also bringing in intervening variables associated with state-level, daily personality. Focusing on two unique concepts, the central tendency and the degree of variation of individuals' momentary personality, I explore their implications in strengthening the linkage between personality traits and performance.

In Chapter 8, I integrate the main findings of this thesis, and discuss the implications they provide to our understanding of individual work performance and how performance can be predicted by personality antecedents, including personality traits and personality states. I also outline the limitations of the present thesis and point out avenues for future research.

To summarise, this thesis seeks to provide a comprehensive understanding of the performance domain by taking the psychological definition of performance to recognise its multidimensional nature, revealing and profiling its content and structure, and identifying its association with personality antecedents. It is hoped that the establishment of a content- and construct-valid, overarching performance framework can provide the basis for future studies to appropriately use work performance criterion.

Figure 1.1. Overview of empirical studies
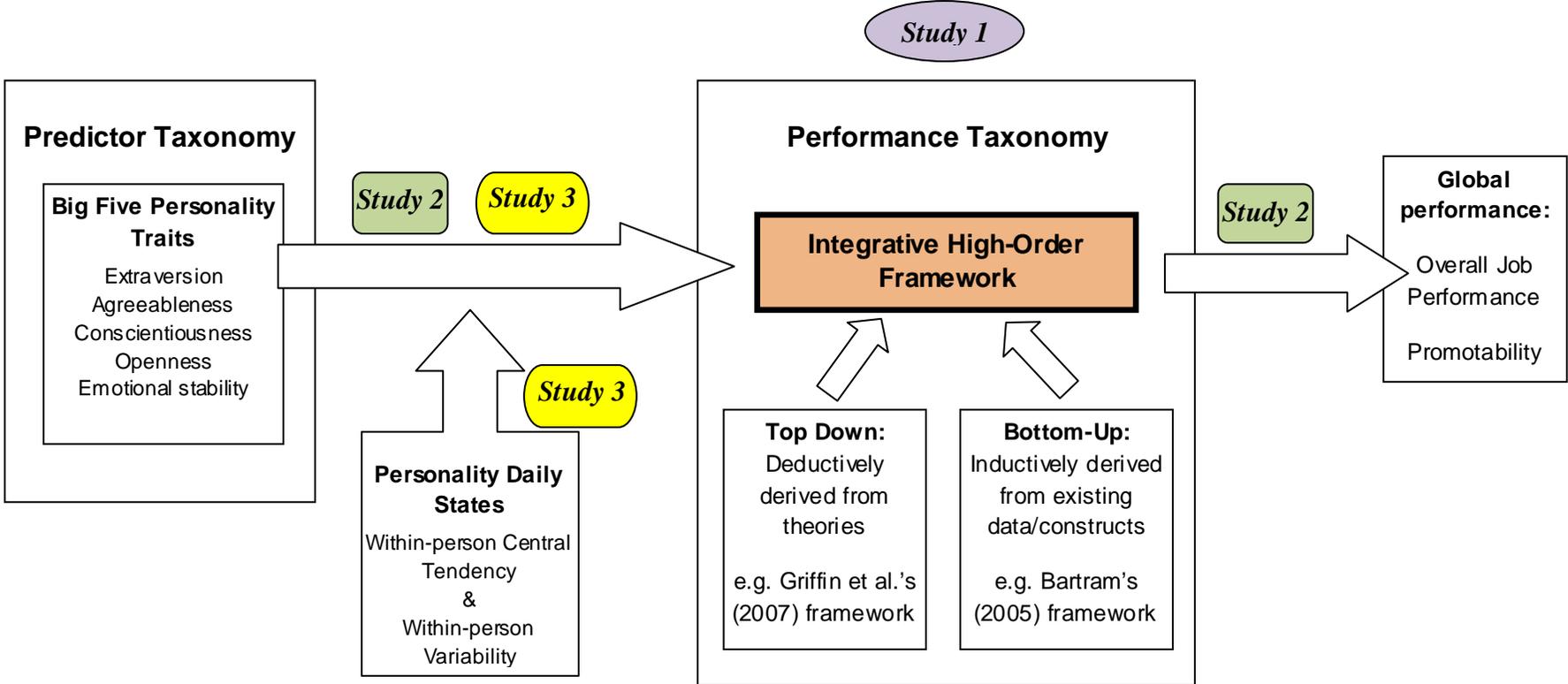
CHAPTER 2: LITERATURE REVIEW I

CONCEPTUALISING AND MEASURING INDIVIDUAL JOB PERFORMANCE:

IN SEARCH OF A UNIFIED HIGH-ORDER PERFORMANCE TAXONOMY

2.1. Overview

In the first chapter of the literature review, I focus on the conceptualisation and measurement of individual performance within the workplace. I first provide a definition of the job performance construct, and then review all the important performance taxonomies developed over the past two decades. I notice that two major approaches have been adopted in model development: a bottom-up, inductive approach that discovers performance taxonomies as emerged from collating all performance constructs, and a top-down, deductive approach which starts with a conceptual and theoretical development, from which performance dimensions were then proposed. I will review the models developed in each of these two streams and summarise their distinct features. Confronting the vast and diverse taxonomies being developed, I note that agreement is urgently warranted so that a collective understanding of the content and structure of the criterion domain needs to be developed.

The first attempt to achieve a collective understanding of performance is to unify performance taxonomies developed from these two approaches. I propose that models developed from the two approaches, which stand at different level of generality/specificity in the performance hierarchy, should be considered. For integration to be made, it is first necessary to scale these models onto the same level of generality/specificity. I suggest that this scaling can be achieved by discovering the high-order structure of the performance taxonomies developed from the inductive approach, which tend to generate more differentiated and detailed specifications about the performance domain, relative to the models developed from the deductive approach. I draw on existing evidence to show how this scaling can be achieved, and

propose several potential high-order structures of the performance domain that can be empirically investigated.

2.2. Defining Work Performance

2.2.1. Two streams in the definition of performance

It has been recognised that there are two major schools of thought in conceptualising the performance domain: the economic perspective and the psychological perspective.

2.2.1.1. The economic perspective

The more traditional school adopts an economic perspective towards job performance, and places most emphasis on the attainment of job outcomes and results (Kane, 1986). Performance is typically measured by traditional performance appraisals (Wexley & Klimoski, 1984), or by calculating the dollar value of an individual employee's outputs (Brogden & Taylor, 1950; Judiesch, Schmidt, & Mount, 1992). This perspective assumes performance to be a general factor that will account for almost all important variance in behaviour at work. It is frequently associated with the pursuit of a single, composite, all-encompassing measure of performance – the 'ultimate criterion', which is considered as the properly weighted average of all important elements, and which can act as a single standard or yardstick to assess employees' job success (Krug, 1961; Stone & Kendall, 1956; Thorndike, 1949).

Such an approach to treat job performance as a composite ultimate criterion has been widely criticised as insufficient in understanding the criterion domain, given that job success is complex and multidimensional even for the simplest type of jobs (Dunnette, 1963a, 1963b; Guion, 1961; F. L. Schmidt & Kaplan, 1971; Seashore, Indik, & Georgopoulos, 1960; Smith, 1976; Toops, 1944; Wallace, 1965). Guion (1961) has pointed out that the ultimate criterion is not measurable. Dunnette (1963a, 1963b) firmly asserted that there is no 'single, all-compassing measure of

occupational success against which predictors must be compared' (p. 319 and p.251), and argued that the over-emphasis on organisational consequences overlooks the nature of linkages between such consequences and actual job behaviours. These researchers proposed that the notion of the single composite measure of job performance should be discarded, and that the analysis of the many facets of actual job behaviours should be started.

2.2.1.2. The psychological perspective

The shift of thinking from an economic to a more psychological approach occurred more recently. Rather than equating performance with effectiveness, productivity and utility, scholars holding a psychological perspective typically view job performance as a constellation of overt job behaviours and focus on capturing behavioural regularities that are critical to organisational functions (e.g. Borman, 1983; Campbell, 1990; Campbell et al., 1993; J. W. Johnson, 2003; Motowildo, Borman, & Schmit, 1997). They clearly distinguish job performance from the results or outcomes of performance. Famously, Campbell (1990) defined performance thus:

> *"Performance is behaviour. It is something that people do and is reflected in the actions that people take...Performance is not the consequence(s) or result(s) of action; it is the action itself" (p. 704)*

These views were reiterated and extended in a later publication by him and his colleagues (Campbell et al., 1993):

> *"Performance is….something that people actually do and can be observed. By definition, it includes only those actions or behaviours that are relevant to the organization's goals and that can be scaled (measured) in terms of each person's proficiency (e.g., level of contribution). Performance is what the organization hires one to do, and do well. Performance is not the consequence or result of action, it is the action itself...Performance consists of goal-relevant actions that are under the control of the individual, regardless of whether they are cognitive, motor, psychomotor, or interpersonal." (pp. 40–41)*

In addition, Campbell (1990) made it clear that the psychological definition of job performance indicates its multidimensional nature:

> *"A job, any job, is a very complex activity; and, for any job, there are a number of major performance components, distinguishable in terms of their*

determinants and covariation patterns with other variables. The correlations among their true scores are less than one." (p. 704)

These behaviour- and action-oriented views towards performance were widely endorsed by many other scholars. Motowildo, Borman and Schmidt (1997) explicated that job performance should be behavioural, episodic, evaluative and multidimensional. They also clearly differentiated performance and performance results, suggesting that performance is episodic behaviours with an evaluative component (i.e., positively or negatively affecting organisational goal attainment), whereas performance results are 'states or conditions of people or things that are changed by performance' (p. 73). In the same vein, Rotundo and Sackett (2002) succinctly defined performance as 'actions and behaviours that are under the control of the individual and contribute to the goals of the organisation' (p. 66). Johnson (2003) reiterated the distinction between performance and effectiveness, arguing that the latter should be the aggregate of the outcomes of performance.

The conceptualisation of performance as a behavioural construct also greatly contributed to the rise of competency modelling in the late 1990s, which has important and wide-ranging practical value. Competencies are conceptualised as behavioural components with an evaluative and multidimensional nature. For instance, Tett et al. (2000) defined competency as 'an identifiable aspect of prospective work behaviour attributable to the individual that is expected to contribute positively and/or negatively to organisational effectiveness' (p. 215). Similarly, Bartram, Robertson and Callinan (2002) defined competencies as 'sets of behaviours that are instrumental in the delivery of desired results or outcomes' (p. 7). The conceptual overlap between competency and job performance (the psychological definition) is clear, and is perhaps the underlying reason that allows competency to be increasingly used as a performance measure in many organisations (Greguras, Robie, Schleicher, & Goff III, 2003; Maylett, 2009; Timmreck & Bracken, 1997; Waldman, Atwater, & Antonioni, 1998).

2.2.1.3. Discussion of the two perspectives

The conceptualisation of job performance as a behavioural construct is an important milestone in industrial and organisational psychology. It lays out the grounds for further research effort to work towards revealing the underlying

meanings, content and structure of the performance construct, and thus directly contributes to the burgeoning research in search of the general taxonomy of performance.

However, the pursuit of the psychological perspective towards job performance does not imply that the economic perspective is entirely useless. Indeed, both should be considered in researching the performance domain. First, these two aspects address different things (i.e., job behaviours and the outcome of behaviours) that are important for respective purposes. If the purpose is to make important personnel decisions such as hiring, rewarding or promoting, using a single overall criterion can provide more straightforward and practical implication; however, if we are mainly concerned with enhancing the understanding of predictor – performance relationships, then the more sophisticated psychological perspective is more appropriate (Borman, 1991). Thus the choice between the two perspectives should be dependent upon the purpose of measuring job performance (F. L. Schmidt & Kaplan, 1971). Second, behaviours and organisationally relevant outcomes form an inextricable relationship, such that they can be considered to stand at different positions in the predictive process. Vallance, Glickman and Suci (1953) indicated that behaviours at day-to-day operations can be considered as 'intermediate' criteria that link to the fulfilment of ultimate organisational goals (i.e. economic definition of performance). Binning and Barrett (1989) suggested conceptualising performance domains as composed of many behaviour-outcome units, such that behaviours are the means to achieve the ends of organisation-valued outcomes. Bartram et al. (2010) explicitly proposed using specific, psychologically oriented performance as the focal constructs of analysis, and consider specific performance as intermediate criterion measures that further relate to the more distal criterion of organisationally relevant outcomes, thus forming a two-stage process. Third, recent theoretical and statistical advancement has allowed the partition of variances explained by different factors in multifaceted, behaviour-oriented performance ratings. Viswesvaran, Schmidt and Ones (2005), in a recent meta-analysis, showed that after controlling for various forms of measurement errors such as the halo effect, there is a strong general factor that accounts for over half of the variance of performance ratings at the construct level. Although the underlying causes of this substantial general factor remain to be

revealed, it is evident that using global, overall measures of job performance is a justifiable practice.

In this thesis, I choose to follow the psychological perspective of defining job performance as overt, job-relevant behaviours that are multifaceted and that are relevant for organisational effectiveness. However, I also recognise the value of overall, global measures of job performance, as they relate more directly to economically and practically relevant outcomes that are frequently the concern of organisations. I will empirically examine the process-oriented views as mentioned above, so as to disentangle how the two types of performance are predicted by psychological antecedents, and this will be addressed in Chapter 6.

2.2.2. The dynamic and changing nature of performance

The nature of job performance has changed greatly over the past decades, given that the meaning and content of job has changed remarkably since its emergence. The initial definition of job stems from production jobs in large industrial factories and bureaucracies. In those contexts, job titles tended to clearly indicate the required duties, responsibilities, and expectations by organisations, and job performance frequently focused on individuals' completion of fixed, repetitive tasks (Bridges, 1994). However, since the middle of last century, researchers have started realising that jobs are becoming more dynamic and fluid as organisational changes occur, and that the nature of jobs is becoming intangible and complex, especially for high complexity jobs such as managerial jobs (Bass, 1962; Prien, 1966). With the gradual disappearing of mass production alongside the fast growth of modern technology, jobs have become even more complex, dynamic and changeable in recent years (Bridges, 1994; Hesketh & Neal, 1999; Ilgen & Hollenbeck, 1991; Ilgen & Pulakos, 1999). For instance, today's jobs frequently require people to move to unfamiliar job roles and to new teams, work under matrix supervision and with people across departmental and organisational boundaries. In this new era that is less job-centred but more person-centred, people are required and rewarded not for getting the necessary work done but for doing their jobs (Bridges, 1994).

These important changes in job roles and requirements have a great impact on how work performance is defined, conceptualised and measured. While there is

continuing attention accorded to how well an employee follows directions and completes assigned tasks, increasing attention is now given to how well this same person works with a fluid and abstract job description, responds to the changing demands of tasks and responsibility, and takes initiatives and a forward-looking perspective to improve the status quo, or prevent potential risks (M. A. Griffin, Neal, & Parker, 2007; P. R. Murphy & Jackson, 1999). These newly emerging aspects of job performance need to be incorporated in the conceptualisation and measurement of performance, as well as more broadly into the whole human resource system, such as hiring strategies, rewarding and compensation schemes, and training and development programmes, so that the full human resource cycle can be well aligned to accommodate the newly emerged job demands.

These changes in conceptualising and measuring job performance also indicate that the nature of performance construct is fluid rather than fixed. It can be changed by the swift alteration of technological, economic, social and cultural contexts. Therefore, it is necessary to put our understanding of job performance into contexts and to regularly revisit and update our thinking and practice towards it.

In the next section, I will look more in-depth into the content of individual job performance as a psychological construct. Specifically, I will review the performance taxonomies that have been developed during the past two decades.

2.3. A Review of Performance Taxonomies Developed Since 1990s

Before reviewing the performance taxonomies, I will first explain the boundary that has been set for this current literature review, as it is not an exhaustive list to encompass all performance taxonomies developed in history.

2.3.1. Criteria for selecting taxonomies

First of all, this review focuses on the performance taxonomies developed over the recent two decades, particularly after Campbell and colleagues' (Campbell, 1990; Campbell et al., 1990) groundbreaking work that redefined work performance and reiterated its complex, multidimensional nature. In fact, the search for the

content and structure of the performance domain dates a long way back. For instance, Austin and Villanova (1992), in their comprehensive review, noted that as early as 1920s, researchers had already noticed the multiple aspects of the performance domain, despite the fact that an understanding of performance at that stage was rather coarse and unsystematic. In this thesis, however, I choose to focus on the development of recent decades, given that this is the major period during which the psychological view of job performance has been broadly embraced by most scholars, and the modelling of job performance has flourished.

Second, this review focuses only on performance taxonomies that were developed for modelling individual performance, while work performance can also be conceptualised at more collective levels, for instance, at the intragroup-level, intergroup-level, or organisation-level (Austin & Villanova, 1992; Bartram et al., 2002; M. A. Griffin et al., 2007; Rousseau, 1985; Vallance et al., 1953). While group-level performance is not the main focus of this thesis, it is necessary to point out that Griffin et al.'s (2007) performance matrix, which includes three performance factors for each of the three levels in organisational research (individual, team and organisation), was chosen to be included. This is due to the fact that levels of this performance matrix can be flexibly extracted so that only individual-level factors are addressed. For instance, Griffin et al. (2010) dealt only with three individual-level performance factors. Details about this model will be described later.

Third, this review focuses on work behaviours that positively contribute to individual and organisational effectiveness. Therefore, work behaviours that have negative connotations, such as counterproductive behaviour which is an important stream in performance research (Bennett & Robinson, 2000; Rotundo & Sackett, 2002; Sackett & DeVore, 2001), are not included. As a result, performance taxonomies containing both productive and counterproductive components, such as the eight-factor model developed by Hunt (1996) for entry-level jobs, were excluded.

Fourth, this review includes performance taxonomies developed in assessment centre settings. Although assessment centre studies usually follow a separate line of research and it may be argued that assessment centre data as obtained in proxy work settings may not reflect actual performance on the job, I consider these studies to provide a valuable source to draw inferences from. First, assessment

centres usually assess an individual's performance on a set of behaviourally scalable dimensions, and frequently, job-related competencies. This is similar to the way performance is assessed in real work settings. Second, comparing across performance taxonomies developed for actual job settings and for pre-hiring assessment centre settings will be beneficial, since it is desirable to maintain consistency in the way performance is assessed before and after the hiring process.

Finally, this review compiles past studies that were designed to comprehensively investigate the entire performance domain. Needless to say, there have been numerous studies that focus on one or several specific performance dimensions, such as contextual/citizenship performance (Borman et al., 2001; Borman & Motowidlo, 1997; Coleman & Borman, 2000), adaptive performance (Pulakos, Arad, Donovan, & Plamondon, 2000; Pulakos et al., 2002), among others. These studies will not be extensively addressed here unless they are closely associated with certain full-ranged performance taxonomies. Further, there are many studies that employ various in-house designed or off-the-shelf competency models whose content and/or construct validity is not guaranteed. This review does not include studies such as these.

Within these above set boundaries, I will describe and discuss the performance taxonomies developed during the past two decades. A historical review over the performance models during this period has led me to conclude that two major approaches in model development have been adopted. One approach is featured by an inductive, bottom-up approach where researchers typically look for the patterns from existing data, such as existing performance constructs that have already being discovered and analysed, and then using different aggregation and synthetic techniques to find the common themes (e.g. performance dimensions) that best explain these otherwise disparate data (Bartram, 2005; Borman & Brush, 1993; Campbell, 1990; Campbell et al., 1993; Tett et al., 2000; Viswesvaran, 1993). The other approach starts from conceptual developments, and at times draws on existing theories in social and organisational psychology, such as job role theory and identity theory (M. A. Griffin et al., 2007; Welbourne, Johnson, & Erez, 1998), from which performance models in line with these theoretical bases were proposed. This can be interpreted as a deductive, theory-driven approach. The choice between these two

approaches in model development has considerable implications on the content, structure and features of the performance models being developed. These implications are discussed after a systematic review of models developed by each approach. Table 2.1 and 2.2 respectively summarise the models developed in each of the two approaches.

2.3.2. Performance taxonomies developed from an inductive approach

2.3.2.1. Campbell and colleagues' job analytical approach

John Campbell and his colleagues' work is perhaps one of the largest and best known examples of developing the taxonomy of individual job performance. Based on a large dataset from Project A, a long-term study focusing on selecting entry-jobs at U.S. Army, Campbell and his colleagues first proposed and structurally tested a five-dimension performance model, composed of *core proficiency*, *general soldier proficiency*, *effort and leadership*, *personal discipline*, and *physical fitness* (Campbell, 1990; Campbell et al., 1990). This model was derived from content analyses and principal component analyses of a large number of criterion scores for each job. This model was later expanded by Campbell et al. (1993) into an eight-dimension model that includes: *job-specific task proficiency*, *non-job-specific task proficiency*, *written and oral communication task proficiency*, *demonstrating effort*, *maintaining personal discipline*, *facilitating peer and team performance*, *supervision/leadership*, and *management/administration*. Campbell et al. (1993) believed that these eight factors can represent performance components at the highest level of abstraction and can adequately describe all jobs in the *Dictionary of Occupational Titles*[1].

While the earlier five-dimension model has been empirically validated (Campbell et al., 1990), empirical support for the eight-dimension model is sparse. Recently, Varela and Landis (2010) examined Campbell et al.'s (1993) factor structure through the use of the Generalised Work Activities (GMA) questionnaire,

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[1] Dictionary of Occupational Titles (DOT) was created by the U.S. Employment Service to compile thousands of occupational definitions to match job seekers to jobs. More details can be found at www.occupationalinfo.org. DOT was later substituted by Occupational Information Network (O*NET).

as provided by the Occupational Information Network (O*NET)[2]. Varela and Landis (2010), in two non-Western samples, found that the 8-factor model needs to be revised to a 10-dimension model. Specifically, they found that *job-specific tasks* and *non-job specific tasks* are too broad, and should be clarified by more specific constructs consisting of *work with people*, *work with data*, *design and create outputs*, *work with things*, and *mechanical office work*. However, even their revised 10-dimension model achieved only a moderate fit (e.g. CFI at about .80 and .85 in two studies, which is well below the standard acceptable cut-off of .95 (Hu & Bentler, 1999)).

Campbell and colleagues' performance taxonomy was essentially developed through a job analytic technique, as Campbell (1990) believed that the multiple dimensions of job performance are manifested in critical incidents analyses, task analyses, and other job analytical techniques. However, there are several problems associated with this approach. First, performance dimensions obtained from this method tend to differ from those obtained using other methods (Viswesvaran & Ones, 2000). Second, job analytical technique is essentially a job-centred approach that focuses on the past or the present, as it portrays how jobs have been done to date. Many researchers have pointed out that today's performance measures should be more person-centred rather than job-centred, and should be more future-oriented, to capture the dynamic and changing nature of job requirements (Dai, 2009; Milkovich & Boudreau, 1997; Tett et al., 2000). Clearly, the job analytical approach may not serve such purposes well.

2.3.2.2. Viswesvaran's lexical approach

A lexical approach towards job performance was adopted by Chockalingam Viswesvaran and colleagues (Viswesvaran, 1993; Viswesvaran, Ones, & Schmidt, 1996). This approach is comparable to the developmental process of the Big Five personality traits, which emerged from collating all personality-relevant adjectives in the English vocabulary (Saucier & Goldberg, 1996). Similarly, Viswesvaran and colleagues comprehensively examined all the measures of job performance being used in all published literature during the past 90 years. They extracted 486 performance constructs to comprehensively represent the vocabulary of the job

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[2] Information available at http://www.onetonline.org/

performance domain. They then grouped the large number of constructs into conceptually distinct categories, and established a 10-factor structure. Viswesvaran and colleagues believe that there is a strong general factor, the overall job performance, that stands at the highest-level and that explains substantial shared variance of specific performance factors (Viswesvaran, 1993; Viswesvaran et al., 2005). Apart from this general factor, they proposed 9 further distinct factors: *job performance/productivity*, *quality*, *leadership*, *communication competence*, *administrative competence*, *effort*, *interpersonal competence*, *job knowledge*, and *compliance with authority*.

2.3.2.3. Borman and Brush's mega-dimensions of managerial performance

To derive a generalisable and comprehensive list of managerial performance, Borman and Brush (1993) collected from both unpublished sources (e.g. from organisations and consultancies) and from published literatures of the managerial dimensions being used and studied. Their search included performance factors developed from a large array of methods, though particularly dominated by critical incident analysis. Based on 187 valid managerial dimensions collected from 26 independent sources, they invited a panel of experienced I/O psychologists to sort these dimensions into self-defined categories. Based on the results of sorting, they proposed 18 'mega-dimensions' that summarise the content of the 187 empirically found dimensions. They also compared the 18 factors to other factors found in earlier literature, and showed that this model was comprehensive enough to encompass the content of all the models. The 18 factors are listed in Table 2.1.

2.3.2.4. Tett et al.'s hyper-dimensions of managerial performance

A further attempt to look into managerial performance taxonomy was later conducted by Tett et al. (2000). The rationale for proposing a new model, as argued by Tett et al., was that earlier defined models contained much variability in content, complexity and population, and did not sufficiently capture managers' behavioural requirement with a future-oriented perspective. Tett and colleagues chose to use competencies as the focal construct to organise and compile data. They studied the performance dimensions addressed in the previously published studies, identifying 47 major competencies that can be grouped into 9 categories. They thus validated

and refined this grouping based on the results of competency sorting tasks, completed independently by a large number of subject matter experts. They finalised the model with 53 competencies, grouped into 9 'hyper-dimensions': *traditional functions*, *task orientation*, *person orientation*, *dependability*, *open mindedness*, *emotional control*, *communication*, *developing self and others*, and *occupational acumen and concerns.*

2.3.2.5. Bartram (2005)'s Great Eight performance framework

A similar approach to Tett et al.'s (2000) was adopted by Bartram and colleagues (Bartram, 2005; Bartram & Martin, 2003; Kurz, Bartram, & Baron, 2004) in developing their performance taxonomy, although Bartram and colleagues appeared to be more inclusive than Tett et al. in content selection. First, apart from those models appearing in the academic literature, they also included the competency models developed by practitioners, including those used at consultancies and corporate organisations in various industries. Second, they included models designed for both managerial and non-managerial positions, while Borman & Brush (1993) and Tett et al. (2000) only focused on the managerial population. Bartram and colleagues identified 112 competency components, and grouped them into 20 competency dimensions; further, these dimensions were subsumed to eight broad competency factors: *leading and deciding*, *supporting and coordinating*, *interacting and presenting*, *analysing and interpreting*, *creating and conceptualising*, *planning and executing*, *adapting and coping*, and *performing and enterprising.* During model development, the authors also explored the eight-factor structure using existing performance rating data collected on various competency instruments, so as to confirm the generalisability of this structure by using different performance measures and samples.

2.3.2.6. Performance taxonomy based on assessment centre data

To investigate the criterion-related validity of assessment centres, Arthur, Day, McNelly, and Edens (2003) performed a meta-analysis compiling past literature from academic journals as well as unpublished sources. They collected 168 assessment dimensions from 34 articles. They then invited experts to sort these dimensions into a more general level of 30 dimensions, and further down to seven

dimensions. These seven dimensions are: *communication*, *consideration/awareness of others*, *drive*, *influencing others*, *organising and planning*, *problem solving*, and *tolerance for stress/uncertainty*. It can be seen that several of these dimensions have overlapping themes to those developed for real work settings, such as *organising and planning* (comparable to Bartram's dimension of *organising and executing*), *communication* (comparable to Tett et al.'s and Viswesvaran's dimension of exactly the same heading), tolerance *for stress/uncertainty* (comparable to Bartram's *adapting and coping* and Tett et al.'s *emotional control*). Such a similarity suggests that models developed in assessment centre settings can be comparable to models developed for real work settings. However, it should be noted that the seven dimensions proposed here may not be sufficiently comprehensive to represent all assessment centre dimensions, due to the fact that Arthur et al.'s primary interest was to look for criterion-related validity, and may thus have excluded individual studies that did not satisfy the major purpose of their study.

2.3.2.7. Summary of performance taxonomies developed from the inductive approach

The above sections have listed the performance taxonomies developed from an inductive, bottom-up approach. It can be noticed that some recurring themes, such as communication, task orientation (job proficiency, executing, organising, planning, among others) and people orientation (considering others, facilitating others' work, coaching, motivating, among others) tend to be present in all proposed taxonomies. To a lesser degree, performance aspects such as problem solving (interpreting and analysing), emotional control (adapting, coping, handling and tolerating stress/uncertainty) and leadership are also repeatedly found in several taxonomies. This shows that certain convergence can be found and indicates the potential to integrate these different models.

Overall, the performance taxonomies summarised above were all derived from an inductive, bottom-up approach. They are all meta-analytical by nature and contribute to an exhaustive profiling and specification of the performance domain. Their developmental process either fully or partially relied on experts' subjective judgment in sorting and synthesising a large number of performance components into smaller number of categories. They differ primarily firstly, in terms of sources of

data: some relied on empirical data that were already in place (e.g. Campbell et al., 1993), some relied on psychological constructs available in the past academic literature (Tett et al., 2000; Viswesvaran, 1993), and some drew on both academic literature and unpublished studies (Arthur et al., 2003; Bartram, 2005; Borman & Brush, 1993); and second, in terms of the focal construct being studied: some focused more on job activities (Borman & Brush, 1993; Campbell et al., 1993) and others focused on competencies that are assortments of behaviours (Bartram, 2005; Tett et al., 2000). However, as a whole, they share an inductive feature, in the sense that they all drew on what already existed, and allowed performance themes to freely emerge, without imposing a strong theoretical framework onto the organisation of the data. This inductive nature is clearly distinguishable from the models developed from a conceptual- and theory-driven approach, which will be discussed in the next section.

Table 2.1. Performance taxonomies developed from an inductive, bottom-up approach

No	Author(s)	No. of Factors	Target Population	Proposed Performance Dimensions
1	Campbell, McCloy, Oppler & Sager (1993) Varela & Landis (2010)	8/10	General but originally derived from military sample	Written and oral communication proficiency Demonstrate effort Maintain personal discipline Facilitate others' performance Supervision/Leadership Management/Administration Job-specific task proficiency Non-job-specific task proficiency
2	Viswesvaran (1993) Viswesvaran, Ones & Schmidt (1996)	9 (excluding the overall performance factor)	General	Job performance/productivity Quality Leadership Communication competence Administrative competence Effort Interpersonal competence Job knowledge Compliance with authority
3	Borman & Brush (1993)	18	Managerial	Planning and organizing Guiding, directing and motivating subordinates Training, coaching and developing subordinates Communicating effectively Representing the organization to customers

				Technical proficiency
				Administration and paperwork
				Maintaining good working relationship
				Coordinating people/resources to get job done
				Decision making/problem solving
				Staffing
				Persisting to reach goals
				Handling crises and stress
				Organisational commitment
				Monitoring and controlling resources
				Delegating
				Selling/influencing
				Collecting and interpreting data
4	Tett, Guterman, Bleier & Murphy (2000)	9	Managerial	Traditional functions
				Task orientation
				Person orientation
				Dependability
				Open mindedness
				Emotional control
				Communication
				Developing self and others
				Occupational acumen and concerns
5	Bartram (2005) Kurz & Bartram (2002)	8	General	Leading and Deciding
				Supporting and Coordinating
				Interacting and Presenting

				Analysing and Interpreting Creating and Conceptualising Planning and Executing Adapting and Coping Performing and Enterprising
6	Arthur, Day, McNelly & Edens (2003)	7	General but based on assessment centre data	Communication Consideration/awareness of others Drive Influencing others Organising and planning Problem solving Tolerance for stress/uncertainty

2.3.3. Performance models developed from a deductive, top-down approach

2.3.3.1. Task versus contextual performance

2.3.3.1.1. Task – contextual dichotomy

The best widely known and most widely cited framework is perhaps the dichotomy of task and contextual performance. Borman and Motowildo (1993) challenged the fact that the previous literature focused mostly on those job activities directly contributing to an organisation's technical core, yet there are many other activities that go beyond these formally recognised parts of one's job and are nevertheless important for organisational effectiveness. They termed this aspect broadly as contextual performance, and clearly articulated its major differences from task performance. According to them, task performance depends on the nature of the technical core in each role, and thus differs across jobs. On the contrary, contextual performance falls outside the task domain, but contributes towards the social and organisational environments that are important catalysts for tasks to be completed; it is not explicitly described or enforced in one's formal roles and responsibilities, and is usually common to many job types. Further, Borman and Motowildo (1993) used contextual performance to summarise several related concepts, including: organisational citizenship behaviour (OCB, Organ, 1988), prosocial organisational behaviour (Brief & Motowidlo, 1986), organisational spontaneity (George & Brief, 1992), among others. Among these constructs, OCB has been most extensively studied. An earlier definition of OCB focused on discretionary helping behaviours that aid the functioning of the organisation (Organ, 1988), yet it was later redefined and clarified, to contain more or less the same meanings as contextual performance (Organ, 1997). Therefore, these two constructs now refer to the same concept, and can be used interchangeably (J. W. Johnson, 2003).

Apart from being conceptualised as distinct constructs, an empirical distinction between task and contextual performance has also been provided. Conway (1996) and Johnson (2001) used confirmatory factor analysis to show that the two factors are empirically distinguishable. Moreover, each of these two aspects can contribute uniquely and substantially to overall job performance, either based on ratings by direct supervisor at work (Borman, White, & Dorsey, 1995; MacKenzie,

Podsakoff, & Fetter, 1991; Motowidlo & Van Scotter, 1994), or using an experimental design by asking managers to rate hypothetical subordinates (Orr, Sackett, & Mercer, 1989; Werner, 1994). More evidence comes from research that links these two dimensions to different individual characteristics. Task performance seems to be better predicted by knowledge, skills and job experiences, whereas contextual performance is better predicted by dispositional variables (Motowidlo & Van Scotter, 1994). The differential prediction on performance factors is another focus of the current thesis, as will be discussed in more detail in the next literature chapter (Chapter 3).

2.3.3.1.2. Finer specification of the contextual domain

To further explicate the contextual performance domain, Van Scotter and Motowildo (1996) moved one step closer to uncovering its two distinct constituents, the interpersonal element and the motivational element. In particular, they defined these two elements as *interpersonal facilitation,* which focuses on cooperative behaviour in helping co-workers complete their tasks, and *job dedication*, which focuses on self-disciplined behaviours such as following rules and working hard. Their empirical study with air force mechanics supported the distinction between *task performance* and *interpersonal facilitation*, yet they failed to differentiate between *interpersonal facilitation* and *job dedication* after correcting for interrater reliability. They thus suggested that *job dedication* cannot be entirely separated from *task performance*, and recommended using the task – interpersonal dichotomy to replace the task – contextual dichotomy.

A further specification of the contextual domain was undertaken by Coleman and Borman (2000), who identified 27 behaviours of contextual performance based on the previous literature. These constructs were then sorted and grouped into a three-dimensional model, based on empirical data. Borman et al. (2001) further validated, refined and finalised this construct by delineating its three constituents, as follows: a) *personal support*, which addresses behaviours benefiting individuals in the organisation; b) *organisational support*, which addresses behaviours benefiting the organisation; and c) *conscientious initiative*, which addresses behaviours benefiting tasks and jobs, with extra-role behaviours being included. However, findings were inconclusive especially concerning the facet of *conscientiousness*

initiative. It was found to load strongly both on the task domain and the contextual domain (J. W. Johnson, 2001; Motowildo et al., 1997), and Johnson (2003) suggested that there was a possibility that it may be a measure of motivation, rather than a performance outcome.

Since the development of the task – contextual taxonomy, this has continuously served as a powerful model, which greatly advances our understanding of the performance domain. It provides a remarkably useful, explicit, and simple framework for organising the complex performance criteria domain. Moreover, this model greatly contributes to the prediction of performance, as predictors can now be more easily aligned to performance outcomes based on their conceptual congruence. This is especially useful for meta-analysis where a substantial and diverse body of research findings needs to be synthesised into a simple framework. Several well-established meta-analyses have used this model to organise multiple criterion measures (e.g. Dudley, Orvis, Lebiecki, & Cortina, 2006; Hurtz & Donovan, 2000).

2.3.3.1.3. Task – contextual dichotomy applied to managerial populations

Based on the task-contextual framework, Conway (1999) meta-analytically studied the structure of managerial performance. He suggested that managerial job roles include facilitating others to achieve goals, and thus the *interpersonal facilitation* aspect, which is one of the two facets of contextual performance according to Van Scotter and Motowildo (1996), may overlap with task performance for managers. Moreover, he proposed that managers' task performance should be differentiated according to two facets: a *technical-administrative* aspect of task performance that includes planning, organising, administration, business judgment and so forth, and a *leadership* aspect of task performance, which includes guiding, directing and motivating subordinates. His confirmatory factor analysis supported a four-factor structure.

A similar four-factor structure for managerial performance was examined by Scullen, Mount and Judge (2003). Based on the three-dimensional model (technical, human, and administrative/conceptual) proposed by Mann (1965) and Katz (1974) for evaluating managerial effectiveness, they included a fourth dimension of citizenship performance. They further hypothesised that these four dimensions may

be organised into two higher-order factors of task and contextual performance. Based on large datasets of 360-degree ratings of managerial performance from four rater groups' perspective (self, boss, peer and subordinates), they found that the four-factor structure fitted the data collected from different rater perspectives equally well. However, the proposition of positing task and contextual performance as two more higher-order dimensions beyond the four factors was not supported.

2.3.3.2. Extension of the task-contextual taxonomy

2.3.3.2.1. Adaptivity

One important extension to the task-contextual taxonomy was an inclusion of the 'adaptivity' aspect. Hesketh and Neal (1999) argued that Borman and Motowildo's (1993) two-dimensional model needs to be complemented with a third dimension of adaptive performance, as there is increasing demand for individuals to cope with changing job requirements arising from technological innovations. Allworth and Hesketh (1999) conceptualised adaptive performance as comprising two aspects: a cognitive component that relates to learning and problem-solving skills, and a non-cognitive component that relates to emotional adjustment and coping in changing contexts.

The existence of an adaptive performance aspect, and its distinction from earlier proposed performance factors, was recognised by Campbell (1999), who considered it necessary to add the adaptive element into his earlier model. Pulakos et al. (2000) looked more in-depth into adaptive performance and further established its conceptual meaning, content and structure. They proposed and tested an eight-dimension structure to represent this domain, which included one's ability in *handling emergencies or crisis*, *handling work stress*, *solving problems creatively*, *dealing with uncertain and unpredictable work situations*, *learning new tasks and technologies*, *demonstrating interpersonal adaptability*, *demonstrating cultural adaptability*, and *demonstrating physically oriented adaptability*. However, Johnson (2001) later commented that most of these factors can be grouped into either task or contextual performance; yet coping with change and self-directed learning in anticipation of change should be unique adaptive performance.

The inclusion of adaptive performance as a unique and important performance domain was formally proposed by Johnson (2003), who systematically summarised previously developed performance taxonomies and proposed an integrated model of job performance where task, contextual (citizenship) and adaptive performance were construed as the three highest-order factors.

2.3.3.2.2. Proactivity

Apart from adaptive performance, proactive behaviour has also gained increasing attention in recent years. The concept of proactivity is not new, as the discretionary part of organisational behaviour that goes beyond role prescription has already been mentioned decades ago (D. Katz, 1964; D. Katz & Kahn, 1978). Later, similar concepts such as non-prescribed behaviour, extra-role behaviour, and conscientious initiative, which address work behaviours such as taking initiative, spending extra effort, improving status quo, and developing oneself, have frequently appeared in the contextual performance literature (Borman, 2004; Borman et al., 2001; Orr et al., 1989; Van Scotter & Motowidlo, 1996; Werner, 1994). This active aspect of performance becomes increasingly warranted, as today's work context is becoming more fast-changing and competitive (Frese, 2008).

Recently, Griffin et al. (2007) proposed that proactive performance should be separately construed as a distinct performance factor, in addition to task performance (proficiency) and adaptive performance (adaptivity). Using both self- and supervisor-ratings, they showed that the three aspects, *proficiency*, *adaptivity*, and *proactivity* are structurally distinguishable factors, and are predicted by different individual characteristics. It may be noted that Griffin et al.'s three aspects did not directly tap all the components in the contextual (citizenship) performance domain. While the proactivity factor maps well onto the *conscientious initiative* facet, the other two facets *personal support* and *organisational support* of contextual performance were not directly represented. Indeed, these facets are encompassed in a less explicit manner. Griffin et al.'s original model not only assesses individual-level performance but also addresses individuals' contribution to team- and organisation-level performance. Specifically, they used a 3*3 matrix to cross-tabulate 3 levels (individual, team, and organisation) with the 3 performance dimensions (proficiency, adaptivity, and proactivity). In this way, the *personal support* and *organisational*

support elements can be embedded in the broader context of team- and organisation-level performance.

2.3.3.3. Performance models underpinned by other theories

While the majority of research efforts using the deductive approach have been devoted to task and contextual performance domains and in particular, the refinement of the contextual domain, it is also worthwhile recognising the existence of other conceptualisations of job performance frameworks.

Welbourne et al. (1998) argued for the need to better conceptualise job performance with stronger theoretical foundations. They explained the multidimensional nature of performance by role theory and identity theory, arguing that each employee is expected to take multiple roles at work. Their five performance factors are associated with the requirement of an employee's five roles: job, career, innovator, team member, and organisational citizen, and they found that the five-role structure can be well supported with samples collected from five different organisations. Although developed from a rather different approach, it is clear that Welbourne et al.'s five roles can be mapped onto factors in other models. For instance, job role relates well to the task or proficiency performance factor; organizational citizen role largely overlaps with the performance aspect of contextual performance (citizenship) performance, especially the facet of organisational support; innovator role can be partially addressed in the proactivity aspect; career-role may be blended in the concept of task performance (i.e. as a reward for task performance) and proactive performance (i.e. as initiative-taking in career planning and self-development); team-role can also be a blended concept as being relating to both task performance (i.e. team proficiency, M. A. Griffin et al., 2007) and the *interpersonal facilitation* aspect of contextual performance. Overall, there could be substantial overlap between Welbourne et al.'s model and other existing models.

Hogan and Holland (2003) adopted socioanalytical theory to distinguish different performance criteria. Socioanalytical theory concerns two basic human needs: a need for getting ahead to strive for better status, and a need for getting along with other members in groups (R. Hogan, 1983, 1991, 1996). For instance, the behaviour of coming to work early and staying late may represent an effort to get

ahead, and assisting co-workers may represent an attempt to get along. In a meta-analysis, Hogan and Holland (2003) categorised all performance outcomes into these two aspects. Although Hogan and Holland's main objective was to enhance personality – performance relationships rather than testing the appropriateness of the two-factor performance models, their categorisation of the performance domain brings in a unique perspective that looks for the implications of individuals' motives behind work behaviour. This perspective may be very useful given that behaviours are underpinned and driven by particular self-generated goals (Latham & Locke, 1991). This study will be further discussed in the next chapter about the prediction of performance.

Building on this *getting ahead* versus *getting along* dichotomy, Hogan and colleagues (R. Hogan & Bensen, 2009; R. Hogan & Kaiser, 2005; R. Hogan & Warrenfeltz, 2003) discussed its implication for measuring managerial effectiveness. They conceptualised that all leadership competencies can be organised into a four-domain model composed of: a) intrapersonal skill that is about regulating one's emotions and accommodating to authority; b) interpersonal skill that is about building and maintaining relationships; c) technical/business skill that is about planning and coordinating business activities; and d) leadership skill that is about building and motivating high-performing teams. Comparing this model to the four-factor model tested by Scullen et al. (2003) can lead to the conclusion that they had a lot in common. For instance, three of the four domains, interpersonal (human), technical, and leadership (administrative) are virtually identical in the two models. The only difference was between the intrapersonal aspect in Hogan and colleagues' model and the citizenship aspect in Scullen et al.'s model, although there could also be some degree of overlap between these two constructs, as they may share concepts such as controlling oneself, being dependable, and following directions and procedures.

Based on reviews of managerial work role requirements, Dierdorff, Rubin and Morgeson (2009) conceptually proposed a three-dimensional model for managerial performance. They grouped all previously developed managerial constructs into three role requirements: *conceptual*, *interpersonal*, and *technical/administrative*. The conceptual aspect focuses on knowledge, skills,

characteristics and behaviours associated with cognitive processes; the interpersonal aspect focuses on the ability to interact, influence and lead others; the technical/administrative factor focuses mostly on the operational and administrative aspect of business.

Using performance ratings collected from assessment centres, Kolk, Born and van der Filer (2004) proposed and tested a triadic taxonomy that seems rather similar to Dierdorff et al.'s (2009) three-dimensional model. Kolk et al.'s model is composed of three factors: *thinking*, *feeling*, and *power*. The thinking factor refers to the cognitive aspect of performance such as analytical thinking and making judgments; the feeling factor refers to the interpersonal aspect of performance including being sociable, sensitive to others' feelings, and cooperative; the power aspect relates to such abilities of giving direction, delegating and exerting control. Kolk et al. (2004) showed that this model relates well to other models such as Zand's (1997) triad leadership theories, and proved its excellent model fit with a large set of empirical data.

2.3.3.4. Summary of the models developed from the deductive approach

This above section summarises most if not all performance taxonomies developed from the top-down, inductive approach. The common theme here is that all of these models were developed conceptually, sometimes originating from established theories and later submitted to further empirical validation. As a result, there are strong scientific and academic implications associated with the models developed using this approach. Evident interconnection and continuity can be observed, such that later developed models usually built upon and extended earlier proposed models. For instance, numerous efforts were dedicated to the gradual refinement of the task – contextual dichotomy, and in particular, the enrichment of the contextual performance domain into unique and distinct facets.

Table 2.2. Performance taxonomies developed from a deductive, top-down approach

No	Author(s)	No. of Factors	Target Population	Proposed Performance Dimensions

1	Borman & Motowildo (1993, 1997)
	Van Scotter & Motowildo (1996)
	Coleman & Borman (2000)
	Borman, Buck et al. (2001)
	Borman (2004)
	Hogan et al. (1998)
		2	General	Task performance
				Contextual performance/Citizenship performance
				    Earlier (Van Scotter & Motowildo, 1996):
				    1) Interpersonal facilitation
				    2) Job dedication
				    Later (Coleman & Borman, 2000):
				    1) Personal support
				    2) Organisational support
				    3) Conscientious initiative

2	Conway (1999)	4	Managerial	Technical-Administrative task performance Leadership task performance Interpersonal facilitation Job dedication
3	Scullen, Mount & Judge (2003)	4	Managerial	Technical skills Administrative skills Human skills Citizenship behaviours
4	Allworth & Hesketh (1999) Johnson (2003)	3	General	Task performance Contextual performance/Citizenship Adaptive performance

5	Griffin, Neal & Parker (2007)	3	General	Proficiency Adaptivity Proactivity
6	Welbourne, Johnson & Erez (1998)	5	General	Job role Team role Innovator role Career role Organisational citizen role

7	Hogan & Holland (2003)
	Hogan & Warrenfelz (2003)
	Hogan & Kaiser (2005)
	Hogan & Benson (2009)
		2/4	General (with special attention on managerial)	Getting ahead
				  Leadership
				  Technical
				Getting along
				  Interpersonal
				  Intrapersonal

8	Dierdorff, Rubin & Morgeson (2009)	3	Managerial	Conceptual Interpersonal Technical/Administrative
9	Kolk et al. (2004)	3	General (mostly managerial and from assessment centre data)	Thinking Feeling Power

2.4. Discussion of the Two Approaches in Model Development

The above section has reviewed the performance taxonomies developed using the two approaches: the inductive approach which starts from existing data and moves upwards along the hierarchy to reveal the common themes that best explain these data, and the deductive approach which starts from conceptual and theoretical development, proposes models and subsequently tests them with deliberately collected data. Looking across and comparing models developed from these two approaches, I summarise the following characteristics, advantages and disadvantages associated with each approach. A summary of these observations are listed in Table 2.3.

First, models using the inductive approach appear to have great specificity, while models using the deductive approach usually contain more general and broad factors. The advantages of specific and general constructs have already been discussed in the past literature (J. W. Johnson, 2003; Ones & Viswesvaran, 1996; Tett et al., 2000). General constructs provide useful and convenient frameworks that are easier to manage and comprehend, and contribute more to the structural part of the validation. On the other hand, specific constructs can provide greater conceptual clarity and refined understanding about causes and effects.

The second point is related to the first. The different level of specificity and generality leads to a different number of factors being proposed in these two approaches. The deductively derived models tend to contain much fewer numbers of factors, typically between two to four, while the inductive approach usually gave rise to eight or more factors, sometimes as many as eighteen (e.g. Borman & Brush, 1993).

Third, the inductive approach is driven by the need to compile as comprehensive a list of performance constructs as possible, so as to encompass the entire content of the performance domain. On the contrary, scholars using the deductive approach are more interested in revealing a small, manageable number of general factors that can best represent the major constituents of the performance domain; whether these factors

provide an exhaustive account of the entire performance space is of relatively less concern.

Fourth, the objective of uncovering the entire performance domain and the sophisticated content analysis involved during model developmental process frequently led to solid content validity for the models developed from the inductive approach. Yet they are not necessarily accompanied with sufficient evidence about construct validity. On the other hand, the deductive approach tends to focus more on construct validity, and models developed with this approach are usually supported with solid evidence about its construct purity and the independence among its constituents. Confirmatory factor analysis, for instance, is frequently conducted, to ensure that the factors proposed in these models are empirically distinguishable from each other. Such efforts to validate constructs seem to be lacking with most models developed from the inductive approach.

Fifth, as has been pointed out by Kurz and Bartram (2002), performance models conceptualised at different level of differentiations suit different purposes between practitioners and academics. They argued that high-specificity models are more useful for practitioners to build behavioural anchors, construct test items and facilitate action planning for their clients, while high-generality models are more appropriate for academics who tend to focus on a small number of general dimensions so as to provide a parsimonious account of the domain. One interesting observation is that when the major research question is to examine the overall fit of certain performance models, or to build a linkage between the entire performance model and other psychological constructs, many scholars tend to factor analyse the multidimensional performance measures into simpler structures, be it task versus contextual dichotomy (e.g. Oh & Berry, 2009), or slightly more differentiated three- or four-factor structure (Scullen, Mount, & Goff, 2000; Scullen et al., 2003). This partially shows that high-specificity factors developed from the inductive approach may not be the best level of analysis for many research questions. These factors may not be empirically distinguishable, which casts doubt on construct validity. For instance, multicollinearity problems in fitting empirical data to hypothesised performance structures have been noticed by Campbell et al. (1990) and Viswesvaran et al. (2005). Varela and Landis's (2010) validation of Campbell et al.'s

(1993) model also yielded rather marginal fit, and they thus looked for alternative, higher-order structures.

Last, while the inductive approach generates a comprehensive list of performance constituents, these constituents may not be entirely applicable to all jobs; Campbell et al. (1993), for instance, have noted that some of their eight dimensions may not apply to certain jobs. On the contrary, the broad-brushed factors derived from the deductive approach are more generalisable across different job types and can thus provide more general understanding about work behaviours. For instance, the distinction between task and contextual performance can perhaps be applied to all jobs, as every job contains a core, well-defined, technical-oriented component and other components that are beyond formal role descriptions.

Table 2.3. Comparison of the inductive approach and deductive approach

	Inductive, bottom-up approach	Deductive, top-down approach
1	Great specificity (finer-grained)	Great generality (broad-brushed)
2	Larger number of factors	Smaller number of factors
3	Focus on the comprehensiveness of content (e.g. generating an exhaustive list of all dimensions)	Focus on uncovering the general themes and thus comprehensiveness is relatively less a concern
4	Solid evidence about content validity	Solid evidence about construct validity
5	Has stronger practical implications (better used in practice)	Has stronger academic implications (better used academically)
6	Some factors may not apply to all jobs	Generalisable across jobs

The comparison made here is based on a rather coarse categorisation of inductive and deductive approaches in model development. It is necessary to point out that these

two approaches can sometimes be used in a mixed way, so that different approaches are applied to different stages of model development. For instance, while the proposition of a task – contextual dichotomy was essentially based on a top-down, conceptually derived approach, the content of the contextual domain was discovered using a bottom-up approach by extensively compiling all relevant behavioural constructs and identifying common patterns from them (Borman et al., 2001; Coleman & Borman, 2000). Recognising the caution of positing these two approaches as being opposite to each other, I hope such a categorisation is legitimate for the purposes of this literature review, which focuses on the development of the entire performance taxonomies, rather than their specific components.

2.5. Unification of the Two Approaches

As can be seen from the above review, there are many performance taxonomies being developed, even just looking back 20 years and remaining within the selection boundaries I set at the beginning. While these efforts have greatly expanded our knowledge of the structure and content of the criterion domain, substantial differences can be observed in terms of how these taxonomies were developed and used. More importantly, there is little indication as to which of them is the best and most appropriate taxonomy to represent the criterion domain.

In the above discussion, I have shown a rough categorisation to organise these different performance taxonomies, based on the methodology by which they were originally developed. Recognising that models in the two categories each have their advantages and disadvantages, it will be useful to bring them together into a unified, integrated framework. Such an overarching framework can provide a useful reference for all researchers and practitioners to evaluate and position their selected performance criteria, and avoid potential confusion and misuse of performance measures.

2.5.1. Unification at the high-order level

A useful way to integrate taxonomies in these two categories is to conceptualise performance as a hierarchical structure, so that the higher-specificity models (derived from the inductive approach) can be subsumed below the high-generality models (developed from the deductive approach). The hierarchical nature of the performance construct is not a new concept. Kurz and Bartram (2002) have indicated that academically derived performance models (high-generality models) can stand at a higher level of abstraction, in comparison to the practically oriented models (high-specificity models). Johnson (2003) also used this hierarchy concept to propose an integrated performance framework, by placing factors of high-specificity models, such as Campbell et al.'s (1993), Tett et al.'s (2000), and Borman and Brush's (1993), at a level below three general factors: task, contextual (citizenship) and adaptive performance. However, it should be noted that Johnson's (2003) summary was based on the performance taxonomies developed up to early 2000s; therefore some other important aspects of performance that have been developed more recently, such as proactive performance, were not included. Moreover, Johnson's (2003) framework was based on conceptual mappings; thus it remains a question of whether the same three general factors as proposed by him, can emerge from empirical data.

Following the above logic, because taxonomies developed from the two approaches tend to stand at different level of abstraction in the hierarchical performance space, it is thus necessary to scale them onto the same level of abstraction, so that direct comparisons can be drawn and further integration can made. Given that inductively derived taxonomies have great specificity, they have the potential to be scaled into more general terms that are comparable with deductively derived taxonomies. Then, comparisons can be made between the two high-generality models developed from different approaches, and if agreement is reached, then our understanding about the hierarchical structure of the performance domain can be confirmed, and integration across all taxonomies can be supported.

2.5.2. Value of identifying high-order structure from inductively derived models

Apart from the potential value in contributing to the establishment of a unified and integrated performance framework, there are several other advantages of discovering the high-order structure from inductive taxonomies.

First, inductively derived performance taxonomies are usually guaranteed to have solid content validity, and can comprehensively describe almost all important content in the performance domain. Therefore, using them as a database to discover a higher-order structure can ensure the scope of coverage, so that no important performance constituents are left out.

Second, as mentioned before, inductively derived models have rarely been tested empirically. To the best of my knowledge, most of the models summarised in the inductive stream, as above, were not extensively investigated for their construct validity, and were not broadly used in academic literature. Perhaps the best exception was the 9-dimension, lexically developed model proposed by Viswesvaran (1993). This model was later applied to several of Viswesvaran's publications, but was still not systematically tested for construct validity. Rather, this model was used as the basis for meta-analytically addressing other issues in performance ratings, such as interrater reliability (Viswesvaran et al., 1996), congruence between supervisor and peer ratings and searching for a general performance factor (Viswesvaran et al., 2005), among others. Therefore, there is still sparse evidence in terms of the construct validity of these high-specificity performance models.

Without well-established construct validity, the broader use of inductively derived, high-specificity models is restricted, especially for academic purposes. In fact, it may be the case that multiple dimensions, as postulated in these high-specificity models, can hardly been found with empirical data, given that these many dimensions may not be easily distinguished with each other by individuals. Studies from assessment centre literature, for instance, have shown that this could be the case. Sagie and Magnezy (1997) found that managers cannot effectively differentiate as few as five performance dimensions, even after receiving assessor training. Lievens and Conway

(2001) summarised a set of assessment centre studies (N=34) and found that dimension variance can be increased by employing fewer performance dimensions to be rated against and by using psychologists rather than managers to provide ratings. Arthur et al.'s (2003) meta-analysis on assessment centres reiterated the need to establish discriminant validity of performance dimensions and showed that a small number of dimensions, such as three to five, may adequately explain the variance of performance criteria. These findings from assessment centre literature may be extended to speculation about performance ratings in real work settings, where individual performance is usually evaluated by supervisors who are not trained I/O psychologists. Therefore, it is perhaps even more difficult to achieve satisfactory differentiation on a large number of high-specificity performance dimensions.

Finally, the discovery of a higher-order structure from the inductively derived models would also have important practical values. As mentioned before, while these models have stronger practical implications and can provide a great detail of information about the individual being rated, it is perhaps also desirable if the multiple performance factors can be aggregated into a smaller number of more general dimensions. As Scullen et al. (2003) have pointed out, framing the multiple factors with a simpler structure may be more effective to project an overall profile about an individual, to deliver a simple and clear message to communicate with client, and to help organisations, HR managers and ratees more easily make sense of rating results.

2.5.3. Evidence of higher-order structure emerged from inductively derived models

There is some existing evidence to show how inductively derived, high-specificity models can be aggregated up the performance hierarchy and mapped onto more general models. This has been achieved either through conceptual sorting or through empirical data analysis, especially factor analytical techniques. However, agreement has yet to be reached concerning the most appropriate higher-order structure. Past research has shown that two-, three-, or four-factors are all possible higher-order structures.

2.5.3.1. Two higher-order factors: task and contextual performance

Campbell et al.'s (1993) eight-dimensional model can be grouped into two general high-order factors. Campbell et al. (1990) indicated that there are essentially two broad categories of factor with all army jobs, one being job-specific and the other being non-job-specific or army-wide. Further, Borman and Motowildo (1993) conceptually grouped Campbell's eight factors into two higher-order clusters: task and contextual performance. They suggested that five of Campbell's dimensions (*job-specific task proficiency*, *non-job-specific task proficiency*, *written and oral communication*, *supervision and leadership*, and *management and administration*) can be grouped into task performance, while the remaining three dimensions can be included in the contextual performance domain.

In proposing the Great Eight model, Bartram (2005) also indicated that his eight dimensions can be aggregated into domains at a more abstract level. He factor analysed the Great Eight dimensions using performance rating data gathered from a meta-analytical approach. Factor analysing the criterion domain (i.e. supervisor rated competencies) yielded a two-factor solution, which Bartram (2005) argued to broadly represent task and contextual performance. The task domain was highly loaded by five dimensions (*leading and deciding*, *analysing and interpreting*, *creating and conceptualising*, *organising and executing*, and *enterprising and performing*); the contextual domain was highly loaded by two dimensions (*supporting and cooperating* and *adapting and coping*). The third dimension (*interacting and presenting*) loaded highly on both domains.

2.5.3.2. Three higher-order factors

As mentioned before, conceptual mapping of multiple models onto a three-dimensional framework has been made by Johnson (2003), who organised previously developed performance taxonomies under three higher-order factors: task, contextual (citizenship), and adaptive performance. Moreover, Dierdorff et al. (2009) conceptually proposed a three-dimension model of conceptual, interpersonal and technical/administrative dimensions, and grouped all previously developed managerial taxonomies into these three dimensions.

There is also empirical evidence that the three factors are at the higher level of abstraction. Bartram (2005) used data collected from the predictor domain (self-reported personality and motivation, and assessed cognitive ability), mapped them onto the Great Eight factors and factor analysed these eight factors. His result yielded a three-factor solution. In comparison to the two-factor solution he obtained by using data from the criterion domain (supervisor ratings), *analysing & interpreting* and *organising & executing* seemed to be separate from the task domain, and formed the third factor. Although Bartram (2005) found this three-factor structure to be unclear and hard to explain, Kurz and colleagues (Kurz, Saville, MacIver, & Hopton, 2010; Kurz, Saville, & MacIver, 2011) argued that this structure can be well represented in their three-factor-effectiveness model, with the three effectiveness factors being named *demonstrate capability*, *work together*, and *promote change*, respectively. *Demonstrate capability* refers to the skills and capabilities in executing core tasks; *working together* refers to the more interpersonal and intrapersonal aspect of effectiveness, while *promote change* refers to driving success and creating innovation. A further piece of empirical evidence comes from Varela and Landis (2010), who validated a performance framework based on Campbell et al.'s (1993) eight-dimension model. They used multidimensional scaling to reveal three higher-order, non-orthogonal dimensions: *target-based* (physical efforts versus intellectual efforts), *hierarchical-based* (about controlling others versus operating on ones' own) and *integration-based* (intrapersonal versus interpersonal).

There are both similarities and discrepancies in terms of the three factors proposed above. For instance, in all these models there is a distinct task factor (*task* in Johnson's, technical/administrative in Dierdorff et al.'s, *demonstrate capability* in Kurz et al.'s, and *target-based* in Varela & Landis'). There is also a distinct interpersonal or citizenship factor (*citizenship* in Johnson's, *interpersonal* in Dierdorff et al.'s, *working together* in Kurz et al.'s, and *integration-based* in Varela & Landis'). A discrepancy exists in the third factor: it could either be adaptive-related (in Johnson's), proactive-related (*promote change* in Kurz et al.'s), cognitive-related (*conceptual* in Dierdorff et al.'s), or power-related (*hierarchical-based* in Varela & Landis').

2.5.3.3. Four higher-order factors

In proposing their 18-dimension managerial performance taxonomy, Borman and Brush (1993) indicated that these many dimensions can be grouped into a four-factor structure, including: a) interpersonal dealings and communications; b) leadership and supervision; c) technical activities and the mechanics of management; and d) useful personal behaviours and skills (e.g. job dedication).

As mentioned earlier (Section 2.3.3.3), Hogan and colleagues (R. Hogan & Bensen, 2009; R. Hogan & Kaiser, 2005; R. Hogan & Warrenfeltz, 2003) indicated that all existing leadership competency models can be summarised into four domains: intrapersonal skill, interpersonal skill, technical/business skill, and leadership skill. However, their proposition has not been empirically validated.

Though not designed to look for higher-order factors, Bartram (2009) proposed that the Great Eight framework may be used to reflect four major functions of leadership – the four leadership foci are: a *strategy* domain that focuses on developing visions and strategies; a *communication* domain that focuses on sharing goals; a *people* domain which addresses the need to gain support; and an *operational* domain which taps delivering success. Again, this mapping was provided conceptually rather than tested empirically.

Overall, the four-factor models proposed above tend to stay at the conceptual level, and are mainly drawn from performance taxonomies designed for the managerial population, rather than for general employees. There are both overlaps and discrepancies in the content of the four factors being proposed in the different models. There is a distinct task (technical, operational) factor, a distinct interpersonal factor and often, a distinct leadership factor. However, the fourth factor seems less consistent among scholars; it may be intrapersonal related (Hogan and colleagues), citizenship related (Borman & Brush, 1993; Conway, 1999) or communication related (Bartram, 2009).

2.5.3.4. Summary of higher-order factors

As discussed above, there is the possibility of two, three or four factors existing at the higher-level, beyond the inductively derived performance models. A summary of

these observations is shown in Table 2.4. While it is still unclear as to what is the best number of higher-order factors, some recent evidence has shown that more differentiated models may explain empirical data better than less differentiated ones. Scullen et al. (2003) showed that a four-factor structure (technical, administrative, human, citizenship) explained 360-degree performance ratings better than a three-factor one, in which *human performance* and *citizenship performance* are combined. Kolk et al. (2004) showed that with assessment centre data, a three-factor solution of *thinking*, *feeling*, and *power* explains empirical data better than the two-factor solution of *feeling* and *thinking*. Such evidence indicates the need to go beyond the simple task – contextual (interpersonal) dichotomy.

Table 2.4. Summary of higher-order performance structure emerging from high-specificity models

	2 Factors	3 Factors	4 Factors
1	Task	Task	Task/Technical/Operational
2	Contextual (citizenship)	Interpersonal/Citizenship	Interpersonal
3	---	Adaptive? Proactive? Power/Leadership? Conceptual?	Leadership? Conceptual (strategy)?
4	---	---	Citizenship? Intrapersonal? Communication?

2.6. Conclusion

This chapter has reviewed the conceptualisation and measurement of individual job performance, with particular attention given to the psychological perspective on

performance. By reviewing the performance taxonomies during the past two decades, I noticed that there were large discrepancies in terms of the structure and content of the performance domain. Such a lack of agreement is troublesome, given that performance is one of the most important constructs in our area.

I organised my review of performance taxonomies based on the two approaches in which these taxonomies were developed: inductively derived and deductively derived. These two approaches tend to produce performance taxonomies with contrasting features, with the most notable difference being their level of specificity. I proposed that integration across various taxonomies can be achieved by scaling inductive-derived, high-specificity taxonomies to the more general level of measurement, so that they can be directly compared to deductively derived taxonomies. In the empirical section of this thesis, I will attempt to do so by exploring the high-order performance structure of the Great Eight taxonomy as inductively developed by Bartram (2005), and link this structure to the deductively derived three-factor taxonomy proposed by Griffin et al. (2007). More detailed discussion about the rationale of choosing these taxonomies are discussed in Chapter 5.

Having discussed and clarified the conceptualisation and measurement of the performance domain, I will now turn to the issue of predicting performance in the next chapter.

CHAPTER 3: LITERATURE REVIEW II

LINKING PERFORMANCE TAXONOMY TO THE BIG FIVE PERSONALITY TRAITS:

USING CRITERION-CENTRIC APPROACH TO ESTABLISH A NOMOLOGICAL NET

3.1. Overview

The previous chapter reviewed and discussed the past literature on the conceptualisation of individual job performance. I concluded that, we first need to adopt a psychological definition to capture the complex, multidimensional nature of work performance; and second, we need to establish unification among various performance taxonomies that have been developed, so that we could have a commonly agreed understanding about the content and structure of the criterion domain. In particular, I propose looking for a high-order performance taxonomy as a potential way to unify performance taxonomies developed from two different approaches, the inductive approach and the deductive approach. The establishment of a clearly articulated and commonly agreed performance framework can help us make more accurate predictions, an aim that is of central importance in industrial and organisational psychology (Campbell, 1990; Hough, 2001; Schneider & Hough, 1995). In this second literature chapter, I thus turn to the predictor end of the predictor – criterion equation by looking into the psychological antecedents of work performance.

So as to identify the psychological antecedents for factors of the high-order performance structure, I reiterate the importance of establishing a nomological net that can link criterion taxonomy to taxonomies in the predictor space, a proposal raised by Schneider and Hough (1995). In this thesis, I focus on personality traits in the predictor space, given that personality traits have been suggested as being meaningful predictors of work performance (Barrick & Mount, 1991; Barrick, Mount, & Judge, 2001; Bartram, 2005; J. Hogan & Holland, 2003; Hough, 1992; Hurtz & Donovan, 2000; F. L. Schmidt

& Hunter, 1998; Tett, Jackson, & Rothstein, 1991), and that a well-established personality taxonomy, the Big Five framework, is already in place to provide a good basis for investigating conceptual and empirical linkage with the high-order performance taxonomy. In this chapter, I begin by briefly introducing personality assessment and the Big Five framework, and will summarise the findings from several seminal meta-analyses that demonstrate the validity of the Big Five in predicting individual work performance. From this summary, I notice that only some of the meta-analysis attempts adopted a psychological, rather than economic perspective in measuring performance. I reiterate the need to take the psychological perspective, but this time from the viewpoint of making more accurate predictions. I then use the criterion-centric perspective to look through the performance taxonomies as reviewed in the previous chapter, so as to identify the personality antecedents that have been found to predict factors in the performance taxonomies. This review shows that insufficient has been done to inform us about the nomological net that links the Big Five personality taxonomy and performance taxonomies. I will conclude this chapter with a set of research questions to be empirically addressed in this thesis.

3.2. Introduction to Personality Assessment and the Big Five

Personality has had a long history of being used in personnel selection, dating back to the selection of U.S. army forces during the world war period (Furnham, 2008; R. Hogan, 2007; R. M. Kaplan & Saccuzzo, 2008; Weiner & Greene, 2007). Since then, its popularity has grown significantly, and it is now widely used in many organisations around the world. In the U.S., for instance, personality testing is a $400 million industry, and at least 30% of all U.S. organisations use personality tests for hiring or related practices (Paul, 2004). In the U.K., the annual survey of the Chartered Institute of Personnel and Development in 2009 reported that 35% of organisations use personality testing as a selection method (CIPD, 2009). In Australia, between 20% and 30% organisations have used some sort of personality assessment in human resource selection

(Di Milia, 2004), and that about 40% of Australian organisations use personality tests in graduate selection (Carless, 2007).

The widespread use of personality assessment is mainly due to the recent empirical evidence that personality traits are useful and important predictors of individual work performance. Although general mental ability has occupied a central role in the predictor space for many years, studies over the past two decades have shown that individual difference in personality can contribute unique and incremental validity in predicting work performance. For instance, in the seminal meta-analysis conducted by Schmitt and Hunter (1998) in which multiple selection methods were compared, the authors found that beyond general mental ability (GMA), personality-related variables such as integrity and conscientiousness displayed a good level of incremental validity in predicting actual job performance (.14 and .09 respectively), and by using personality in combination with cognitive test, predictive validity on work performance can be enhanced to as high as .65. There is also evidence that when the criterion is measured by subjective ratings, personality ($r = .206$) and cognitive ability ($r = .220$) predicted almost equally well (Schmitt, Gooding, Noe, & Kirsch, 1984). A recent meta-analysis by Bartram (2005) provided further evidence that personality contributes unique and incremental validities above cognitive ability. By using the Great Eight performance taxonomy, Bartram (2005) showed that personality traits predicted all eight performance dimensions; more importantly, personality predicted some performance dimensions much better than cognitive ability did, especially on those less task-oriented dimensions such as *leading and deciding*, *supporting and cooperating*, and *enterprising and performing*. Therefore, scholars to date have generally agreed that personality characteristics can consistently relate to job performance, and can make a worthwhile contribution to predicting individuals' likelihood of success on the job (Landy, Shankster, & Kohler, 1994; Muchinsky, 1993; K. R. Murphy & Bartram, 2002).

A major reason that facilitates scholars' investigation on personality as predictors of performance lies in the emergence of a useful personality taxonomy, the Big Five personality framework that was developed and established in early 1990s (Digman, 1990; Funder, 1994; Goldberg, 1990, 1993; McCrae & Costa, 1990). The Big Five, which is

frequently mentioned as bringing about the renaissance of personality research (e.g. Barrick & Ryan, 2003; Kroeck & Brown, 2003; Viswesvaran & Ones, 2010), has resulted in widely burgeoning research activities that continue until today.

The Big Five personality framework was developed from a lexical approach based on many years of exhaustive review and compilation of personality-related adjectives in English dictionary, and then facilitated by the advancement of factor reduction techniques in identifying common themes from large volume of words (Allport & Odbert, 1936; Cattell, 1943, 1945; Fiske, 1949; Galton, 1884; Norman, 1963, 1967; Tupes & Christal, 1992). These longitudinal joint efforts have led to the conclusion that five stable high-order factors, namely extraversion, agreeableness, openness to experience, conscientiousness and emotional stability (or negative neuroticism), can sufficiently describe all English words relating to an individuals' stable characteristics in behavioural tendencies and preferences, and can thus well represent the entire domain of personality. Since the establishment of this general theoretical framework, researchers have extended their investigation into different cultural settings, so as to look for cross-cultural generalisability of the same Big Five structure. Support of the same structure has been found from many different countries worldwide (McCrae & Antonio, 2005; McCrae & Costa Jr., 1997).

3.3. Big Five Personality and Performance: Evidence from Meta-analyses

The Big Five personality framework is a solidly established and commonly agreed taxonomy in the predictor space. Following the development of this model, several important meta-analyses that link the Big Five to work performance outcomes have been published since 1990s (Barrick & Mount, 1991; Barrick et al., 2001; Bartram, 2005; J. Hogan & Holland, 2003; Hough, 1992; Hurtz & Donovan, 2000; Salgado, 1997; Tett et al., 1991). In employing the entire personality taxonomy, these studies provide a comprehensive overview of the validity of personality, and generate reassuring evidence that personality traits can reliably and consistently predict work performance across

occupational contexts. In this section, I will briefly review these studies and summarise their findings.

Before presenting these studies, it should first be noted that this is not an exhaustive summary of meta-analysis on personality traits and work performance. I include only those studies that focus on the entire Big Five-related dimensions, and on assessing either global performance or the entire taxonomies of performance. This provides a holistic picture of the relationship between the personality space and performance space. Accordingly, this excludes the following types of meta-analyses: 1) those focusing on only one personality domain such as conscientiousness or integrity (Dudley et al., 2006; Mount & Barrick, 1995; Ones, Viswesvaran, & Schmidt, 1993); 2) those failing to organise the personality scales based on the Big Five structure (e.g. McHenry, Hough, Toquam, Hanson, & Ashworth, 1990; Robertson & Kinder, 1993); 3) those focusing on only one specific factor of the criterion space such as organisational citizenship behaviour (Chiaburu, Oh, Berry, Li, & Gardner, in press; Organ & Ryan, 1995); 4) those focusing on the performance of a particular type of job, such as jobs involving interpersonal interaction (Mount, Barrick, & Stewart, 1998). However, it should also be pointed out that despite these exclusions, some of them were taken into account in Barrick et al.'s (2001) second-order meta-analysis, which is a meta-analysis of previous meta-analyses. Since Barrick et al.'s (2001) study is included in this current review, the results from some of those excluded studies are still represented here.

3.3.1. Review of meta-analysis of Big Five personality and performance

Table 3.1 presents a summary of perhaps the best known meta-analyses in which comprehensive reviews concerning the entire Big Five personality dimensions and the entire performance domain were conducted. A review of these studies led me to organise them into two major types of meta-analysis, based on the different criteria being employed. One type involves the use of global- and/or composite-level performance criteria, which have been argued in the previous chapter as being economic oriented criteria. The other type involves the use of specific, behaviour-oriented performance criteria that fit better with the psychological definition of performance. The results associated with each of the two types of meta-analyses are discussed as follows.

3.3.1.1. Meta-analyses using economic oriented performance

The first type that uses global and/or composite performance as the criterion is mainly constituted by earlier meta-analyses conducted during the 1990s. These studies usually use several global or composite criteria to measure performance outcomes. For instance, Barrick and Mount (1991) and Salgado (1997) separately reported the validities for job proficiency, training performance, personnel data, and Tett et al. (1991) simply organised performance outcomes into subjective performance and objective performance. These criteria are very broad and coarse categories, and do not consider partitioning performance into different components.

These studies frequently report overall validity coefficients for each of the Big Five traits, which is useful for us to derive a general picture about the value of each trait. For instance, a major conclusion from these studies is that conscientiousness is the most useful trait in relating to job performance, with most meta-analyses reporting validities at above .20 after correcting for various measurement and sampling errors. Emotional stability and extraversion have also been shown to relate relatively consistently with job performance, although with a smaller magnitude, such that most corrected validities are in the range of .10 to .20. The predictive validities of agreeableness and openness to experience seem less consistently found than other traits. While Tett et al.'s (1991) summary of theory-derived, confirmatory-type of studies suggested that these two traits have the highest validity among all Big Five dimensions, such a result was not replicated in other meta-analyses. Barrick et al.'s (2001) second-order meta-analysis shows that the type of criterion being chosen has important implications for validities of these two traits. Openness to experience has a strong relationship with training performance (.33 for estimated true correlation at the construct level) but not for objective performance data (.03). Agreeableness has a strong relationship with teamwork (.34 for estimated true correlation at the construct level) but less so for supervisor ratings of performance (.13).

3.3.1.2. Meta-analyses using psychological oriented performance

The second type of meta-analysis better endorses the psychological perspective of job performance, which has been argued in the previous chapter as the more desirable approach to study performance. Meta-analyses of this type were all conducted after the 2000s except Hough's (1992) study. This type of studies tends to include multiple behaviour-oriented performance factors, and frequently uses well established performance taxonomies to represent the entire criterion space. These studies are separately reviewed as follows.

Hough's (1992) study was perhaps one of the earliest attempts to bring the psychological definition of performance into meta-analysing the validity of personality. She found that personality traits related to different performance factors in rather different manners, such that validity coefficients of the same trait spread over a large range and can sometimes differ in direction, where a different performance factor is targeted. This demonstrates the need to use differentiated performance in researching the validity of personality, rather than to lump various performance components into global or composite criteria. While this pioneering study is an important first step in achieving a more refined understanding of personality – performance relationships, its limitations should also be noted. In particular, there was no detailed report about the psychometric properties of the performance taxonomy being used. It can also be noted that some factors in her taxonomy were not behaviour-oriented representations of certain performance aspects, but rather, global performance measures for specific occupational groups. This includes factors such as *sales effectiveness* and *combat effectiveness*.

Hurtz and Donovan (2000) adopted the well-established task – contextual performance framework developed by Borman, Motowildo and colleagues (Borman & Motowidlo, 1993; Motowidlo & Van Scotter, 1994; Van Scotter & Motowidlo, 1996), and reported the validities of the Big Five traits in relation to each of the three high-order performance factors: task performance, job dedication, and interpersonal facilitation. Their findings showed that the validities for each of the Big Five traits indeed differ across the different performance outcomes, although conscientiousness and emotional stability had prevalent relationships with all three performance factors.

Hogan and Holland (2003) used socio-analytical theory to differentiate two major types of human motives: getting ahead and getting along, and argued that all performance criteria can be categorised into behaviours underpinned by these two motives. They conducted a meta-analysis of 43 validation studies that used the Hogan Personality Inventory (HPI, R. Hogan & Hogan, 1992) and found that these two types of behaviours are, indeed, predicted by different personality traits. For instance, agreeableness (as measured by interpersonal sensitivity) is more strongly related to the behaviours of *getting along* (corrected $r = .23$) than *getting ahead* (corrected $r = .11$) while the ambition facet of extraversion is more strongly related to *getting ahead* (corrected $r = .26$) rather than *getting along* (corrected $r = .17$). However, there is also a pattern consistent with the results found in Hurtz and Donovan's (2000) and other earlier meta-analysis, such that conscientiousness (as measured by prudence) and emotional stability (as measured by adjustment) are the best predictors of both performance outcomes.

Bartram (2005) developed a well differentiated Great Eight performance taxonomy to represent the structure of the criterion space; moreover, he proposed conceptual linkages between the Big Five and the eight performance dimensions, such that some traits are proposed to link to only performance dimensions but not to others. Using the 29 studies in which Occupational Personality Questionnaire was used to measure personality and by organising performance ratings into the eight dimensions, Bartram (2005) found that the personality trait – performance dimension relationship was in accordance with the conceptual linkage, such that the conceptually aligned relationships were much stronger than the conceptually non-aligned relationships. For instance, as can be seen in the last row of Table 3.1, openness to experience related most strongly to the conceptually related performance factor of *creating and conceptualising* (observed $r = .13$) and *analysing and interpreting* (observed $r = .09$), yet it correlated almost zero with the remaining six dimensions.

3.3.2. Summary of meta-analysis results

Overall, the above reviewed meta-analyses show that personality traits as measured by the Big Five structure offer meaningful predictions on performance

outcomes. In particular, conscientiousness has the most consistent relationship with performance across multiple meta-analyses. What is more important in these studies is that the type of performance criterion being compared against has important implications for the validity of the Big Five traits. While some traits such as conscientiousness may be generally more useful than others in predicting job performance, when we take the psychological perspective towards performance, we tend to find that different behavioural aspects are predicted by different personality traits. This psychological perspective was rarely taken into account in earlier conducted meta-analyses, possibly due to the fact that fine specification of the performance domain was not made until early 1990s (see Section 2.3). Since then, the refined understanding of the structure of job performance has led to much better synergy between the Big Five personality structure and performance structure in more recent meta-analyses. Such a move away from a great reliance on global or composite performance measures in validation research is an important step in advancing our understanding of the relationship between personality and work performance.

Table 3.1. Big Five personality and work performance: Summary of meta-analysis results

Author	Criteria included	Extraversion		Openness		Agreeableness		Conscientiousness		Emotional stability	
		Obs r	Cor r	Obs r	Cor r	Obs r	Cor r	Obs r	Cor r	Obs r	Cor r
Using Global Performance											
Barrick & Mount (1991)	Job proficiency Training proficiency Personnel data	.08	.13	.03	.04	.04	.07	.13	.22	.05	.08
Tett et al. (1991)[b]	Subjective Objective	.10	.15	.18	.27	.22	.33	.12	.18	.15	.22
Salgado (1997)	Performance rating Training performance rating Personnel data	.05	.12	.04	.09	.01	.02	.10	.25	.09	.19
Barrick et al. (2001)[c]	Supervisor ratings Objective performance Training performance Teamwork	.06−.13	.13−.28	.02−.14	.03−.33	.06−.17	.13−.34	.10−.15	.23−.31	.05−.13	.08−.22
Using Specific Performance											
Hough (1992)[d]	Overall performance	0.2 & .09		.01		.04		.19 & .07		.11	
	Technical proficiency	.06 & .02		.16		.02		.02 & .05		.05	
	Irresponsible behaviour[e]	.01 & -.06		-.15		-.08		-.19 & -.24		-.15	
	Sales effectiveness	.19 & .25	N/A	.15	N/A	N/A	N/A	.27 & .06	N/A	.18	N/A
	Creativity	-.25 & .21		.07		-.29		.14 & -.07		-.05	
	Teamwork	N/A & .08		.11		.17		.14 & .17		.13	
	Effort	.00 & .17		.11		.15		.21 & .14		.16	

Source	Criterion									
	Combat effectiveness	-.02 & .08		-.07		-.04		.13 & .08		.19	
Hurtz & Donovan (2000)	Aggregated performance	.06	.10	.04	.07	.07	.13	.14	.22	.09	.14
	Task performance	.04	.07	-.01	-.01	.05	.08	.10	.16	.09	.14
	Job dedication	.03	.05	.01	.01	.06	.10	.12	.20	.09	.14
	Interpersonal facilitation	.06	.11	.03	.05	.11	.20	.11	.18	.10	.17
Hogan & Holland (2003)[f]	Getting along	.10 & .01	.17 & .01	.02 & .08	.03 & .12	.12	.23	.14	.31	.19	.34
	Getting ahead	.15 &.02	.26 &.04	.07 & .09	.12 & .15	.09	.11	.12	.20	.14	.22
Bartram (2005)	Leading & Deciding	.09		.01		-.01		.00		.01	
	Supporting & Cooperating	.06		-.03		.09		-.06		.01	
	Interacting & Presenting	.18		.04		-.05		-.07		.01	
	Analysing & Interpreting	.00		.09		-.06		.06		.00	
	Creating & Conceptualising	.07	N/A	.13	N/A	-.08	N/A	-.06	N/A	.02	N/A
	Organising & Executing	-.05		-.02		-.01		.15		-.04	
	Adapting & Coping	.00		-.02		.01		-.03		.09	
	Enterprising & Performing	.09		-.01		-.07		-.01		.02	

Note:

a) obs *r* = observed correlation; cor *r* = correlation corrected for sampling error, range restriction, and unreliability of criterion as well as of predictor;

b) only Tett et al. (1991)'s results are based on confirmatory analysis;

c) Barrick et al. (2001) is a meta-meta-analysis based on all past meta-analyses;

d) Hough (1992) used an extended categorisation of Big Five such that extraversion is split into two dimensions of affiliation (before &) and potency (after &), and conscientiousness is split into two dimensions of achievement (before &) and dependability (after &);

e) The validity for 'Irresponsible behaviour' was reversed in this summary, due to that all other constructs except this address desirable behaviour;

f) Hogan and Holland (2003) used extended categorisation of Big Five such that extraversion is split into two dimensions of ambition (before &) and sociability (after &), and openness to experience is split into two dimensions of intellectance (before &) and school success (after &).

3.4. The Needed Approaches for Predicting Performance

3.4.1. Focusing on specific performance

The previous chapter discussed the fact that the economic and psychological definitions of performance lead to two different ways of operationalising the measurement of performance; that is, performance is either measured by global, composite measures or by specific, behaviour-oriented factors. While global or composite measures of job performance can be of useful economic value in assisting personnel decisions, they are amalgamated, insensitive measures, and as such, they do not contain sufficient psychologically meaningful information (Bartram et al., 2010), and that they are highly situation-dependent since different behaviours are valued in different job and organisational contexts (Bartram et al., 2010; Binning & Barrett, 1989; Conway, 1999; Mitchell, 1983; Motowildo et al., 1997; Robertson & Kinder, 1993; Tett & Burnett, 2003). The complex nature of global-level performance measures, indeed, makes it problematic to use it as the criterion on which predictions need to be made. This is due to the fact that using s global/composite performance will obscure the true relationships between each specific predictor and each specific behavioural factor (Hough, 2001). As shown in the meta-analyses reported in the previous section, different aspects of performance are frequently preceded by different Big Five personality traits, and such a differentiation is unable to be made if we only use heterogeneous overall performance measures. Moreover, as different behaviours are judged to be beneficial to overall performance in different organisational contexts, a generalisable and consistent pattern of the relationships between predictors and performance cannot readily be defined using global performance. Therefore, in order to make more accurate and generalisable predictions of performance, we need to focus on using more psychologically meaningful measures, which tap specific performance aspects.

It has also been suggested in the previous chapter that specific performance, which are factors of performance taxonomies, and global performance, can be considered to form a two-stage process such that specific performance is the

intermediate criterion while global performance is the ultimate criterion (Bartram et al., 2010; Binning & Barrett, 1989; Vallance et al., 1953). Such a conceptualisation suggests that in predicting these two types of performance, specific performance is the more proximal criterion in relation to predictors, while global performance stands at a more remote position. Such a difference in proximity to predictors also indicates that specific performance, rather than global performance, is more easily and directly predictable. This process view of prediction will be empirically investigated in this thesis (in Chapter 6).

3.4.2. Establishing a nomological net

The use of psychologically oriented performance as a criterion is also important for the purposes of drawing a clear conceptual linkage between predictor constructs and criterion constructs. Such a request to take construct-oriented thinking to conceptually align predictors and criteria has been reiterated by many scholars (Bartram, 2005; Borman & Motowidlo, 1997; Campbell, 1990; Guion & Gottier, 1965; Hough, 2001; Mount & Barrick, 1995; Schneider & Hough, 1995; Schneider, Hough, & Dunnette, 1996; Smith, 1976). Schneider and Hough (1995) made it most explicit that a construct-oriented approach is needed when exploring personality – performance relationships, such that it is important to specify 'a personality taxonomy, a performance taxonomy, and a nomological net that links them' (p. 87). With the establishment of this nomological net, researchers will be able to draw up informed hypotheses for testing and validating relationships between specific personality traits and specific performance criteria, rather than using 'broadside' approach that blindly relates all predictors to all criteria without the presence of theoretically meaningful linkages (Guion & Gottier, 1965; Schneider & Hough, 1995).

Using such a nomological net to make theoretically informed predictions can lead to validity gains in relating personality predictors to performance outcomes. Tett et al.'s (1991) meta-analysis showed that personality validities are higher in confirmatory type of studies where *a priori* defined relationships are validated, than in exploratory type of studies that do not have hypothesised relationships. Pulakos, Borman and Hough

(1988) and Morgeson et al. (2007) also suggested that more effective predictions occur when predictors are selected and linked to criteria in a face-valid manner.

In stressing the importance of the logical overlap between predictor and criterion, Warr (1999) proposed a method to identify the extent of linkage between personality attributes and job performance. He illustrated this method through the use of the Occupational Personality Questionnaire (OPQ), a well-established personality measure, and Inventory of Management Competencies (IMC) that measures managerial performance. By asking subject matter experts to rate how each scale in the OPQ is concordant with each scale in the IMC, he established a concordance matrix between the two measures. He then compared this concordance matrix with data empirically collected, and found that the association between self-reports of personality and supervisor-ratings of behaviours relates to the degree of *a priori* defined conceptual concordance between these two sets of constructs. For instance, the absolute mean correlation between personality traits and performance constructs was .02 when the personality – performance pairs had zero conceptual concordance, but can be as high as .25 for those pairs that had highest conceptual concordance. Such findings empirically support the value of establishing a 'concordance matrix' or 'nomological net' so as to provide theoretical guidance for testing personality – performance relationships.

3.4.3. Taking a criterion-centric perspective

The traditional approach to validation has centred on predictors, such that the majority of emphasis has been given to exploring the nature, definition and structure of the predictor space, such as the personality construct. In comparison, much less attention has been accorded to the criterion space until recent decades. As a result of this unbalanced efforts at the two ends of the predictor – criterion equation, we cannot effectively build meaningful linkage to map out the nomological net. As noted by some scholars, 'much of the battle has to be fought on the criterion side of the prediction equation' (Morgeson et al., 2007, p. 710).

A more desirable approach, therefore, is to take a 'criterion-centric' perspective as proposed by Bartram (2005), which stresses the shift from predictors towards what

we are predicting – the criterion. This perspective requests that we begin our investigation from the criterion space, and then work backwards to reveal the predictors in relation to criteria, rather than starting from the predictors such as the Big Five and then looking for their predictive validity. Such a re-focusing on criteria is a legitimate shift of mindset, as our final goal is to accurately predict performance outcomes.

The previous chapter presented the attempt to stress the importance of the criterion space, by reviewing previously developed performance taxonomies and conceptually synthesising the various frameworks. Here, I will bring in personality and review personality antecedents for factors of the performance taxonomies.

3.5. Personality and Specific Performance: A Criterion- and Construct-Centric Review

In this section, I take the construct- and criterion-oriented perspective to briefly review past efforts that disentangled the personality predictors for variables in performance taxonomies. This review provides a basis for identifying the nomological net between personality and performance. This review is built upon the performance taxonomies as reviewed in the previous chapter (in Section 2.3) such that I report here only those taxonomies for which personality antecedents have been proposed and tested.

This review is summarised in Table 3.2, and a brief discussion for each of the listed studies is provided as follows. As can be noted, in comparison to the greater number of performance taxonomies being proposed (Table 2.1 and 2.2 in Chapter 2), only a small fraction of them has been accompanied with efforts in revealing the personality antecedents. Three of these included studies (Bartram, 2005; J. Hogan & Holland, 2003; Hurtz & Donovan, 2000) have been reported in the previous summary of meta-analysis (Table 3.1), yet the focus of this section is to look for an alignment between predictor constructs and criterion constructs, rather than revealing the magnitude of predictive validity.

3.5.1. Implications from the Project A

The first piece of evidence in aligning personality antecedents and factor of a performance taxonomy comes from Project A, a large-scale project conducted in the U.S. Army which links a complete list of predictors, including skills, cognitive ability, personality, vocational interests and job preferences, among many others, to five broad performance constructs (Hough, Eaton, Dunnette, Kamp, & McCloy, 1990; McHenry et al., 1990). Their five-dimension taxonomy is the earlier version of Campbell et al.'s (1993) eight-dimension taxonomy as reviewed in Section 2.3.2.

This project used the Assessment of Background and Life Experiences (ABLE) to measure 11 temperament/personality traits, based on which four major personality composite scores were computed: achievement orientation, dependability, adjustment and physical condition. In McHenry et al.'s (1990) systematic report of all predictor – criterion relationships, the authors found that all five performance factors can be predicted by an aggregation of all personality attributes, although with varying magnitude. *Effort and leadership*, *personal discipline*, and *physical fitness and military bearing* were especially well predicted by composite personality scores, with uncorrected and corrected *r* both within the range of .30 and .40. The other two factors, *core technical proficiency* and *general soldiering proficiency*, were also predicted by personality composites, though with less strong magnitude (both uncorrected *r* = .15, and corrected *r* = .25 and .26). In particular, the authors found that among the four personality composites, dependability was the most important personality antecedent for *personal discipline*; achievement orientation was the most important personality antecedent for *effort and leadership*; and physical condition composite was the most important personality antecedent for *physical fitness and military bearing*.

3.5.2. Antecedents of the task – contextual taxonomy

A good deal of research has been dedicated to revealing the psychological predictors of the best known task – contextual performance taxonomy. In arguing for the uniqueness of the contextual aspect of performance, Borman and Motowildo (1993, 1997) pointed out that this aspect may be especially strongly predicted by individual

differences in personality, such that people who are empathetic, altruistic, extraverted, non-neurotic, dependable and hardworking are more likely to engage in citizenship and prosocial behaviours. Motowildo and Van Scotter (1994) provided empirical evidence that the two aspects of performance are predicted by different antecedents. They found that contextual performance was strongly predicted by the personality traits of work orientation, dependability, cooperativeness, internal control, and to a less extent, by dominance and adjustment. Task performance, however, was only moderately predicted by work orientation and dependability among the six traits, as included in analysis. Van Scotter and Motowildo (1996) further split contextual performance into two facets: interpersonal facilitation and job dedication, and empirically tested the distinction across the three performance aspects. Their results revealed that some distinction can be made, such that extraversion and agreeableness correlated significantly higher with interpersonal facilitation than with task performance. However, the proposed distinction between task performance and job dedication, and between interpersonal facilitation and job dedication, was not as clear as expected.

A comprehensive review of the personality antecedents of the task – contextual performance framework was provided by Hurtz and Donovan (2000), as has been mentioned in the earlier review of meta-analysis. Hurtz and Donovan partitioned performance using the three dimensions proposed by Van Scotter and Motowildo (1996). Their results were more or less similar to Van Scotter and Motowildo's, such that an insufficiently clear distinction can be made between task performance and job dedication, as both aspects were most strongly predicted by conscientiousness and emotional stability; the interpersonal facilitation aspect, however, tends to be distinguishable, as it was additionally predicted by agreeableness, and to a lesser degree, extraversion.

3.5.3. Antecedents of the task – contextual – adaptive taxonomy

The proposition of adding an adaptive performance into the task – contextual dichotomy has also been accompanied by attempts revealing differential antecedents for this newly added aspect. Allworth and Hesketh (1999) argued that adaptive performance reflects the ability to cope with change and to transfer learning from one task to another, and hypothesised that this aspect should be well predicted by personality variables of

openness to experience and neuroticism. This has received some support from the authors' empirical data, such that openness to experience had a slightly stronger relationship with adaptive performance than with task or contextual performance. Conscientiousness was found to show the strongest relationship with task performance and the second strongest relationship with contextual performance, yet it did not relate to adaptive performance.

3.5.4. Antecedents of the proficiency (task) – adaptivity – proactivity taxonomy

The extension of the above performance taxonomy to include a proactive element was also well supplied with information about the differential relationships between performance factors and personality traits. When considering these three performance factors at the individual level, Griffin et al. (2007) revealed that proficiency was most strongly predicted by an individual's job role clarity (i.e., the degree to which individuals are clear about their roles); adaptivity was most strongly predicted by individual's personality of openness to change; and proactivity was most strongly predicted by individual's role-breadth self-efficacy (i.e., individual's confidence in their ability to carry out proactive tasks). Later, using the same performance taxonomy, Neal, Yeo, Koy, and Xiao (in press) specifically tested the relationships between these performance factors with the Big Five personality traits. They found that proficiency was best predicted by conscientiousness, while adaptivity was best predicted by emotional stability (negative neuroticism), and proactivity was predicted positively by openness to experience and negatively by agreeableness. Apart from these, conscientiousness, and to a lesser extent emotional stability, had a ubiquitous effects on most performance domains, which supported earlier meta-analysis findings such that conscientiousness and emotional stability may be the most important traits for all aspects of job performance (Barrick et al., 2001; Hurtz & Donovan, 2000; Salgado, 1997).

3.5.5. Using socioanalytical theory to link personality and performance

As has been mentioned in the review of meta-analysis (Section 3.3.1), Hogan and Holland (2003) presented a socioanalytical perspective in linking personality and performance taxonomies. Their approach is a good example of building a nomological

net as the authors aligned the predictor and the criterion domains using the same two basic motives of human nature: the motive of getting ahead of others and of getting along with others. In the predictor domain, they developed a seven-scale Hogan Personality Inventory (HPI, R. Hogan & Hogan, 1992) that captures the Big Five personality traits, while incorporating implications from socioanalytical theory. In the criterion domain, they grouped all performance criteria into two types of work behaviour, underpinned by these two motives. Their meta-analysis, based on 43 validation studies, showed that while both types of behaviours were predicted by conscientiousness (measured by prudence in HPI) and emotional stability (measured by adjustment in HPI), the *getting along* aspect was better predicted agreeableness (measured by interpersonal sensitivity in HPI) and the *getting ahead* aspect was better predicted by the ambition facet of extraversion. Such results converge with findings in earlier meta-analyses about the strongest effect of conscientiousness and emotional stability, yet further show that more nuanced patterns can be found by categorising job performance based on the two types of motive patterns, and that validity can be improved by conceptually linking personality and performance constructs. The authors also revealed that when performance criteria are organised into the same seven dimensions as measured in the predictor space, even stronger validity can be found.

As has been mentioned in the previous chapter (Section 2.3.3), Hogan and colleagues made a fine-grained conceptualisation of performance beyond the getting ahead – getting along dichotomy. They conceptualised that getting ahead and getting along are two meta-concepts that can be further categorised into the following four domains, to represent leadership performance: intrapersonal skill, interpersonal skill, technical/business skill and leadership skill (R. Hogan & Bensen, 2009; R. Hogan & Kaiser, 2005; R. Hogan & Warrenfeltz, 2003). A conceptually built nomological net between these four leadership domains and the seven HPI personality traits was proposed by Hogan and Benson (2009) and is shown in Table 3.2.

3.5.6. The criterion-centric approach to link personality and the Great Eight

In proposing the Great Eight framework to comprehensively represent the performance domain, Bartram and colleagues also examined the psychological

antecedents for each factors in this framework (Bartram, 2005; Kurz & Bartram, 2002). Based on conceptual relevance, they proposed that each factor in the Great Eight performance framework should be preceded by certain trait(s) in the Big Five personality framework, thus providing a nomological net across the two taxonomies (shown in Table 3.2). Bartram's (2005) meta-analysis of 29 studies supported the fact that the personality – performance relationships were indeed stronger than the non-hypothesised relationships. He also provided evidence that by mapping the psychological predictors (as composed of the Big Five personality traits, two motivation factors, and general mental ability) onto the same Great Eight dimensions as in the criterion space, even stronger associations may be found. Like Hogan and Holland's (2003) study, such results empirically confirm the value of building conceptual concordance between predictor and criterion measures.

3.5.7. Summary

In this section, I used a criterion-centric approach to study the performance taxonomies that have been reviewed in the previous chapter, by summarising existing research evidence about their personality antecedents. I also applied construct-oriented thinking in aligning personality constructs in relation to criterion constructs. Through this review, I noted the following observations.

First, it seems that most of the evidence comes from investigating deductively derived performance taxonomies, especially those associated with or stemming from the task – contextual taxonomy. This echoes an earlier made observation such that deductively derived performance models tend to be examined more substantially by academics (Section 2.4), as it is typical for academics to look for psychological antecedents once their performance models are proposed, established and validated. In comparison, among those taxonomies developed from the inductive approach, only the earlier version of the model derived from the Project A (Campbell et al., 1990) and the Great Eight framework developed by Bartram (2005) have been investigated to reveal their personality antecedents.

Second, only a fraction of these studies employed the entire Big Five personality taxonomy. Some studies addressed only one or two traits from the Big Five, and other used traits that do not typically lie in the Big Five framework. The studies where all Big Five traits were examined are marked with an asterisk (*) in Table 3.2. As mentioned before, for a nomological net to be effectively established, we need a taxonomy at each end of the predictor – criterion equation (Hough, 2001; Schneider & Hough, 1995). Therefore, many of those studies listed in Table 3.2 do not offer sufficient information for us to derive a holistic and complete understanding about the relationships between personality and performance. The studies from Hogan and Holland (2003) and from Bartram (2005) are perhaps most informative, in the sense that they are meta-analytical by nature, and they apply the 'nomological net' perspective effectively in aligning personality and performance. Both studies provided evidence that such alignment can lead to validity gains for personality trait predictors.

Third, while the studies by Hogan and Holland (2003) and by Bartram (2005) had several similarities, two major differences exist between them. The first difference is already mentioned above, namely that Hogan and Holland's conceptualisation of performance taxonomy stems from a deductive, theory-driven approach, and Bartram's development of performance taxonomy stems from an inductive, data-derived approach. The second difference is that Hogan and Holland's study is slightly more predictor-oriented than criterion-centric, as their socioanalytical theory was first applied to the conceptualisation of personality constructs and later extended to the performance constructs, while Bartram (2005) started from the criterion space and then aligned predictors against the identified performance framework.

To summarise, while relatively speaking, a good number of performance taxonomies have been developed and used, as has been seen in the previous chapter, it is surprising that much less effort has been dedicated to discovering their conceptually meaningful personality antecedents, and even less has been geared towards establishing a nomological net between predictors and criteria. This shows that we still do not have sufficiently solid evidence about the linkage between personality and performance. As has been discussed, establishing a nomological net can offer a theoretical basis for us to

derive a meaningful and specific hypothesis, conduct a confirmatory type of study, and potentially obtain evident validity gains in studying personality and other psychological antecedents. This thesis thus contributes to this understudied area by proposing and validating a nomological net between the high-order performance taxonomy and the Big Five personality taxonomy.

Table 3.2. Performance taxonomies with corresponding personality trait predictors

Authors	Performance dimensions	Proposed/discovered personality antecedents
Project A: Hough et al. (1990) McHenry et al. (1990)	1) Core technical task proficiency 2) General soldiering proficiency 3) Effort and Leadership 4) Personal discipline 5) Physical fitness and military bearing	 Achievement orientation Dependability Physical conditions
Borman & Motowildo (1993, 1997)	1) Task performance 2) Contextual performance (OCB)	 empathetic, altruistic, extraverted, non-neurotic, dependable, hardworking
a) Motowildo & Van Scotter (1994)	1) Task performance 2) Contextual performance (OCB)	Work orientation, dependability Work orientation, dependability, cooperativeness, internal control, dominance, adjustment

b) Van Scotter & Motowildo (1996)	1) Task performance
	2) Contextual performance (OCB)
	   i) Interpersonal facilitation
	
	   ii) Job dedication
		Conscientiousness, expectancy of task success
		
		Agreeableness, extraversion, conscientiousness, expectancy of task success, positive affectivity
		Conscientiousness, expectancy of task success, Agreeableness, , positive affectivity

c) Hurtz & Donovan (2000)*	1) Task performance
	2) Contextual performance (OCB)
	   i) Interpersonal facilitation
	   ii) Job dedication
		Conscientiousness, emotional stability
		
		Conscientiousness, emotional stability, agreeableness, extraversion
		Conscientiousness, emotional stability

Allworth & Hesketh (1999)*	1) Task performance	Conscientiousness
	2) Contextual performance (OCB)	Conscientiousness
	3) Adaptive performance	Openness to experience
Griffin, Neal, & Parker (2007) Neal et al. (2010)*	1) Proficiency	Conscientiousness
	2) Adaptivity	Openness to change, emotional stability, conscientiousness
	3) Proactivity	Role-breadth self-efficacy, openness to experience, (-) agreeableness, conscientiousness, emotional stability
Hogan & Holland (2003)* Hogan & Warrenfelz (2003) Hogan & Benson (2010) Hogan et al. (1998)	1) Getting ahead:	Prudence, adjustment, ambition
	i) Leadership	Surgency/extraversion
	ii) Technical	Openness to experience
	2) Getting along:	Prudence, adjustment, interpersonal sensitivity
	i) Interpersonal	Agreeableness, surgency/extraversion
	ii) Intrapersonal	Conscientiousness, emotional stability
Bartram (2005)* Kurz & Bartram (2002)	1) Leading and Deciding	Extraversion
	2) Supporting and Coordinating	Agreeableness
	3) Interacting and Presenting	Extraversion
	4) Analysing and Interpreting	Openness to experience
	5) Creating and Conceptualising	Openness to experience
	6) Planning and Executing	Conscientiousness
	7) Adapting and Coping	Emotional stability
	8) Performing and Enterprising	(-) Agreeableness

Note: (-) indicates that a negative relationship is hypothesised; * indicates the employment of the entire Big Five factors

3.6. New Perspective about Personality

3.6.1. The Need for alternative conceptualisation

Thus far, this chapter has discussed the need to take a construct- and criterion-centric perspective in researching the validity of personality traits, and has reiterated the request by Schneider and Hough (1995) of establishing a nomological net that links personality taxonomies and performance taxonomies. It is hoped that through better aligning personality and performance constructs at the conceptual level, the personality – performance linkages can be strengthened and their relationships can be enhanced with empirical data.

In addition to this attempt, it is also necessary to look for additional approaches to strengthen personality – performance linkages. The major impetus to search for alternative understanding about the predictions of personality comes from the observation that personality traits do not seem to produce very high validity in relating to performance outcomes (Guion & Gottier, 1965; Mischel, 1968; Morgeson et al., 2007; Pervin, 1994). Although the emergence of the Big Five personality framework has led to great popularity in studying and using personality over the past two decades, results from the meta-analyses as reviewed before indicate that predictive validities typically fall below .30 and sometimes below .20, even after various measurement errors are taken into account. Certainly, different scholars approach the same predictive coefficient in contrasting ways. To most researchers, a predictive validity at about .20 is sufficient to show that there is consistent effect of personality on work performance, but to some less optimistic scholars, this value is too low to provide 'generalisable evidence that personality measures can be recommended as good or practical tools for employee selection' (Guion & Gottier, 1965, p.159).

In this thesis, I consider one of the many reasons for the less satisfactory prediction of personality traits. That is, the traditional trait approach usually assumes a great level of consistency in individual behaviours, whereas in reality, individuals are active reactors to situational cues and can display remarkably different behaviours across

time (Allport, 1937; Diener, Larsen, & Emmons, 1984; Mischel, 1968; Nesselroade, 1991; Revelle, 1995). As a result, within-person variability can be as much as, if not more than, between-individual difference (Fleeson, 2001). Due to the large influence from situations and the malleable nature of personality in responding to situations, predicting behaviours and performance solely with knowledge of personality traits is very difficult. This concept is succinctly summarised by Professor Robert Wood as *'Traits are good, but not consistent'* at a recent keynote speech at International Congress of Applied Psychology in 2010.

Relatedly, it can be posited that personality traits may be rather distal antecedents to relate directly and validly to performance (even behaviourally defined, specific performance). The predicting path may need to pass through more proximal constructs that manifest the influence of traits and subsequently transfer the influence into observable behaviours (e.g., Kanfer, 1990). The mediating mechanism through which traits translate into work behaviours, however, has not been fully disentangled.

These above-mentioned issues suggest that one way to enhance our understanding about personality – performance linkages is to go beyond the trait approach and move to a more process-oriented approach, which can perhaps better capture the dynamic and malleable aspect of personality and help disentangle the process of trait being translated into work performance.

3.6.2. The interactionistic theories of personality

Several process-oriented, interactionistic theories about personality have been proposed by scholars. These theories pay attention to the process through which an individual interacts with changing situations, and propose that dispositional traits are the determining factor in explaining individual differences in the way people respond to and interact with occurring situations.

Based on empirical observations of children's momentary interpersonal behaviours while attending a 6-week summer camp, Mischel, Shoda and colleagues (Mischel & Shoda, 1995, 1998; Shoda, Mischel, & Wright, 1994) found that while the

same person's behaviours can differ significantly across different situations, individuals react to the same situations in a rather stable pattern. For instance, some children consistently demonstrate verbally aggressive behaviours when warned by teachers, but not when approached by peers. As such, individuals have a 'if…then…' situation-behaviour pattern that is coherent across time. Such observations led the authors to consider personality as a Cognitive-Affective Personality System (CAPS), composed of various cognitive and affective units. They argued that this system has a stable organisation of cognitive-affective units that are readily evoked and encoded by different situational demands.

Tett and colleagues proposed a trait activation theory to argue that the behavioural expression of a latent trait requires that trait to be enacted by trait-relevant situational cues (Tett & Burnett, 2003; Tett & Guterman, 2000). These authors suggested that predictions of behaviours based on trait measures can be improved with the knowledge of trait-relevant situations, and behavioural consistency across situations is dependent upon the similarity of trait-relevant situational cues. As with the CAPS, the trait activation theory also integrates the concept of both intraindividual consistencies and interindividual uniquenesses in individuals' propensity to behave in identifiable ways.

Fleeson and colleagues (Fleeson, 2001, 2004; Fleeson & Gallagher, 2009; Fleeson & Jolley, 2006; Fleeson & Leicht, 2006) proposed a density distribution theory to integrate the conceptualisation of stable personality traits and dynamic, momentary level of personality (i.e. state-level personality). This theory posits that an individual would display all levels on a given trait in everyday life, and aggregating all expressed momentary states into a density distribution would profile the frequency of his/her standings at all levels on the latent trait. While an individual's states at different occasions may be largely different, this person's signature personality is displayed by the entire density distribution, which has stable values on key parameters such as mean, width and kurtosis. Therefore, by conceptualising personality as the entire density distribution, we can more adequately capture and profile individually different characteristics.

In general, considering personality as an interactive system or as a distribution curve, rather than a fixed trait-like entity, tends to offer more insights into the interplay between personality traits and situations, and tends to generate a more complete profile of an individual's personality. Such more complete profiling may have important implications for improving the prediction on work behaviour and performance outcomes. For instance, a recent study by Minbashian, Wood and Beckmann (2010) demonstrated the merit of considering the state-level personality in addition to trait-level personality. These authors showed that momentary conscientiousness states that are contingent upon task demand, contributed unique variance to individuals' adaptive performance over and above stable dispositional difference in conscientiousness trait.

Such a dynamic perspective towards personality opens a new playground for personality researchers, and is just beginning to be applied in industrial and organisational psychology. We need more empirical studies to investigate the merit of this perspective, and to explore whether a stronger link between personality traits and work performance can be built. This thesis thus intends to contribute to this understudied area by considering and measuring personality as momentary states, in addition to the traditional approach of measuring personality as latent dispositional traits.

3.7. Research Questions Investigated in This Thesis

Thus far, I have reviewed the past conceptualisation and measurement of individual work performance and how work performance can be predicted from individual differences as measured by the Big Five personality traits. On the basis of the literature reviewed in these two chapters, I now outline three major research questions to be investigated in this thesis.

First, as reviewed in Chapter 2, I found that a high level of variation exists as to the way job performance is defined, conceptualised and measured. Such a lack of agreement is not very effective in building collective knowledge about the criterion domain. Through conceptual analysis, I found that the various established performance

taxonomies can be grouped into two major types, based on the methods they were developed from. Taxonomies developed from the inductive, bottom-up approach tend to offer more exhaustive coverage of the criterion space, and is thus more ideal for generating a comprehensive profile. However, they also tend to stand at the lower level of generality in the psychological space, in comparison to the other type of taxonomies that were developed from the deductive, top-down approach. Only by scaling the two types of taxonomies onto the same generality level can meaningful comparisons and unifications be made. Given these observations, I propose looking for a high-order structure from the inductively derived taxonomies and comparing this structure to deductively derived taxonomies. Therefore, the first empirical question of this thesis is to reveal the most appropriate, high-order structure, so as to obtain a refined and unified understanding of the criterion space.

> *Research Question 1: What is the most appropriate high-order factor structure to represent the construct of individual job performance? Can agreement be made between performance taxonomies developed from different approaches?*

Once a unified high-order performance structure is identified, it should then be used as a benchmark for us to move backwards to reveal its psychological antecedents. This is a criterion-centric approach that would contribute to more targeted and meaningful predictions (Bartram, 2005). Moreover, a nomological network needs to be established, such that a holistic picture and theoretical bases are built between predictor and criterion to inform empirical studies (Schneider & Hough, 1995). As reviewed in Chapter 3, to this date, only a few researchers have taken this perspective in investigating personality – performance relationships and we still have insufficient knowledge about what this nomological net should look like. Therefore, the second research question of this thesis is to conceptually and empirically build a nomological net between the high-order performance framework and the already established Big Five personality framework.

> *Research Question 2: Can a nomological net be built between the discovered high-order performance taxonomy and the Big Five personality taxonomy?*

Finally, the existing evidence about personality – performance relationships indicates that their relationships are at most moderate, leaving us room to further strengthen the linkages. I consider that one explanation to these insufficiently high relationships is the innate oversight with personality trait approach, which does not take account of the malleable, fluid, situational dependent nature of personality. I introduce several interactionistic theories, in which personality is conceptualised as an interactive system rather than fixed trait entities. This perspective can help refine our understanding about the process that latent personality constructs are translated into work performance. While this perspective has been studied and applied in social psychology, little has been done to bring it into work contexts. I am thus interested in finding out whether employing this new conceptualisation can help us improve the prediction on performance.

Research Question 3: Can we enhance the personality – performance relationships by taking into account of the dynamic perspective about personality?

In the next chapter (Chapter 4) I will briefly discuss the methodology adopted in this thesis, and then move to three empirical studies in Chapter 5 – 7 that address the three raised research questions.

CHAPTER 4: METHODOLOGY

4.1. Overview

This chapter will discuss the methodology adopted in this thesis. I will first explain the use of quantitative methodology, and then introduce the study contexts, data collection methods and ethical considerations.

4.2. Quantitative Methodology

This thesis adopts a quantitative approach that draws on positivist assumptions regarding uncovering the cause and effect of social reality, measuring and testing of hypotheses, and replicating and generalising findings (Bryman, 2008; Henwood & Pidgeon, 1993; B. Kaplan & Duchon, 1998). While it is recognised that a quantitative approach can be limited in understanding the complexity of subjective experience (ditto), it has been a remarkably useful approach in researching work performance and personality. The judgment of work performance is essentially dependent upon quantifiable measures that can help make organisational relevant decisions. Adopting a psychological perspective to understand performance also indicates that quantitative methods can help identify the underlying structure to disentangle the multiple dimensions of performance. In terms of the study of personality, there is a strong tradition in the development and use of quantitative oriented measurements in clinical, social and industrial and organisational psychology, such that a list of psychological variables can be used to effectively differentiate individuals from one another. When it comes to data analysis, statistical methods are frequently employed by researchers. Typical statistical methods include factor analysis, which is useful for decomposing the covariation among behavioural tendencies, so as to find a small number of latent variables, and structural equation modelling, which can help test and reveal the causal models of personality processes (Fraley & Marks, 2007).

4.3. Study Contexts

This thesis presents three empirical studies that were carried out in the cultural context of China. Being the home to the largest working population in the world, China has witnessed a fast-growing attention and interest from researchers worldwide in the area of organizational behaviour.

Data for the three empirical studies were collected from two different occupational contexts. Study 1 and Study 2 were conducted with full-time job incumbents at a multinational organisation. Study 3 was conducted with graduate students in a business educational setting. In both occupational contexts, the studies were administered for developmental purposes, such that participants' results on various measures were only used to help improve their understanding about themselves and did not have any implications for personnel decisions. The two study contexts are described separately as follows.

4.3.1. Study 1 & Study 2

Data of these two studies were collected from the China team of a major multinational corporation in the telecommunications industry, which is headquartered in France. This multinational organisation is one of the largest in the industry, operating in over 130 countries worldwide.

The China branch of this multinational company started off as a joint venture owned by a Belgium-based company and a local, Shanghai-based company, with the local company being the larger shareholder. Later, the Belgium-based company was acquired by a France-based multinational corporation. While the ownership of the joint venture transferred to the French company, the local company remained the major shareholder until 2002, when the French company purchased more shares to become the biggest shareholder and turned the joint venture into a shareholding company. In 2005, the French corporation acquired another U.S.-based major telecommunication

corporation, thus becoming the second largest telecommunication manufacturer in the world. The China-based shareholding company accordingly became the China branch of this corporation.

For 18 years during the joint venture period, the management team of the company reported directly to the State-owned Assets Supervision and Administration Commission of the State Council, a major government agency in charge of all state-owned organisations. With such government involvement, it can be expected that a traditional, Chinese management style dominated the company for most of its history. Chinese societies are dominated by collectivistic culture in which in which the self is perceived as part of collective, and behaviours such as harmony-seeking, conflict-avoiding and relationship-building occupies central role in daily interaction (Bond, 1996; Tu, 1985). Such a culture may result in certain personality traits (e.g. agreeableness, respect for authority) and performance aspects (e.g. interpersonal performance) being particularly valued than others. Although a full-fledged review and analysis of cultural effect is not the main purpose of this thesis, cultural factors may provide useful insight in deriving certain hypotheses and explaining findings.

The China branch is headquartered in Shanghai. It has over 10,000 employees, out of which 4,000 are in research and development type of jobs. This current study was conducted at two major departments, a research-oriented product division and a quality control and customer care division. Most employees in these two departments have an academic and professional background in electronic engineering. Initial contact for conducting the study was made with the human resource managers at these two divisions, who agreed to integrate this study as part of an internal employee development program. To invite voluntary participation in this study, the human resource team sent out group emails to employees at these two divisions. A total of 415 employees agreed to take part in the initial contact. The actual number of participants who completed various measures will be provided in the methods section of empirical studies (Chapter 5 and 6).

4.3.2. Study 3

Data for Study 3 were collected from full-time Master of Business Administration (MBA) students at a leading graduate business school headquartered in Shanghai, China. MBAs accepted to this business school have an average of 6 years of working experience prior to enrolment, and a substantial amount of them have held managerial positions before commencing their studies. Although measuring work performance with MBAs may raise concerns as MBAs are not working in real organisational environments, they can nevertheless be argued to be a proxy managerial and professional sample, for the following reasons. First, they have had several years of working experience, which should allow them to have a good understanding of their work behaviours. Second, the interactive and practical nature of MBA training should allow students to express general work behaviours and styles that are applicable beyond the academic setting. During the MBA programme students are intensively trained to practice on numerous organisationally relevant business scenarios, which require them to analyse business problem and generate solutions, work together with teams on group projects, plan their time and coordinate others to complete tasks and assignments. These activities frequently have strong resemblance to real job assignments in organisational settings. Third, it is expected that a successful MBA graduate should have the potential to be a fully-fledged future leader who can succeed in various business settings; thus using a generic performance measure to assess their work performance is appropriate. Therefore, I consider this sample to be appropriate to test the relationships between personality and behaviour-based work performance.

Participants of this study were 98 MBA students undertaking an elective module of 'leading self, career, and others'. The module contains eight 3-hour sessions that spread over one month's time. This current study was embedded into the course design, such that students were required to complete several assessment instruments, and were later provided with individual feedback reports and group feedback sessions.

4.4. Mode of Data Collection

4.4.1. Using internet self-administered survey

To quantitatively explore the structure of performance (research question 1) and the relationship between personality traits and performance (research question 2), I used an internet self-administered survey method to collect individual responses on personality measures and performance measures. Self-administered survey involves sending an email with an URL-embedded message so that recipients are directed to a web-based survey as evoked by a web browser. This survey technique is now widely applied in organisation research, due to its many advantages compared to traditional paper-and-pencil surveys. The most notable advantages includes low cost (Dillman, 2000; W. C. Schmidt, 1998; Simsek & Veiga, 2000, 2001), rapidity in data collection (Mehta & Sivadas, 1995; Sproull, 1986), producing less missing values (Stanton, 1998), and the easiness of implementing personal contact via email, which is highly useful for sending reminding signals (Simsek & Veiga, 2001). Compared to face-to-face administrations, a web-based survey can also lead to participants' greater willingness to self-disclose (Sproull, 1986), which is useful in this study context, where evaluation and judgment of the self are largely involved.

The disadvantages of internet surveys are also noteworthy. In particular, such disadvantages include sampling issues and non-sampling errors. First, representativeness of samples is difficult to guarantee via the use of internet surveys, due to the fact that these surveys can only be completed by those who have access to computer and internet and who are familiar with participating in electronic surveys (Simsek & Veiga, 2000, 2001; Stanton, 1998). Therefore, a sampling control is needed to understand the obtained sample in relation to the population, and to avoid false identities. Second, nonsampling errors, which refer to all the other errors that are not sampling-related such as nonresponse errors and measurement errors, are also likely to occur with internet surveys (Simsek & Veiga, 2000, 2001). Some intended participants may not respond to the survey, thus contributing to a low response rate and possibly biased results (Couper,

2000; Solomon, 2001), and some inattentive or careless respondents might skip items or use a uniform response (J. A. Johnson, 2005).

An internet survey method is considered appropriate for studies in this thesis, due to that the participants included being individuals who had proficient knowledge with, and convenient access to the computer and internet. Study 1 and Study 2 use a sample of employees at a high-technology organisation. Study 3 uses a sample of full-time MBA students. Both samples use computers extensively on a daily basis, and have constant access to the internet in their workplace/institute. Moreover, sampling control was adopted by gathering the email addresses of the selected participants prior to data collection, so that email invitations can be sent to targeted individuals. Some questionnaires were administered at test publishers' survey platform, which automatically generates and delivers individual email invitations so as to provide unique username and password (for details, see Table 4.1). This is to allow only pre-defined individuals to access the survey so that false identities can be minimised (Simsek & Veiga, 2000, 2001; Stanton, 1998). Involvement from organisations was also established, so as to minimise nonresponse errors. In Studies 1 and 2, the human resource officers at the telecommunication organisation took care of most communications with participants, and regularly sent out reminder emails. In Study 3, the class coordinator in charge of the module was heavily involved in communicating and following up with the students.

Table 4.1. Administrative method of internet self-administered survey

Measure	Study 1 Establishing Performance Taxonomy	Study 2 Building linkage between Personality and Performance	Study 3 Validating the linkage as found in Study 2
Performance measure	Group invitation email providing URL-link	Group invitation email providing URL-link	Individual email containing unique access code
Personality trait measure	N/A	Individual email containing unique access code	Individual email containing unique access code

4.3.2. Using experience sampling method to measure personality states

To explore research question 3 that considers the merit of dynamic perspective of personality, I employed an experience sampling approach in Study 3 to measure individuals' momentary personality. Experience sampling, otherwise known as the diary method, is characterised by collecting data on many occasions from the same individuals, thus permitting researchers to understand and examine reported momentary experiences in a more natural context. The major advantages of the experience sampling technique include the ability to capture both within-person and between-person differences, and to minimise memory effects by requiring participants to recall recent rather than distant events (Bolger, Davis, & Rafaeli, 2003; Reis, 1994; van Eerde, Holman, & Totterdell, 2005).

Although having been used in many areas that research into human behaviour such as personality processes (e.g., Bolger & Zuckerman, 1995; Fabes & Eisenberg, 1997; Rhodewalt, Madrian, & Cheney, 1998), marital and family interaction (Almeida, Wethington, & Chandler, 1999; Downey, Purdie, & Schaffer-Neitz, 1999), and mental health (Alloy, Just, & Panzarella, 1997), it is only recently that this method has been applied to work psychology. The topics explored include emotion and work (Miner, Glomb, & Hulin, 2005), social interactions at work (Tschan, Rochat, & Zapf, 2005), occupational health (Sonnentag, Binnewies, & Mojza, 2008), among others. However, to date rather limited work has been done on momentary personality and work performance, except a recent study by Minbashian et al. (2010). Given that personality can be conceptualised as a state-level, as well as a trait-level construct (Fleeson & Gallagher, 2009), using an experience sampling method can effectively capture momentary personality at multiple occasions, providing information that may help reveal the dynamic process of translating latent personality traits into work performance.

4.3.3. Timescale of data collection

The timescale for data collection from the two samples in the three studies is illustrated in Figure 4.1. Study 1 used cross-sectional data collected from two sources (self and supervisor) at one time point. Study 2 involved data collection at two time points such that personality trait measures were first administered; performance measures from both self and supervisors were collected one month later. In Study 3, personality trait measures and performance measures were administered about one month apart, and participants' daily experiences were sampled at up to 8 time points during the one-month interval.

Figure 4.1. Timescales of data collection

	Time 1		Time 2
Study 1			Performance (self and supervisor)
Study 2	Personality traits (self-report)		Performance (self and supervisor)
Study 3	Personality traits (self-report)	Personality states* (self-report diaries)	Performance (self-report)

Note: * self-report diaries were collected from eight days with one experience sampled for each day.

4.5. Ethical Considerations

4.5.1. Anonymity and informed consent

In both of the two samples, data collection involved multiple time points and multiple instruments. Therefore, personal identifiers were needed to match data collected from various sources. Furthermore, as both studies were designed to be

development-oriented, individual feedback reports needed to be provided to participants as a benefit of participating in this research; thus individuals' names and email addresses were needed to deliver individual feedback reports. Given these reasons, personal identifiers were needed throughout the project administration and data collection. However, as soon as data matching was completed and all feedback reports were delivered, individuals' names and other personal identification information were removed from the database so as to ensure anonymity.

Moreover, prior to the project, participants were given sufficient information about the questionnaires they would be given, the timescale and the intended usage of their data, as well as the type of feedback they could expect out of the studies. In the first sample (job incumbents), participation was voluntary, although strongly recommended by the human resource department of the organisation. In the second sample (MBA students), participation in online surveys was required, due to the fact that they were part of the course assignments; however, completing the experience-sampling study was entirely voluntary.

4.5.2. Debriefing and dissemination

For each online instrument completed, participants were provided with an individual feedback report that describes and interprets their scores on the instrument. All feedback reports were either automatically generated and sent to the participants from the test publishers' survey platform, or generated and delivered by myself using a pre-defined email template. The participants were assured that only themselves but not others had access to their individual reports, and they were invited to contact me (rather than their organisation) for any queries regarding the feedback report.

As required by the telecommunications company (Study 1 & 2) who participated in this project, a summary of the project report (in Chinese) was prepared by me. In this summary report, only group scores as averaged across all participants were reported and discussed. No information about any individual employees was released.

As part of the course requirement at the business school (Study 3), separate debriefing sessions were arranged for each of the online instruments the students completed. All debriefing sessions were conducted by experienced work psychologists who had been certified to use these instruments.

I will now turn to the empirical sections of this thesis. The next chapter presents the first empirical study, which focuses on revealing the most appropriate high-order structure of the criterion domain.

CHAPTER 5: EMPIRICAL STUDY 1

THE STRUCTURE OF INDIVIDUAL JOB PERFORMANCE: IN SEARCH OF A HIGHER-ORDER PERFORMANCE STRUCTURE

5.1. Overview

This thesis takes a criterion-centric perspective by starting from the content and structure of the criterion space. In this first empirical study, I thus draw from an inductively derived performance framework, the Great Eight performance framework (also referred to as the UCF - Universal Competency Framework), and examine its high-order structure using empirical data collected from employees and supervisors at a Chinese organisation. The Great Eight framework was developed through an inductive, bottom-up approach by compiling a large number of existing competency constructs from academic literature and from practitioners' models, and sorting them into a framework featured by eight generic factors at the most fundamental level (e.g., Bartram, 2005; Bartram & Martin, 2003; Kurz & Bartram, 2002). As discussed in Chapter 2, models as such can provide a comprehensive coverage of the performance space and can thus be used as a good foundation to discover the appropriate structures at the higher-order of abstraction. Also, scaling the inductively derived models such as Great Eight into the more general level can allow them to be directly compared to other existing, deductively derived performance structures. This comparison can help examine the level of agreement and discrepancies between the high-order structures developed from two different approaches, and further contribute to establishing a commonly agreed, integrated performance framework in profiling the criterion space.

From the multiple deductively developed performance taxonomies, this study takes the 3-dimension model developed by Griffin et al. (2007), given that this is a recently developed, theory-driven model that well captures the emerging aspects of

performance. I will first investigate the most appropriate high-order performance structure from the Great Eight framework, using performance ratings from both employees themselves and their direct supervisors. Then, I will examine whether alignment can be empirically built between this high-order structure and Griffin et al.'s (2007) performance taxonomy. Figure 5.1 presents the positioning of the present chapter in the whole thesis, with the grey-shaded areas indicating the content of this chapter.

Figure 5.1. The positioning of Study 1
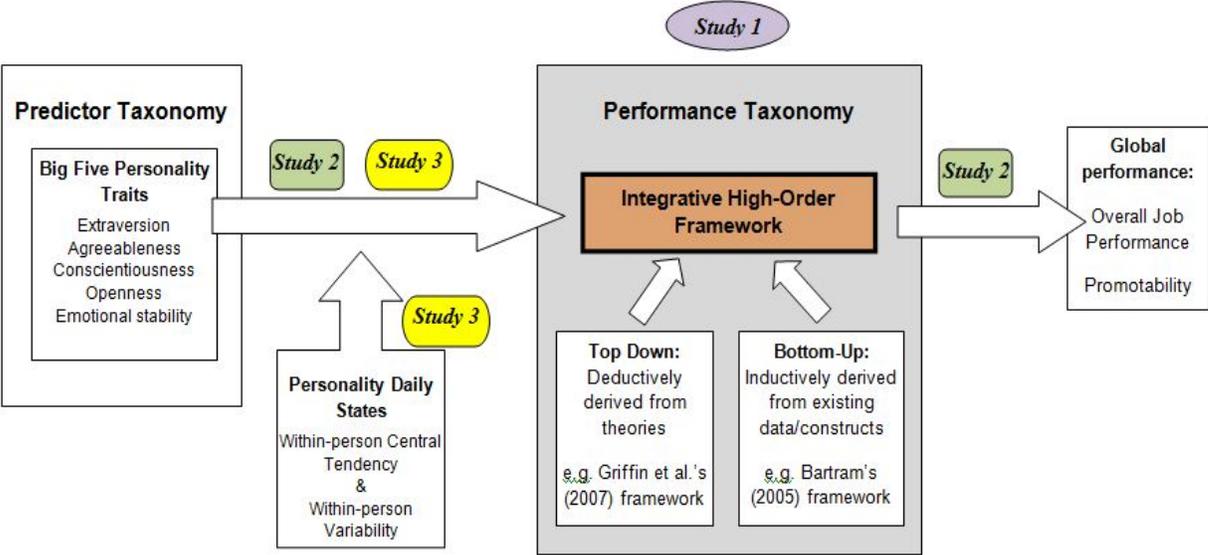
5.2. Literature and Hypotheses

5.2.1. The Great Eight – an inductively derived and comprehensive taxonomy of job performance

The literature chapter briefly mentioned the Great Eight taxonomy and in the following section I will provide a more detailed introduction to this model. The Great Eight framework was derived from large-scope and longitudinal efforts, for the purposes of discovering the psychological structure of the performance domain and for building a generalisable taxonomy that can well align the predictor and the criterion space (e.g., Bartram, 2005; Bartram & Martin, 2003; Bartram et al., 2002; Kurz & Bartram, 2002). As with the approach adopted by Tett et al. (2000) who substantially reviewed academic literature to compile and integrate all existing leadership competencies, the identification of the Great Eight framework went through a substantial review of the existing competency constructs appearing both in the academic literature and in practitioners' competency models. In total, 112 competency components were discovered at the most detailed behavioural level that can represent the building blocks of this framework; they were sorted and grouped into 20 competency dimensions, which were then organised by 8 broadest and most abstract competency clusters[3]. In this way, this framework was established as a three-tier, hierarchical model that exhaustively compiled competency constructs at a different level of abstraction. Table 5.1 defines the eight most general dimensions, as discovered at the most fundamental level, and Figure 5.2 shows the three-tier structure of the Great Eight framework.

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[3] From personal communication with SHL Group in early 2011, I learned that the some minor changes and updates have been made to this model. For instance, there are now 23 (rather than 20) dimensions at the middle level. However, the main idea about this hierarchical structure and the eight factors at the top level remain the same.

Table 5.1. The Great Eight – Universal Competency Framework (UCF)

No	Competency	Definition
UCF1	Leading & Deciding	Takes control and exercises leadership. Initiates action, gives direction, and takes responsibility.
UCF2	Supporting & Cooperating	Supports others and shows respect and positive regard for them in social situations. Puts people first, working effectively with individuals and teams, clients, and staff. Behaves consistently with clear personal values that complement those of the organization.
UCF3	Interacting & Presenting	Communicates and networks effectively. Successfully persuades and influences others. Relates to others in a confident, relaxed manner.
UCF4	Analysing & Interpreting	Shows evidence of clear analytical thinking. Gets to the heart of complex problems and issues. Applies own expertise effectively. Quickly takes on new technology. Communicates well in writing.
UCF5	Creating & Conceptualising	Works well in situations requiring openness to new ideas and experiences. Seeks out learning opportunities. Handles situations and problems with innovation and creativity. Thinks broadly and strategically. Supports and drives organizational change.
UCF6	Organising & Executing	Plans ahead and works in a systematic and organized way. Follows directions and procedures. Focuses on customer satisfaction and delivers a quality service or product to the agreed standards.
UCF7	Adapting & Coping	Adapts and responds well to change. Manages pressure effectively and copes well with setbacks.
UCF8	Enterprising & Performing	Focuses on results and achieving personal work objectives. Works best when work is related closely to results and the impact of personal efforts is obvious. Shows an understanding of business, commerce, and finance. Seeks opportunities for self-development and career advancement.

Source: Bartram (2005; competency titles and definitions are taken from SHL Universal Competency Framework™ Profiler and Designer Cards).

Figure 5.2. The three-tier, hierarchical structure of the Great Eight Framework
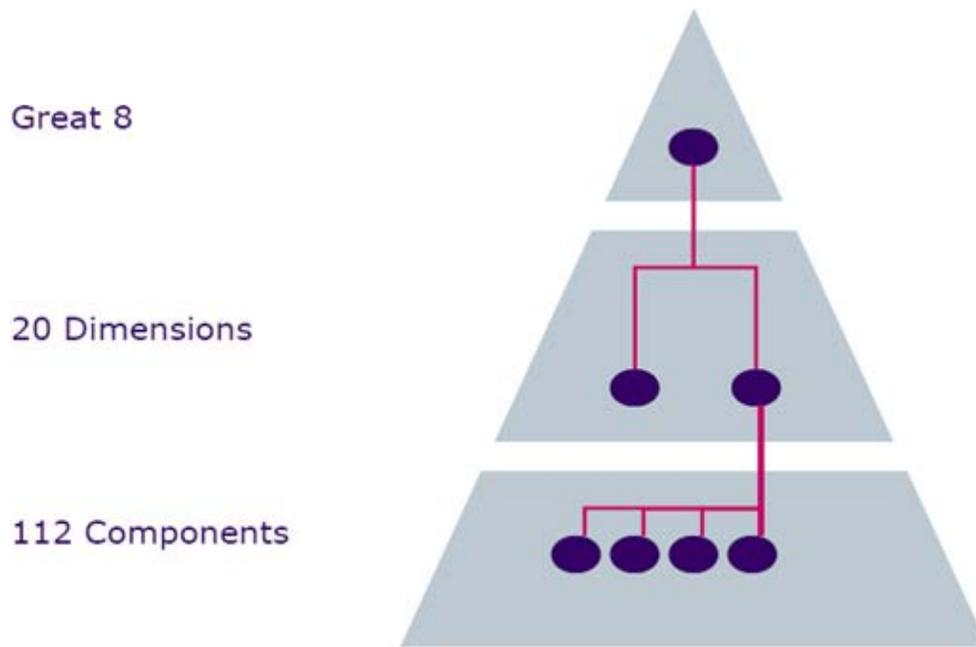
Source from: SHL Group Ltd. [4]

Bartram and colleagues (Bartram, 2005; Bartram & Martin, 2003; Bartram et al., 2002; Kurz & Bartram, 2002) have suggested that the Great Eight structure is a fundamental, general performance model that is comprehensive enough to encompass the job requirements for all job types and in all work settings, and can be well applied in different cultural contexts. According to them, this eight-factor structure provides a broad categorisation of job performance constructs, while maintaining a sufficient level of differentiation.

There is also some empirical evidence about the construct validity of the Great Eight. The technical manual of the Great Eight indicates that several validation studies of international scope have been carried out during model development (Bartram &

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[4] Same as indicated in the previous Footnote, the number of factors shown in each tier is based on the earlier version of UCF as reported by Bartram (2005). However, the three-tier concept remains the same.

Martin, 2003). More specifically, principal component analyses have shown that eight factors can be extracted to explain most of the variance, by using self, supervisor, and other colleagues' ratings on various competency instruments from which the Great Eight was developed (Bartram & Martin, 2003; Kurz et al., 2004). Bartram's (2005) meta-analysis indicates that data from about 4,000 participants across different industries and in over 10 countries were employed in the development of the Great Eight, showing good generalisability in terms of the findings. Despite these immense efforts, it should be noted that these analyses were carried out during the developmental process of the Great Eight, and were conducted on the competency instruments that were not originally developed to measure the Great Eight framework. Therefore, the true construct validity of the Great Eight remains unsettled. Moreover, despite the international coverage of the Great Eight, data from Asian cultures were rather limited. For instance, in Bartram's (2005) meta-analysis, only one out of the 29 studies was from an Asian country (Korea). Therefore, it is not entirely clear whether the Great Eight structure can be well generalised to the Asian cultural context.

As discussed in Chapter 2, many inductively derived performance models, such as those developed by Campbell et al. (1993), Borman and Brush (1993), Viswesvaran (1993), Tett et al. (2000), and the Great Eight being investigated in this study, tend to have the same issue about construct validity not being thoroughly investigated. These taxonomies usually aim to achieve comprehensive coverage of the performance domain and rely substantially on experts' subjective judgment during model development. These models tend to have great specificity and solid content validity; therefore, they can be used as a good foundation to reveal high-order performance structures with guaranteed content coverage.

Among the inductively derived taxonomies, the Great Eight framework is perhaps the most appropriate model to be used for the purposes of revealing the high-order structure, for the following reasons. First, it has been developed rather recently. This gives it the advantage of including some new aspects of performance, such as adaptive performance and proactive performance, which were not taken into account as distinct high-level constructs in earlier developed models. For instance, Campbell et al.'s

(1993) eight-dimensional model and Viswesvaran's (1993) nine-dimensional model fail to capture the adaptive element. In comparison, the Great Eight model posits these factors as unique and independent dimensions (e.g. *UCF7 adapting and coping*; *UCF5 creating and conceptualising*). Second, the Great Eight was designed to be a general model that can be applied to all employees across all jobs and industries (Bartram, 2005), whereas some other frameworks targeted at specific job types such as managers (Borman & Brush, 1993; Tett et al., 2000). Therefore, using the Great Eight may produce more generalisable findings that can be applied to employees at a wider level. Third, the Great Eight was established by consolidating evidence both from performance constructs as published in academic literature and from unpublished performance models being used by practitioners, while some other inductively derived taxonomies were essentially based on published literature (e.g., Tett et al., 2000; Viswesvaran, 1993). This indicates that the Great Eight may have broader coverage and possibly stronger practical implications than some other models. Lastly, the development of the Great Eight has involved the consideration of cross-cultural variations, by soliciting the judgment from experts in and collecting data from over ten countries, including several non-Western countries (Bartram & Martin, 2003). This may give the Great Eight more advantage in terms of its cross-cultural generalisability.

Given these reasons, the recently and inductively derived Great Eight performance taxonomy is a useful foundation to reveal the high-order structure of the performance domain.

5.2.2. The higher-order performance structure

As discussed in the literature chapter (Section 2.5 in Chapter 2), high-specificity models as developed through an inductive, bottom-up approach, can be further aggregated into a more general, high-order structure. Chapter 2 has discussed the possibility of the existence of two-, three-, or four-factor structures. Table 5.2 below restates the potential high-order factors, as discussed in Chapter 2. However, in this table I omitted the factors specific to managerial population, given that this study intends to look for patterns for the general employee population rather than managers and leaders.

I propose that factors in the Great Eight framework can be further aggregated into a two-, three-, or four-factor structure at the more general level. In the following section, I will discuss these potential high-order structures for the Great Eight. I will also draw inferences from other studies, in relation to each of these high-order structures, so as to provide external evidence in support of their generalisability.

Table 5.2. Summary of higher-order structure as emerged from high-specificity performance taxonomies

No.	2 Factors	3 Factors	4 Factors
1	Task	Task	Task/Technical/Operational
2	Contextual (citizenship)	Interpersonal/Citizenship	Interpersonal
3	---	Adaptive? Proactive? Conceptual?	Conceptual (strategy)?
4	---	---	Citizenship? Intrapersonal? Communication?

Note: Table adapted from Table 2.4 in Chapter 2.

5.2.2.1. Two-factor higher-order structure

Bartram (2005) reported that by using the eight performance factors that are aggregated from supervisor ratings in multiple studies (i.e. representing the criterion domain), a two-factor structure tended to emerge. Bartram found that these two factors can be roughly categorised into the task-contextual dichotomy of performance (Borman & Motowidlo, 1993). The task factor seemed to capture most of the UCF dimensions, while the contextual factor was primarily composed of *UCF2 supporting and cooperating* and *UCF7 adapting and coping*. The *UCF3 interacting and presenting* seemed to load almost equally on both factors.

The existence of a task-contextual taxonomy at the highest level of the criterion domain has already been well argued by Borman and Motowildo (1993, 1997). They also provided a conceptual grouping of Campbell et al.'s (1993) high-specificity, eight-factor taxonomy into the two domains of task and contextual. Their arguments show the potential for factors in inductively derived models to be aggregated into a high-order, two-factor structure.

5.2.2.2. Three-factor higher-order structure

The possibility of a three-factor high-order structure is also empirically supported in Bartram's (2005) study. By aggregating data onto the Great Eight, as collected from the predictor domain, including scores on personality, motivation, and cognitive ability, Bartram found a three-factor structure, such that the two dimensions *UCF4 analysing and interpreting* and *UCF6 organising and executing* were split from the task aspect of the two-factor structure, as discussed above, and formed a unique third factor. Bartram found this 3-factor structure difficult to explain as two UCF dimensions, which address performance aspects of solving problems, executing core tasks, and delivering results, should closely relate to task performance. Some insights were provided by Kurz and colleagues (Kurz et al., 2010; Kurz et al., 2011), who proposed a three-factor-effectiveness model to explain the three factors revealed in Bartram's (2005) study. They termed the three effective factors as *demonstrate capability*, *work together*, and *promote change*, respectively. *Demonstrate capability* refers to the skills and capabilities in executing core tasks, thus this concept is in line with the content covered in *UCF4 analysing and interpreting* and *UCF6 organising and executing*. *Work together* refers to the interpersonal and intrapersonal aspect of effectiveness, and can thus be aligned with *UCF2 supporting and cooperating* and *UCF7 adapting and coping*. *Promote change* addresses the performance aspects of driving success and creating innovation, which seems to share the content of the remaining four Great Eight factors, especially *UCF5 creating and conceptualising* and *UCF8 enterprising and performing*. Therefore, these three factors as proposed by Kurz and colleagues tend to effectively explain the 'unexplainable' structure as empirically found by Bartram (2005). Kurz and colleagues (Kurz et al., 2010; Kurz et al., 2011) also used data separately collected from

a job analysis instrument and from a personality instrument, to reveal that the three-factor, higher-order structure is applicable to both the predictor domain and the criterion domain, and is more complete than the two-factor structure of task – contextual dichotomy.

When reviewing other three-factor high-order structures, as described in Table 5.2, we can see both consistency and discrepancy in comparison to the factors proposed by Kurz and colleagues. All the other attempts using higher-order factors from the high-specificity models point to the existence of a distinct task factor that is consistent with the *demonstrate capability* factor. There is also a distinct interpersonal factor in other models which is conveyed in the *work together* factor, although *work together* tends to have broader content as it lumps together the interpersonal facet (*UCF2 supporting and cooperating*) and the adaptive facet (UCF7 *adapting and coping*). According to some scholars (Allworth & Hesketh, 1999; J. W. Johnson, 2003), the adaptive factor may need to be separately construed as a unique factor.

As to the third factor, there seems to be more disagreement. Kurz and colleagues tend to support the distinctiveness of a proactivity factor (*promote change*), which was not found in other proposed models. Johnson's (2003) conceptual integration of multiple high-specificity models postulates adaptive performance as a distinct third factor, while blending the proactivity aspect (e.g., the conscientious initiative facet) into both the task and the citizenship factors of performance. Dierdorff et al.'s (2009) integration of the high-specificity models to measure managerial performance indicates a distinct conceptual factor as the third factor, in addition to the task (technical/administrative) and interpersonal factors. In Kurz and colleagues' definition, this conceptual factor was incorporated into the *demonstrate capability* factor, which contains the conceptually oriented dimension *UCF4 analysing and interpreting*.

5.2.2.3. Four-factor higher-order structure

There is no particularly strong existing evidence for a four-factor structure at the higher-level of the Great Eight, except for a corporate leadership model proposed by Bartram and colleagues (Bartram, 2009; Bartram & Brown, 2006; Bartram & Martin,

2003). These authors have proposed that the Great Eight dimensions can be used to reflect four major functions of leadership: *developing the vision, sharing the goals, gaining support,* and *delivering success*. These four foci can be succinctly summarised as four major leadership domains: strategy, communication, people, and operational, which were then cross-tabulated with the two types of leadership orientation: transactional and transactional leadership, to form a 4*2 leadership matrix. The authors assigned each Great Eight factor to each cell in this matrix, to profile the entire leadership domain. Because this corporate leadership model was construed to describe leadership functions rather than high-order factors of the Great Eight, and targets at leaders rather than general employees, it could not be directly employed as a benchmark to derive four-factor high-order structure.

Evidence from other scholars that supports a four-factor structure is discussed in Chapter 2 (e.g., Borman & Brush, 1993; R. Hogan & Bensen, 2009; R. Hogan & Kaiser, 2005; R. Hogan & Warrenfeltz, 2003). It also tends to focus on managerial population. However, I expect that a possible four-factor structure can be found from the Great Eight and can be applicable to the entire employee population. I will describe the reasoning as follows by drawing better clarification about two of the three factors proposed by Kurz and colleagues (Kurz et al., 2010; Kurz et al., 2011), the *work together* factor and the *promote change* factor.

First, the *work together* factor, which is mainly contributed by *UCF2 supporting and cooperating* and *UCF7 adapting and coping*, tends to conflate two distinct performance constructs, interpersonal performance and adaptive performance. Based on the definition provided in Table 5.1, UCF2 concerns one's behaviours in terms of supporting and respecting others, maintaining effective interpersonal relationships and standing by one's ethical standard, while UCF7 is about responding to organisational change and coping with pressure and setbacks. Clearly, these two are rather different concepts. Given that adaptive performance is increasingly recognised as an important and unique performance factor (Allworth & Hesketh, 1999; M. A. Griffin et al., 2007; Hesketh & Neal, 1999; J. W. Johnson, 2003), it is possible to separate it from other factors in the contextual domain. Therefore, I expect UCF2 and UCF7 to belong to two

distinct high-order factors, interpersonal performance and adaptive performance, respectively. This clarification is also consistent with the factor structure proposed by Hogan and colleagues (R. Hogan & Bensen, 2009; R. Hogan & Kaiser, 2005; R. Hogan & Warrenfeltz, 2003), who deliberately separated interpersonal and intrapersonal (i.e. resilience, adjustment that share part of the adaptive concept) aspects of performance.

Similar conceptual ambiguity can be found with the *promote change* factor, which consists of *UCF1 leading and deciding*, *UCF3 interacting and presenting*, *UCF5 creating and conceptualising*, and *UCF8 enterprising and performing*, based on Bartram's (2005) factor analysis using ratings from the predictor space. While the label of *promote change* suggests that all factors should relate to the change-related, proactive aspect of performance, a closer inspection of these four UCF factors indicates that this may not be the case. Proactivity is about self-initiated behaviours to bring about positive change to the self or to the organisation (Bindl & Parker, 2010; Frese, 2008; Grant & Ashford, 2008; Parker & Collins, 2010). Proactive performance is future-oriented, and is thus frequently associated with innovation and change. Based on the definition of the four factors as listed in the Table 5.1, I find that *UCF1 leading and deciding*, *UCF5 creating and conceptualising* and *UCF8 enterprising and performing* may contain meaning close to the definition of proactive performance, but *UCF3 interacting and presenting* does not. *UCF1 leading and deciding* is about taking control over and giving directions to others, and may suggest an action-oriented tendency to make things happen; *UCF5 creating and conceptualising* addresses individual tendency to seek out learning opportunities, think broadly and strategically, handle situations with creativity and support organisational change; *UCF8 enterprising and performing* contains the elements of develop new business opportunities, finding business leads, and exerting effort to one's own development and career advancement. These themes tend to coincide with the self-initiated, improvement-focused and change-oriented definition about proactive behaviour as described above (ditto).

UCF3 interacting and presenting, on the other hand, is about maintaining effective interpersonal relationships through communicating, networking and interacting with others. Its relationship with proactive performance seems looser and less direct;

rather, it seems more related to the interpersonal aspect of performance. Since interpersonal performance is an important and frequently occurring factor in all previously proposed, four-factor performance models (e.g., Borman & Brush, 1993; R. Hogan & Bensen, 2009; R. Hogan & Kaiser, 2005; R. Hogan & Warrenfeltz, 2003), it seems reasonable to posit it as a separate factor formed by *UCF2 supporting and cooperating* and *UCF3 interacting & presenting*.

As a result of the above conceptualisation, I propose a four-factor structure as an alternative to a two- and three-factor structure, to stand at the higher-level of the Great Eight framework. The mapping of Great Eight onto these four factors, together with its mapping onto the two- and three-factor structure, as already discovered by Bartram (2005), is presented in Table 5.3. Table 5.3 also presents a simple one-factor structure (Model 1) in which all factors were expected to load on only one general performance factor.

Table 5.3. Proposed high-order performance structures of the Great Eight

No.	Great 8 factors	Model 1: 1-factor	Model 2: 2-factor	Model 3: 3-factor	Model 4: 4-factor
UCF1	Leading & Deciding	General	Task	Promote change	Proactive
UCF2	Supporting & Cooperating	General	Contextual	Work together	Interpersonal
UCF3	Interacting & Presenting	General	Task/Contextual	Promote change	Interpersonal
UCF4	Analysing & Interpreting	General	Task	Demonstrate capability	Task
UCF5	Creating & Conceptualising	General	Task	Promote change	Proactive
UCF6	Organising & Executing	General	Task	Demonstrate capability	Task
UCF7	Adapting & Coping	General	Contextual	Work together	Adaptive
UCF8	Enterprising & Performing	General	Task	Promote change	Proactive

5.2.2.4. Summary of high-order factor structure:

Based on the discussions above, a two-, three-, or four-factor are all possible higher-order structures for the performance domain, yet it remains unclear as to what is the most appropriate high-order structure. It may be expected, however, that slightly more differentiated models provide a better fit with empirical data. For instance, the simplest two-factor, task-contextual dichotomy may not offer sufficient explanation of the complex criterion space. In particular, the definition of contextual performance may be too broad and too vague to encompass all behaviours that are non-prescribed by job roles. This is probably the reason that clarifying and disentangling the facets of the contextual domain started immediately after the establishment of the task-contextual dichotomy by Borman and Motowildo (1993). For instance, Van Scotter and Motowildo (1996) differentiated two elements of contextual performance, an *interpersonal facilitation* factor that is about being cooperative, considerate and helpful to co-workers, and a *job dedication* factor that is about being self-disciplined, rule-following, hardworking and taking initiatives.

There is also some empirical evidence to support more differentiated, rather than less differentiated performance structures. Kolk et al. (2004) showed that with assessment centre data, the three-factor solution of *thinking*, *feeling*, and *power* explained empirical data better than the two-factor solution of *feeling* and *thinking* (representing interpersonal and task). Velera and Landis (2010) in validating Campbell et al.'s (1993) structure, also showed that the task versus contextual (in-role versus extra-role) dichotomy provides a rather poor fit to empirical data, again pointing to the need to go beyond the simple task – contextual (or task – interpersonal) dichotomy. Scullen et al. (2003) further showed that a four-factor structure (technical, administrative, human, citizenship) explained 360-degree performance ratings better than the three-factor structure in which human performance and citizenship performance are combined. Therefore, I propose:

Hypothesis 1: The 4-factor structure, consisting of task, interpersonal, adaptive, and proactive factors, will fit empirical data better than the less differentiated, two- and three-factor structures.

5.2.3. Relationship with deductively derived performance taxonomy

To integrate performance taxonomies developed from different approaches (inductive and deductive), I compare the higher-order structure emerging from inductively derived, high-specificity frameworks such as the Great Eight, to deductively derived, high-generality models. A successful mapping at the high level of abstraction in the criterion space would provide empirical evidence to assure us that consistency across various taxonomies can be found, and that a shared understanding of performance can be achieved. If, however, discrepancies are revealed, then it is also helpful to look into to the nature of these discrepancies, so as to assist future model building and model integration.

From the numerous deductively derived performance models (as reviewed in Chapter 2), I took the three-factor model developed by Griffin et al. (2007) as the benchmark to compare the high-order structure of Great Eight. Based on job role theory, this model describes and differentiates between three critical aspects of performance: proficiency, adaptivity, and proactivity. The proficiency aspect addresses task performance on the job roles that are prescribed; the adaptivity aspect delineates how individuals cope with and respond to changes to their existing job roles; the proactivity aspect depicts how well individuals initiate change to their work roles and to their environment. Griffin et al. (2007) provided evidence that these three aspects are empirically distinguishable both with self-reported and supervisor-reported performance ratings, by using large samples collected from two Australia-based organisations. The primary reason for choosing this model, apart from its strong theoretical basis, is that it is a recently derived framework that has incorporated newly emerged performance domains of adaptivity and proactivity. These two aspects address adapting to and creating changes in organisations, and have been recognised as increasingly critical in

today's fast-changing, dynamic and interdependent work environment (Frese, 2008; Hesketh & Neal, 1999; Wall & Jackson, 1995). Therefore, this model gives more comprehensive and updated profiling of the performance domain, as compared to earlier developed performance frameworks such as those based on the task-contextual dichotomy.

Earlier discussion has led to the hypothesis that although different numbers of high-order factors are possible, a four-factor structure will be more appropriate than the less differentiated two- or three-factor structure. Based on the four-factor structure as proposed, I further expect that three factors from this model can be directly mapped one-to-one with factors in Griffin et al.'s (2007) model. From earlier conceptualisation, it is evident that three of the four factors, that is, task, adaptive, and proactive performance, can be almost identically aligned with the proficiency, adaptivity, and proactivity factors in Griffin et al.'s model. Therefore, I expect that sufficient convergent and discriminant validity can be found by comparing the three factors across two models. The fourth factor in the high-order structure, interpersonal performance, is not directly represented in the three individual-level performance dimensions in Griffin et al.'s framework, and may be more strongly reflected in their team- and organisational-level performance dimensions (see Section 2.3.3.2.2 for descriptions of this framework). Given that this study focuses on only individual-level variables, the interpersonal factor is thus not expected to relate strongly to the three individual-level performance dimensions in Griffin et al.'s framework.

> *Hypothesis 2a: The proactive factor in the higher-order structure will be most strongly related to the proactivity factor in Griffin et al.'s framework.*

> *Hypothesis 2b: The task factor in the higher-order structure will be most strongly related to the proficiency factor in Griffin et al.'s framework.*

> *Hypothesis 2c: The adaptive factor in the higher-order structure will be most strongly related to the adaptivity factor in Griffin et al.'s framework.*

Hypothesis 2d: The interpersonal factor in the higher-order structure will NOT strongly related to any individual-level factor in Griffin et al.'s framework.

5.3. Method

5.3.1. Participants

The study was conducted in the China team of a major multinational corporation in the telecommunications industry. Employees and their direct supervisors at two departments, a research-oriented product division, and a quality control and customer care division, were invited to participate. The majority of employees and supervisors had an engineering background. Employees were invited to complete the self-report version of UCF questionnaire. Their direct supervisors were invited to complete the supervisor version of UCF questionnaire. Additionally, supervisors also completed the performance measure as developed by Griffin et al. (2007) in assessing proficiency, adaptivity, and proactivity. Email invitations and web-links to take the survey were sent to a total of 415 employees and their direct supervisors, and valid results were obtained from 242 employees and 158 supervisors, representing a response rate of 58.3% for employees and 38.1% for supervisors. The matched sample size of self-ratings and supervisor ratings was 135. Among the 242 employees who completed survey, 63 (26% of the total) were from the research-oriented product division, representing a response rate of 41%; the remaining (74% of the total) was from the quality control and customer care division, representing a response rate of 68%. Among the 158 supervisors who completed survey, 33 (21% of the total) were from the research-oriented product division, representing a response rate of 19%; the remaining (79% of the total) was from the quality control and customer care division, representing a response rate of 52%. It was not entirely clear why the response rate was greatly different across the two divisions, and it was speculated that one reason may be the different level of support for the project from the management team of the two divisions. It should be noted that the unequal proportion of completed responses across the two divisions may have biased the results towards the

quality control and customer care division, an issue that will be discussed in the discussion section.

5.3.2. Measures

Each of the Great Eight is measured by two to four competencies selected from the UCF competency pool, making a total of 22 competencies to be included in this study. The selection was made on the basis of ensuring and maximising broad coverage of the middle-tier (20 dimensions), so that the content of all Great Eight factors can be fairly well represented. Table 5.4 lists these selected competencies. The organisation of these competencies in the Great Eight framework and a sample item for each competency is shown in Appendix A. The psychometric properties of these competencies and Griffin et al.'s performance measures are described as follows, and are reported in Table 5.4.

Self-reported UCF questionnaire used in this study contains 200 items, assessing 22 competencies. The number of items in each competency scale is provided in Table 5.4 (indicated by n in the parentheses after each scale reliability coefficients). Participants were required to answer on a 5-point Likert scale to indicate the extent to which they agree with the presented behavioural statement, with 1 indicating strongly disagree and 5 indicating strongly agree. Cronbach's alphas of the 22 competencies ranged from .71 to .94, with a median of .86.

Supervisory reported UCF questionnaire contained 87 items assessing the same 22 competencies as in the self-reported version. The number of items in each competency scale is provided in Table 5.4 (indicated by n in the parentheses after each scale reliability coefficients). The response scale was the same as in the self-reported UCF, except that an extra response option of 'do not know' was provided, allowing for the possibility that some behaviours may be difficult to observe for supervisors. Cronbach's alphas of the 22 competencies ranged from .61 to .87, with a median of .79. The slightly lower reliability associated with a few competencies (e.g. UCF7.1, UCF7.2) may have been due to the presence of negatively scored items in the scales.

Proficiency, Adaptivity and Proactivity were each measured by 3 items developed by Griffin et al. (2007). The response scale was a 7-point Likert scale, with 1 indicating *strongly disagree* and 7 indicating *strongly agree*. Cronbach's alphas were .88, .87 and .89 on these three scales respectively, based on responses collected from supervisors. The items in Griffin et al.'s model are provided in Appendix B.

The Chinese version of the above measures was used. Chinese translations for the items in UCF competencies were independently conducted by experienced bilingual psychologists employed at the test publisher, and then reviewed and confirmed by myself. For Griffin et al.'s (2007) measure, items were first translated by myself and then reviewed and approved by five other experienced work psychologists.

5.3.3. Data Analysis

Due to relatively small sample size, analyses in this study are carried out using competency scores, rather than item scores. It should be noted, however, that even by performing analysis at the scale-level rather than item-level, the sample size of this study is still not optimal. While the sample size for self-report has reached minimum requirement (e.g. sample size at least 10 times of the number of variables, T. A. Brown, 2006), the sample size collected from supervisors is clearly unsatisfactory. This limitation may have affected the stability and generalizablity of the findings of this study.

I primarily adopt exploratory factor analysis (EFA) analysis to test the higher-order structure of UCF competencies. The reason for using EFA rather than CFA (confirmatory factor analysis) is that CFA has been found to be overly restrictive, since each indicator is allowed to load on only one factor and cross-loading of indicators is excluded. Several scholars have suggested that this restriction may lead to a poor fit of the data, distortion of the observed pattern of relations among the factors, and overestimation of the correlation among latent factors (Asparouhov & Muthén, 2009; Marsh et al., 2010; Marsh et al., 2009). Such a problem may be especially severe when CFA is applied to multifactor rating instruments, since it is often difficult to get an acceptable fit for even good multifactor rating instruments (Marsh et al., 2010; Marsh et al., 2009).

Therefore, exploratory factor analysis (EFA) has recently been re-advocated (Asparouhov & Muthén, 2009; Marsh et al., 2009) and an Exploratory Structural Equation Modelling (ESEM) procedure has been implemented in statistical programmes such as Mplus (Muthén & Muthén, 2008). ESEM is a combined approach of EFA and CFA. It can correct the measurement error and provide various fit indices that are not typically available in traditional EFA, and at the same time, releases the zero-factor loading restriction associated with CFA. Marsh and colleagues used data collected from a well-established teaching rating questionnaire (Marsh et al., 2009) and from a well-known personality questionnaire NEO-PI (Marsh et al., 2010), and showed that CFA does not yield a satisfactory fit to *a priori* structure, even for a well-established structure such as the Big Five. Comparative fit index (CFI) was frequently below the desirable cut-off point of .90, and RMSEA was above .10. Instead, ESEM significantly improved the model fit to a much more satisfactory level, and at the same time, generated more differentiated factors with intercorrelations among the latent factors being greatly reduced.

When multidimensional performance ratings are involved in this study, it is highly likely that different performance variables will be intercorrelated, and that imposing a structure to force each variable to load only on one high-order factor may not be appropriate. Therefore, I will use the EFA analysis as proposed by Marsh and colleagues. Based on the earlier arguments about a possible higher-order performance structure, I have separately requested two factors, three factors, and four factors to be extracted from the data. For comparison purposes, I also kept in the results from requesting only one factor; this is to examine whether all performance variables fall into one general performance factor. I separately analysed the factor structure of self-rated and supervisor-rated performance, so as to examine whether the same results can be obtained. Due to that the sample size being better with self-rated performance than with supervisor rated performance (N=242 versus N=158), self-ratings are considered as the benchmark and supervisor ratings are considered to provide additional information for validation. All analyses in this study are conducted in Mplus version 5.1.

Table 5.4. Reliability, mean and standard deviation (S.D.) for 22 UCF competencies and Griffin et al.'s (2007) measures

UCF Competencies	Self (N=242)			Supervisor (N=146-158)			Self-Super (N=129-135)	
	Reliability	Mean	S.D.	Reliability	Mean	S.D.	Difference	Cohen's *d*
UCF1.1 Making difficult decisions	.82 (n=8)	3.37	.55	.80 (n=4)	3.53	.63	.23	.40
UCF1.2 Coordinating others	.94 (n=9)	3.45	.72	.86 (n=4)	3.62	.69	.21	.29
UCF1.3 Motivating others	.84 (n=10)*	3.68	.51	.82 (n=4)	3.69	.58	.03	.06
UCF2.1 Understanding others	.85 (n=8)	3.79	.52	.68 (n=3)	3.75	.57	-.02	-.03
UCF2.2 Acting Ethically	.80 (n=8)	3.98	.47	.74 (n=4)	4.09	.50	.11	.22
UCF2.3 Maintaining good relationships	.84 (n=8)	4.10	.46	.77 (n=4)	4.06	.55	-.05	-.11
UCF3.1 Networking	.92 (n=10)	3.35	.67	.87 (n=4)	3.39	.64	.08	.11
UCF3.2 Resolving conflicts	.85 (n=8)*	3.55	.58	.74 (n=4)	3.66	.51	.17	.29
UCF3.3 Persuading	.90 (n=9)	3.75	.55	.79 (n=4)	3.79	.52	.07	.14
UCF3.4 Presenting to others	.93 (n=10)*	3.38	.68	.87 (n=4)	3.43	.70	.11	.14
UCF4.1 Evaluating critically	.87 (n=9)	3.74	.49	.73 (n=4)	3.84	.53	.12	.24
UCF4.2 Making rational judgment	.85 (n=8)	3.99	.43	.84 (n=4)	4.06	.55	.13	.25
UCF4.3 Updating specialist knowledge	.91 (n=9)	3.55	.64	.64 (n=4)	3.73	.52	.21	.35
UCF5.1 Generating new ideas	.89 (n=10)*	3.62	.63	.81 (n=4)	3.60	.65	-.01	-.02
UCF5.2 Thinking strategically	.93 (n=10)	3.70	.61	.85 (n=4)	3.41	.60	-.23	-.39
UCF6.1 Planning ahead	.71 (n=10)*	3.65	.45	.69 (n=4)*	3.72	.53	.09	.17
UCF6.2 Working systematically	.88 (n=9)	3.99	.46	.79 (n=4)	3.89	.56	-.05	-.10
UCF6.3 Monitoring quality	.80 (n=9)*	4.07	.41	.74 (n=4)	3.99	.53	-.08	-.17
UCF7.1 Adapting to change	.80 (n=10)*	3.53	.50	.61 (n=4)*	3.77	.53	.23	.46
UCF7.2 Coping with pressure	.81 (n=10)*	3.70	.50	.65 (n=4)*	3.68	.52	.00	.01
UCF8.1 Striving to achieve	.89 (n=10)	3.79	.54	.81 (n=4)	3.82	.58	.06	.11
UCF8.2 Develop business opportunities	.94 (n=8)	3.28	.72	.86 (n=4)	3.21	.61	-.03	-.02
Griffin et al. (2007)'s Proficiency	----	----	----	.88 (n=3)	6.01	.74	----	----
Griffin et al. (2007)'s Adaptivity	----	----	----	.87 (n=3)	5.75	.76	----	----
Griffin et al. (2007)'s Proactivity	----	----	----	.89 (n=3)	5.58	.89	----	----

Note:

a) * indicates the scale contains negatively worded items; b) n in the parentheses shows number of items in each scale; c) Self-Supervisor difference scores were calculated by subtracting self-ratings from supervisor ratings. Thus positive scores indicate that supervisors rated higher than the self; d) Sample size on some supervisor-rated competencies was fewer given that the 'don't know' response was coded as missing.

5.4. Results

5.4.1. Descriptive statistics

Table 5.4 provides the mean and standard deviation of all the performance measures used in this study. The last column of Table 5.4 also provides the difference scores between self-ratings and supervisor ratings on 22 UCF scales. Given that there were fewer supervisors than employees completing the questionnaire, these difference scores were calculated based on data from those whose self-ratings and supervisor ratings were matched. The difference scores were calculated by subtracting self-ratings from supervisor ratings, thus positive scores indicate that supervisor's ratings were higher than self-ratings. Effect size was also calculated as Cohen's *d* score, which is the difference between mean ratings in proportion to their pooled standard deviation (Cohen, 1988). The following results can be observed. First, supervisors rated higher than the self on most UCF competencies, showing that there is no evidence of self-inflation in performance ratings. Second, differences on the 22 competencies are not substantial between self and supervisor ratings. According to Cohen (1988), an effect size at 0.2 or 0.3 levels can be considered as a small effect, and an effect size at the 0.5 level is a moderate effect. In Table 5.4, most of the differences between self and supervisor ratings are within the small effect size range, with only a few approaching the moderate effect.

Table 5.5 provides the intercorrelations among all 22 UCF competencies of self- and supervisor-reported ratings. One observation from this table is that there is no clear evidence that competencies within the same Great Eight factors correlated higher with each other than with competencies belonging to different Great Eight factors. This tends to suggest that the convergent and discriminant validity of the eight-factor structure may not be highly satisfactory with this dataset.

Table 5.5. Intercorrelations of 22 UCF competencies (below diagonal: self-report, N=242; above diagonal: supervisor-report, N=146-158)

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22
1. UCF1.1		**.35**	**.34**	.19	.16	.08	.33	.40	.51	.48	.58	.29	.40	.54	.52	.21	.38	.37	-.02	.43	.42	.51
2. UCF1.2	**.45**		**.69**	.41	.35	.50	.49	.62	.64	.66	.48	.41	.44	.44	.58	.31	.65	.57	.07	.40	.52	.52
3. UCF1.3	**.40**	**.67**		.61	.55	.64	.47	.73	.69	.63	.60	.58	.59	.53	.65	.54	.72	.68	.22	.44	.75	.57
4. UCF2.1	.48	.46	.60		**.48**	**.64**	.44	.72	.58	.50	.43	.59	.37	.32	.54	.45	.58	.53	.20	.33	.45	.35
5. UCF2.2	.38	.38	.52	**.41**		**.49**	.12	.46	.43	.27	.51	.61	.46	.36	.37	.38	.55	.61	.37	.50	.55	.23
6. UCF2.3	.24	.39	.61	**.64**	**.44**		.51	.64	.57	.48	.41	.52	.39	.34	.39	.34	.58	.53	.35	.35	.49	.35
7. UCF3.1	.50	.61	.56	.71	.33	.57		**.57**	**.51**	**.59**	.29	.33	.40	.40	.41	.24	.38	.29	.06	.03	.28	.61
8. UCF3.2	.51	.67	.78	.69	.44	.59	**.72**		**.78**	**.66**	.54	.54	.42	.42	.63	.43	.64	.59	.21	.40	.58	.54
9. UCF3.3	.56	.61	.75	.71	.49	.63	**.70**	**.83**		**.69**	.57	.49	.48	.49	.65	.39	.63	.59	.21	.46	.54	.56
10. UCF3.4	.45	.52	.70	.60	.43	.56	**.64**	**.79**	**.80**		.46	.40	.50	.51	.68	.35	.60	.47	.02	.25	.47	.67
11. UCF4.1	.59	.60	.63	.59	.48	.47	.50	.64	.71	.56		**.66**	**.61**	.71	.62	.45	.68	.64	.09	.54	.70	.47
12. UCF4.2	.41	.49	.66	.57	.53	.64	.46	.61	.66	.58	**.70**		**.57**	.54	.52	.56	.71	.71	.27	.53	.65	.36
13. UCF4.3	.44	.56	.61	.48	.44	.47	.64	.61	.63	.58	**.61**	**.58**		.60	.63	.41	.54	.52	.17	.38	.63	.62
14. UCF5.1	.42	.45	.66	.49	.40	.49	.45	.65	.68	.60	.71	.57	.50		**.66**	.35	.55	.54	.11	.47	.62	.59
15. UCF5.2	.64	.65	.69	.61	.50	.50	.63	.73	.79	.67	.83	.68	.75	**.71**		.38	.61	.57	.06	.46	.63	.70
16. UCF6.1	.10	.35	.47	.28	.42	.42	.23	.32	.36	.32	.43	.57	.41	.30	.43		**.65**	**.54**	.09	.28	.45	.30
17. UCF6.2	.45	.65	.75	.55	.60	.61	.55	.67	.69	.60	.72	.77	.64	.57	.74	**.65**		**.77**	.21	.51	.68	.48
18. UCF6.3	.29	.45	.63	.45	.59	.57	.39	.47	.53	.39	.60	.67	.54	.50	.59	**.64**	**.74**		.25	.58	.70	.42
19. UCF7.1	.08	.16	.54	.32	.27	.38	.14	.37	.35	.39	.34	.44	.17	.56	.31	.31	.36	.35		**.52**	.27	.00
20. UCF7.2	.14	.30	.61	.33	.39	.41	.10	.42	.39	.44	.44	.59	.26	.55	.39	.41	.47	.47	**.75**		.56	.25
21. UCF8.1	.55	.55	.61	.54	.59	.45	.56	.64	.64	.55	.73	.66	.64	.65	.74	.41	.70	.65	.37	.41		**.51**
22. UCF8.2	.53	.63	.64	.60	.35	.47	.75	.74	.72	.66	.66	.56	.83	.60	.79	.28	.61	.42	.20	.24	**.63**	

Note: a) the expected high correlations (i.e. competencies underneath the same main factor) are bolded; b) in self-report (below diagonal), $p < .01$ for $r > .17$; in supervisor-report (above diagonal), $p < .01$ for $r > .21$.

5.4.2. High-order structure of the UCF

Before testing the four hypothesised high-order structure, I briefly examined the model fit results of the originally proposed Great Eight structure through the use of confirmatory factor analysis (CFA). In both self and supervisor ratings, the eight-factor model could not be produced, due to overly high intercorrelations among several latent factors. This shows that eight factors may be too many for participants to make sufficient distinctions among them. This is consistent with those discussed in the literature chapter that the construct validity of inductively derived taxonomies may be hard to establish due to their high-specificity nature, and it may be necessary to move upwards along the performance hierarchy, so that good construct validity may be found.

Exploratory factor analysis was performed in Mplus version 5.1 to explore the high-order structures of the Great Eight. The default maximum likelihood (ML) extraction and geomin rotation (a type of oblique rotation) method was used. These were suggested to be more desirable than other extraction and rotation methods, since ML estimation provides goodness-of-fit evaluation and statistical inference, and oblique rotation allows latent factors to be correlated, and is thus more realistic in the real world (T. A. Brown, 2006). In evaluating model fit results, I follow the conventional approach by relying on several different goodness-of-fit indices to make a decision: the absolute fit index of chi-square (χ^2) and its associated χ^2/df ratio (chi-square as divided by degree of freedom), a relative fit index of comparative fit index (CFI), two proximate fit indices of root mean square error of approximation (RMSEA), and standardised root mean square residual (SRMR). It has been suggested that an excellent fitted model should have a non-significant χ^2, a χ^2/df ratio below 3, a CFI above .95, a RMSEA below .08, and a SRMR below .10; and because χ^2 is highly sensitive to sample size, the remaining indices are frequently more relied upon to make the decision about accepting or rejecting a model (Hu & Bentler, 1999; Schermelleh-Engel, Moosbrugger, & Müller, 2003).

EFA fit results by separately requesting 1, 2, 3, 4 factors are provided in Table 5.6. The one-factor model was to test whether the 22 UCF scales can be

explained by one single general performance factor. The performing of 2-, 3-, and 4-factor models allows latent factors to intercorrelate, as the default setting in Mplus.

First, it can be seen that the one-factor model shows a rather poor fit to the data both with self-ratings (χ^2 = 1551.998, df = 209, χ^2/df = 7.43, CFI = 0.731, RMSEA = 0.163, SRMR = 0.085) and with supervisor ratings (χ^2 = 933.935, df = 209, χ^2/df = 4.47, CFI = 0.730, RMSEA = 0.148, SRMR = 0.090), suggesting that there is more than one general factor underlying all 22 competencies. It also seems that the 2-factor and 3-factor solutions did not explain the data well enough. It is only when four factors were allowed to be extracted from the data that fit indices started to approach an acceptable level (with self-ratings, χ^2 = 494.745, df = 149, χ^2/df = 3.32, CFI = 0.931, RMSEA = 0.098, SRMR = 0.027; with supervisor ratings, χ^2 = 344.429, df = 149, χ^2/df = 2.31, CFI = 0.927, RMSEA = 0.091, SRMR = 0.032).

Although most fit indices were still slightly below the optimal level except for SRMR, these values may be regarded as acceptable, since less stringent cut-off values of CFI being between .90 and .95 and RMSEA below .10, can be accepted especially with small sample sizes (Bentler, 1990; Hu & Bentler, 1999; Marsh, Hau, & Wen, 2004; Mathieu & Taylor, 2006). Moreover, the 4-factor solution was supported from scree plots and eigenvalue results, given that only the first four factors had eigenvalues of higher than 1, and the scree plot flattened out beginning from the fifth factor. This shows that four factors can sufficiently explain the variance of ratings on the 22 UCF competencies. The pattern was similar between self-ratings and supervisor ratings, showing that employees and their supervisors interpreted and differentiated the multiple dimensions of job performance in a similar way.

Table 5.6. Model comparisons of the high-order structure of UCF

Model	χ^2	df	Ratio χ^2/df	CFI	RMSEA	SRMR
Self-Rating (N=242)						
Model 1: 1-factor	1551.998	209	7.43	0.731	0.163	0.085
Model 2: 2-factor	1084.205	188	5.77	0.821	0.140	0.055
Model 3: 3-factor	741.166	168	4.41	0.885	0.119	0.039
Model 4: 4-factor	494.745	149	3.32	0.931	0.098	0.027
Supervisor Rating (N=158)						
Model 1: 1-factor	933.935	209	4.47	0.730	0.148	0.090
Model 2: 2-factor	661.381	188	3.52	0.823	0.126	0.064
Model 3: 3-factor	435.456	168	2.59	0.900	0.100	0.041
Model 4: 4-factor	344.429	149	2.31	0.927	0.091	0.032

The factor loading results of the four-factor solution in both self- and supervisor-ratings are presented in Table 5.7, with loadings higher than .40 shown in bold. A comparison of the factor loadings between self-ratings and supervisor ratings suggests that a generally similar pattern can be observed, yet some discrepancies were also in place. I will first summarise the similarities. With both rating sources, the first factor is loaded by most competencies within the factors of UCF2 and UCF3, and these competencies clearly address a people-oriented construct that is about being cooperative, understanding others and getting along with others. It is thus consistent with the hypothesised interpersonal performance factor. Factor 2 is loaded by most competencies from UCF4, UCF5 and UCF8, as well as UCF1.1 making difficult decisions competency that is part of UCF1. This is partly supportive of my hypothesis, as I expected UCF1, UCF5 and UCF8 to merge as a proactivity factor, but I did not expect UCF4 to load on this factor as well. Looking through the competencies in this high-order factor, it seems that they not only address the proactive element of creating new strategies, developing business opportunities and improving oneself, but also include a cognitive element of making decisions and evaluating problems. Therefore, this factor is re-labelled as cognitive/proactive performance, so that both elements are incorporated. Factor 3 attracts all three

competencies within UCF6 and some competencies from UCF4. Interestingly, this factor is also loaded by UCF2.2 acting ethically, a facet that is part of UC2 supporting and cooperating. Nevertheless, this factor is mainly about delivering and executing core tasks, and is thus consistent with the task performance factor I expected. Finally, factor 4 is predominately loaded by the two UCF7 competencies and clearly addresses adaptive performance. As a whole, the factor loading results from both self and supervisor ratings lend support to my hypotheses, yet it should also be pointed that some loadings may not be as clear-cut as expected.

The discrepancies between employees' self-ratings and their supervisors' ratings exist in the competencies of UCF1.2, UCF3.4, UCF4.1, UCF4.3, UCF5.1, UCF8.1 and UCF8.2. Some of these discrepancies are not substantial; for instance, with UCF1.2 and UCF8.2, the loadings are generally consistent yet with slightly different magnitude across the two rating sources. However, some other discrepancies are greater, showing that supervisors perceived some competencies to reflect different aspects of performance dimension than employees did. For instance, with *UCF8.1 striving to achieve*, employees tended to perceive this competency as reflecting cognitive/proactive performance, yet supervisors perceived it as more reflective of task performance. These discrepancies across self- and supervisor-ratings, as well as the unexpected factor loadings in relation to hypotheses, suggest that the high-order performance structure may not be perfectly clear-cut.

To examine factor congruence between the four-factor structures from the two rating sources, I computed Tucker's Phi (Tucker, 1951) as a congruence index. Tucker's phi was .96, .90, .91, and .85 on the four factors respectively. Considering that above .85 or .90 usually indicates a good to excellent level of congruence (J. M. F. ten Berge, 1986), this suggests satisfactory equivalence in factor structure between self-ratings and supervisor ratings.

Taken together, using competencies representing the Great Eight, I found that a four-factor structure can be seen as the most appropriate high-order factor structure supported by the results using both self-ratings and supervisor ratings of performance. The four factors, interpersonal performance, cognitive/proactive performance, task performance and adaptive performance, are generally in line with the four factors I proposed (hypothesis 1). The factor structures across self-reported and supervisor-

reported data had good congruence, suggesting great similarity in the way employees and their supervisors interpreted and differentiated aspects of job performance.

It seems that several competencies have substantial cross-loading across the four latent factors, which may indicate that using CFA to restrict each of them to load on only one factor may be overly restrictive. To confirm what Marsh and colleagues have suggested about the superiority of EFA over CFA (Marsh et al., 2010; Marsh et al., 2009), I retrospectively tested this emergent four-factor structure in CFA. The CFA model shows a much poorer fit (with self-ratings, $\chi^2 = 1017.284$, $df = 201$, CFI = 0.837, RMSEA = 0.130, SRMR = 0.156; with supervisor ratings, $\chi^2 = 753.462$, $df = 201$, CFI = 0.800, RMSEA = 0.132, SRMR = 0.160) than that produced in EFA. Modification indices indicated that several competencies had significantly high loadings on factors that they were not supposed to load on. These results reflect the fact that performance competencies may contain complex meanings, and should thus not be forced to load onto only one high-order factor.

Table 5.7. Exploratory factor analysis on 22 UCF competencies

	Self-Report (N=242)				Supervisor Report (N=158)			
	1 Inter-personal	2 Cognitive /Proactive	3 Task	4 Adaptive	1 Inter-personal	2 Cognitive /Proactive	3 Task	4 Adaptive
UCF1.1 Making difficult decisions	.158	**.641**	-.044	-.035	.022	**.711**	-.149	.263
UCF1.2 Coordinating others	.380	.289	.248	-.021	**.492**	.252	.098	.154
UCF1.3 Motivating others	**.414**	.072	.265	**.431**	**.463**	.133	.394	.144
UCF2.1 Understanding others	**.590**	.101	.127	.136	**.592**	-.149	.304	.135
UCF2.2 Acting Ethically	.071	.124	**.498**	.114	.080	-.142	**.508**	.364
UCF2.3 Maintaining good relationship	**.518**	-.184	.391	.213	**.600**	-.226	.289	.190
UCF3.1 Networking	**.779**	.157	.104	-.166	**.646**	.260	.045	-.252
UCF3.2 Resolving conflicts	**.651**	.203	.020	.264	**.740**	.067	.086	.205
UCF3.3 Persuading	**.555**	.296	.086	.220	**.615**	.246	-.020	.289
UCF3.4 Presenting to others	**.603**	.164	-.017	.297	**.592**	**.421**	.032	-.048
UCF4.1 Evaluating critically	-.032	**.699**	.237	.177	-.045	**.448**	**.450**	.240
UCF4.2 Making rational judgment	.091	.230	**.499**	.256	.056	.048	**.661**	.228
UCF4.3 Updating specialist knowledge	.316	**.421**	.307	-.094	.030	**.435**	**.442**	.045
UCF5.1 Generating new ideas	.084	**.499**	-.049	**.530**	-.061	**.625**	.312	.141
UCF5.2 Thinking strategically	.155	**.704**	.187	.099	.291	**.533**	.154	.148
UCF6.1 Planning ahead	-.056	-.056	**.748**	.113	.114	.019	**.615**	-.026
UCF6.2 Working systematically	.189	.209	**.627**	.118	.256	.139	**.551**	.178
UCF6.3 Monitoring quality	-.021	.104	**.766**	.105	.140	.105	**.530**	.311
UCF7.1 Adapting to change	-.007	-.071	-.013	**.875**	.067	-.295	-.047	**.661**
UCF7.2 Coping with pressure	-.101	-.011	.164	**.836**	-.092	.168	-.025	**.904**
UCF8.1 Striving to achieve	.081	**.500**	.322	.152	.063	.274	**.489**	.275
UCF8.2 Develop business opportunities	**.487**	**.500**	.049	-.041	.370	**.598**	.037	-.061

Note: Loadings at >.40 are shown in bold.

5.4.3. Effects of background variables

To test the stability of the four-factor high-order performance structures, I then examined whether such a structure was related to background variables, including employees' age, sex (dummy-coded as male vs. female), organisational tenure, organisational level (dummy-coded as manager vs. non manager), and departmental membership (dummy-coded for the two divisions). Two ESEM with covariate analyses were separately performed for self-ratings and supervisor ratings.

Using the procedures recommended by Marsh et al. (2009), I first tested a model by entering the five background variables as independent variables and the four factors emerged from EFA analysis as dependent variables, and then constrained all background effect to zero. Model fit results are provided in Table 5.8. It can be seen that the background effect was present, but not substantial, given that the model fit was still acceptable after all background effects were constrained to zero.

Table 5.8. Model fit results for ESEM with covariates

Model	χ^2	df	CFI	RMSEA	SRMR
Self (N=240)					
4-factor ESEM	494.745	149	0.931	0.098	0.027
4-factor ESEM with background variables	666.004	239	0.916	0.086	0.032
4-factor ESEM with constraining background effects to 0	715.268	259	0.910	0.086	0.057
Supervisor (N=158)					
4-factor ESEM	344.429	149	0.927	0.091	0.032
4-factor ESEM with background variables	460.774	239	0.919	0.077	0.038
4-factor ESEM with constraining background effects to 0	510.077	259	0.908	0.078	0.059

The intercorrelations among the five background variables and the four high-order performance factors are shown in Table 5.9. With self-rated performance, departmental membership had a positive relationship on interpersonal performance, showing that employees in the quality control and customer care division perceived

themselves to have better interpersonal skills, which may reflect that these employees' jobs involved more interpersonal interactions than those working in the research division; older, male employees rated themselves higher on the cognitive/proactive aspect of performance, and older employees also regarded themselves as better in task performance. A slightly different picture was present from the supervisors' perspective, with supervisors tending to rate higher on the cognitive/proactive aspect for younger, male employees and those who had stayed in the organisation for a longer period of time.

Table 5.9. Relationships between four performance factors and covariates

	1	2	3	4	5	6	7	8	9
1. Department		.37**	-.18*	.34**	.20**	.04	-.12	.10	-.09
2. Age	.43**		-.08	.73**	.43**	-.11	-.25*	.20	.14
3. Sex (M=0, F=1)	-.21**	-.05		-.06	.03	.04	-.34**	-.09	-.08
4. Tenure	.34**	.73**	-.07		.39**	.06	.31**	-.06	-.03
5. Org Level	.21**	.36**	-.06	.38**		.23	.12	-.18	-.06
6. F1-Interpersonal	.21**	-.04	.05	.05	.01		.39**	.45**	.29**
7. F2-Cognitive/Proactive	.00	.23*	-.14*	-.05	-.08	.56**		.37**	.27**
8. F3-Task	.12	.21*	-.12	-.13	-.02	.39**	.41**		.48**
9. F4-Adaptive	-.05	-.04	.08	.04	-.11	.33**	.32**	.45**	

Note:
a) Below diagonal: self-reported performance (N=242); above diagonal: supervisor reported performance (N=158);
b) Department: research-oriented product division = 0, quality control and customer care division = 1; Org Level: non-manager = 0, manager = 1.

5.4.4. In comparison to deductively derived performance model

Given that the four factors, as found above, are in good alignment with my hypothesised factors, especially insofar as the task, adaptive, and proactive (although in combination with cognitive) factors are all present, I was able to proceed to compare this four-factor high-order structure to the three-factor model proposed by Griffin et al. (2007). This comparison was made with supervisor ratings of the UCF competencies and Griffin et al.'s three individual-level performance factors – proficiency, adaptivity, and proactivity.

The intercorrelations among factors in the two models are shown in Table 5.10, and the structural model by regressing Griffin et al.'s three factors on the four high-order performance factors is shown in Figure 5.3. Notably, the three factors in Griffin et al.'s model had a high intercorrelation (.77 – .84). Therefore, I conducted confirmatory factor analyses to compare the model fit of a 3-factor model ($\chi^2 = 62.404$, $df = 24$, CFI = 0.967, RMSEA = 0.101, SRMR = 0.031) to that of a 1-factor model with all items loading on a single performance factor ($\chi^2 = 101.881$, $df = 27$, CFI = 0.936, RMSEA = 0.133, SRMR = 0.037). The results showed that the three-factor model was significantly superior to the one-factor model ($\Delta\chi^2/\Delta df = 13.149$, p < .01), providing some evidence that it is more desirable to treat these factors separately.

In testing the structural model, scores on Griffin et al.'s (2007) three factors were averaged across individual items, due to that the small sample size did not allow item-level data to be used. The results showed that the adaptive aspect from four-factor structure had a ubiquitous and strong effect on all three performance factors in Griffin et al.'s model, yet its strongest effect did occur on adaptivity ($\beta = .64$, $p < .01$) as hypothesised (h2c). The hypothesised relationships between task performance in the four-factor model and proficiency in Griffin et al.'s model ($\beta = .37$, $p < .01$, supporting h2b), and between cognitive/proactive performance in the four-factor model and proactivity in Griffin et al.'s model ($\beta = .32$, $p < .01$, supporting h2c) were also found, although the strength of their effects was second to that of adaptive performance ($\beta = .54$ and .46, $ps < .01$, respectively). The interpersonal aspect in the four-factor model did not significantly relate to any factor in Griffin et al.'s model ($\beta = -.06$, -.05, and .04, respectively on proactivity, proficiency, and adaptivity, all $n.s.$), supporting h2d. Overall, apart from the ubiquitous effect of adaptive performance, satisfactory convergent and discriminant validity between this new four-factor structure and Griffin et al.'s model was found. This confirms the construct validity of this high-order performance model, and shows that convergence and agreement can be made between inductively derived models such as the Great Eight and deductively derived models such as Griffin et al.'s model. This provides us evidence that various performance taxonomies can be unified and integrated under a common high-order framework.

Table 5.10. Correlations between factors in the four-factor model and in Griffin et al.'s (2007) three-factor model (N=157 supervisor ratings)

	1	2	3	4	5	6
1. Proficiency						
2. Adaptivity	.84					
3. Proactivity	.77	.83				
4. F1-Interpersonal	.25	.31	.30			
5. F2-Cognitive/Proactive	.23	.34	**.50**	.37		
6. F3-Task	**.60**	.48	.59	.44	.36	
7. F4-Adaptive	.69	**.73**	.65	.27	.23	.48

Note:
a) All values significant at .01 level, except that proficiency and F2-Cognitive/Proactive correlated at .05 level.
b) Hypothesised relationships are shown in bold.
c) For proficiency, adaptivity and proactivity, individual items were aggregated into item parcels in the analysis.

Figure 5.3. Structural model for the 4-factor structure and Griffin et al. (2007)'s 3-factor structure
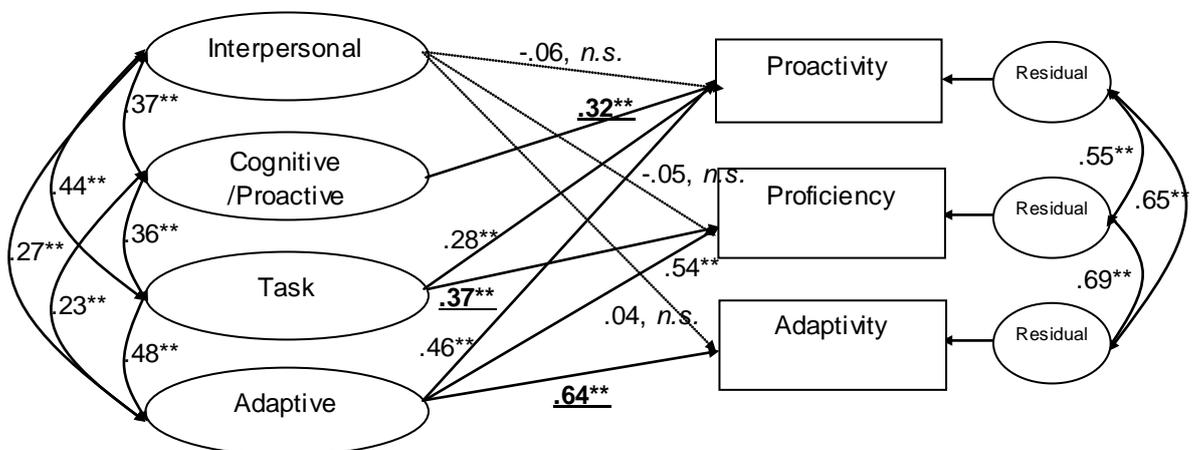
Note: a) expected relationships are bolded and underscored. b) proficiency, adaptivity, and proactivity are observed variables (denoted by square block).

5.5. Discussion

This study investigates the latent high-order structure of the performance domain by using a recently proposed, inductively derived Great Eight performance framework. Results from both employees' self-ratings and their supervisors' ratings

lend support to the hypothesis that a more differentiated four-factor structure, as composed of interpersonal, cognitive/proactive, task, and adaptive performance, can well represent the high-order structure of the performance domain. More importantly, this four-factor structure can be aligned with a deductively derived performance model. Relatively satisfactory mapping can be achieved by linking three factors of this structure to factors in Griffin et al.'s (2007) performance model, despite that adaptive performance from the four-factor model related strongly to all Griffin et al.'s factors. I now discuss the implications of this four-factor model in broader theoretical and practical contexts.

5.5.1. The four-factor performance model

As hypothesised, the four-factor structure is superior to the two- and three-factor structures suggested by Bartram (2005). Therefore, this study supports the argument that more differentiated high-order structures are needed (e.g., Scullen et al., 2003), due to the fact that simpler, less differentiated structures such as the task – contextual dichotomy cannot offer a sufficient explanation as to the complex, multidimensional performance domain. This may be especially true in today's dynamic, fast-changing work environment, which places increasingly high and multifaceted demands on employees, requesting them to deal more effectively with changes, take more initiatives, and fulfil more diverse roles at work (M. A. Griffin et al., 2007; Ilgen & Pulakos, 1999; Welbourne et al., 1998). The fact that the same performance structure can be revealed from self-ratings and supervisor ratings echoes earlier studies (Facteau & Craig, 2001; Scullen et al., 2003) and shows that different raters share a relatively common conceptualisation of performance dimensions.

The themes of the four factors, namely, interpersonal, cognitive/proactive, task and adaptive performance, have repeatedly appeared in earlier literature, although they have not always been integrated into a single taxonomy. Task performance assesses how well an employee completes core tasks, and is the primary focus of all organisations and job roles; thus, this aspect has occupied a central role in virtually all developed performance taxonomies. The interpersonal aspect is similar to the *interpersonal facilitation* facet of contextual performance (Van Scotter & Motowidlo, 1996), the *personal support* facet of organisational citizenship

behaviour (Borman et al., 2001; J. W. Johnson, 2003), and the *feeling* factor in Kolk et al.'s (2004) three-factor structure emerged from assessment centre data. The proactive aspect of cognitive/proactive performance and adaptive performance have been clearly articulated by Griffin et al. (2007), who well argued that adaptivity and proactivity are increasingly critical in today's uncertain, dynamic and boundaryless work environment and thus should be separately construed. Kurz and colleagues' (Kurz et al., 2010; Kurz et al., 2011) 3-effectiveness-model also taps on these two aspects, with *working together* incorporating the adaptive element, such as showing resilience and adapting to change, and *promoting change* addresses several themes of proactivity such as innovating and driving for success. Overall, this four-factor structure tends to accommodate the recently emergent performance constituents, and appears to offer a comprehensive coverage of the required performance aspects in today's work context.

The cognitive/proactive factor may appear confusing as it seems to lump together two different constructs. However, it is not new that cognitive and proactive aspects do share some common content. Using a managerial performance rating form, Warr and Bourne (2000) extracted three factors from a total of 36 scales, with one of the three factors being *cognitive and proactive behaviours* that summarises action-driven behaviours and strategic orientation. Furthermore, it has been recognised that there is indeed a strong cognitive element in proactive behaviour. Scholars have argued that engaging in proactive behaviours include active information seeking, challenging status quo and innovating to bring about change (Crant, 2000; Parker, Williams, & Turner, 2006). These actions all require active and deliberate cognitive involvement. Recent theoretical advancement of proactivity has also revealed that it is better conceptualised as a process of behaviours that starts from goal generation and goal setting, which are then translated into actions (Bindl & Parker, 2010; Frese & Fay, 2001; Grant & Ashford, 2008). Cognitive involvement is evident in the goal generation and goal setting stages. Besides, there has been evidence showing that the cognition-related personality trait, openness to experience, predicted individuals' proactivity at work as rated by supervisors (Neal et al., in press), again supporting the cognitive element embedded in proactive behaviours.

Overall, this four-factor high-order model gives a broad and abstract conceptualisation of work performance, while maintaining a good degree of differentiation. In addition, given that scholars have argued for alignment of bandwidth in building relationships between predictors and criteria (J. Hogan & Roberts, 1996), it is important to conceptualise work performance in a way that has comparable bandwidth to that of the predictor. If we are continually interested in using predictors at a broad level, such as Big Five traits, it is best that the performance criterion is aligned at a similarly broad level, such as the four factors. The issue of predicting performance will be addressed in more detail in the next empirical study.

5.5.2. Organising the Great Eight into four higher-order factors

Based on factor analysis results with self-ratings and supervisor ratings, I summarised the pattern of how Great Eight factors are organised into the higher-order, four-factor structure. Figure 5.4 illustrates this mapping.

The patterns are in general consistent across self and supervisor ratings, as I earlier hypothesised, and are thus not repeated here. It should be noted that while most of the eight dimensions are expected to load on only one high-order factor, a few double-loadings are allowed. First, *UCF1 leading and deciding* is allowed to load both on the interpersonal factor and on the cognitive/proactive factor. This is due to *leading* and *deciding* seeming to be two different components that may need to be distinguished from each other. Leading tends to involve the ability to coordinate and motivate other people to get the job done (*UCF1.2 coordinating others* & *UCF1.3 motivating others*), while deciding is a more cognitive aspect, as can be reflected in *UCF1.1 making difficult decisions*. Second, *UCF4 analysing and interpreting* both contributes to getting the task done (task performance) and involves substantial cognitive activity and some proactive components (e.g. *UCF4.3 updating specialist knowledge* that is about improving and developing oneself); thus the double-loading of this UCF dimension on two high-order factors is allowed.

Figure 5.4. Mapping of Great Eight onto the four-factor high-order structure
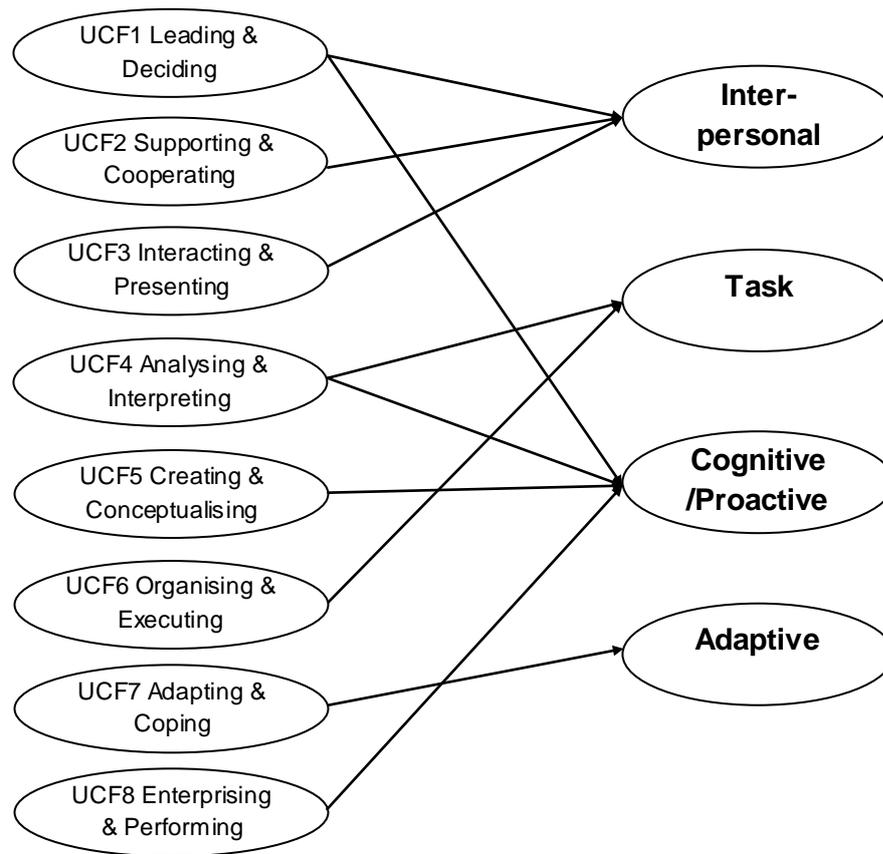
5.5.3. Four-factor structure in relation to deductively derived models

The fact that this high-order structure derived from the inductively developed Great Eight can be mapped onto a deductively developed performance model is a promising result. This result contributes to earlier conceptual mapping of high-specificity models onto high-generality models such as that conducted by Johnson (2003), and provides empirical evidence that integration can indeed be made between performance models developed from different approaches.

The broad effect of adaptive factor in the four-factor structure in relating to Griffin et al.'s performance factors should be noted. One explanation is that this adaptive aspect may contain a broader scope than that defined in Griffin et al.'s model. This adaptive aspect is mainly contributed by *UCF7 adapting and coping*, which not only addresses adapting to changes in the environment, as similarly defined by Griffin et al., but also encompasses one's competency in dealing with

setbacks and coping with pressure. It may be expected that coping with pressure can also refer to the pressure in executing core tasks (proficiency) and in working on self-initiated, non-defined tasks (proactivity), leading to a strong relationship with these two non-adaptivity factors. By looking into the relationships of the two facets of UCF7, I found that *UCF7.1 adapting to change* had a fine differentiation with Griffin et al.'s three factors such that it only correlated with adaptivity ($r = 40, p < .01$) but not with the other two factors; *UCF7.2 coping with pressure*, however, correlated strongly with proactivity ($r = .28, p < .05$) in addition to adaptivity ($r = .38, p < .01$)[5]. This provides some support for my speculation.

The other explanation could be due to the nature of this sample, which was primarily composed of engineers working in the fast-changing telecommunications industry. The majority of (79%) supervisor ratings were collected from the supervisors of those employees working in the customer care and quality control division. With these employees, a major part of their daily job is to respond to and deal with the technical problems from the customers' side. Therefore, being prepared for the uncertainty of receiving customers' calls, quickly and flexibly responding to customers' demands and handling immense work pressure may be the most important job requirement for these engineers. Accordingly, supervisors of these employees may especially value the adaptivity of their subordinates. Unfortunately, insufficient data were available from the other division in terms of drawing meaningful comparisons across departments.

5.5.4. Practical implications of the four-factor higher-order structure

The four factors not only relate well to those identified in the academic literature, but may also have strong practical value. Indeed, using four factors to frame multiple competencies have been used by many practitioners. For instance, Saville's WAVE instrument[6] used the four quadrants of *adapting approaches* (adaptive), *solving problems* (the cognitive aspect of cognitive/proactive), *influencing people* (interpersonal) and *delivering results* (task) to organise 12 major

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[5] Correlation analysis was conducted in Mplus rather than in SPSS, so that the high intercorrelations among Griffin et al.'s three factors can be controlled.
[6] See www.savilleconsulting.com for details.

competencies or performance domains. The Denison organisational culture and leadership model developed by Denison consulting[7] also groups 12 major performance aspects into *adaptability* (adaptive), *mission* (cognitive/proactive), *consistency* (task) and *involvement* (interpersonal). In industrial practice, the famous 4-E leadership model proposed and executed by Jack Welch can again be roughly mapped to the factors found in this study. The four Es include Energy, Energizer, Execute and Edge, which are about possessing energy and motivation, sparking people to perform, producing measurable results, and making good judgment and having competitive edge, respectively (Krames, 2005). These first three elements may be clearly represented in the cognitive/proactive, interpersonal, and task dimensions, as found in this study, although the Edge factor (e.g. about tough-mindedness) is only implicitly addressed by adaptive performance. Altogether, despite the fact that much of this evidence is drawn from models targeting leadership effectiveness, they point to the generalisability of a four-factor high-order model, and indicate its usefulness in conceptualising, articulating and measuring individuals' performance in work settings.

Kurz and Bartram (2002) pointed out that the use of performance models at different levels of differentiation can be used for different purposes, such that broadly defined models are more useful for academics to parsimoniously profile the performance domain, while finer-grained models are more useful for practitioners to build behavioural anchors, construct test items and facilitate action planning for their clients. While it is true that high-specificity models such as the Great Eight can provide important details about an individual, it may also be useful to frame the Great Eight or its specific competencies within a more general, four-factor structure as found in this study.

5.5.5. Using ESEM to analyse performance ratings

Methodologically, the results of this study tend to suggest that using the recently proposed ESEM approach is more appropriate for performance ratings, given the evidently superior model fit results compared to those generated in CFA

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[7] See www.denisonculture.com for details.

analysis. This may be especially the case when competency-based performance ratings are used, since job competencies are usually amalgams of a set of specific job behaviours and can thus contain multiple and complex meanings that tap several different performance factors. Using CFA may be overly restrictive in this context and may produce poor fit results. For instance, in a recent study by Varela and Landis (2010), only modest model fit (e.g. CFI at only about .85) can be obtained in CFA analysis with even the most superior and most differentiated performance model. Therefore, when analysing data from performance ratings, using the ESEM approach as proposed by Marsh et al. (2009) may lend insights to overcome such a problem of fit.

5.5.6. Limitations

There are several limitations associated with this study. The first of these concerns the fact that only a subset of the Great Eight competencies was included. The Great Eight was developed as a hierarchical structure of work performance and included a very large pool of competency components (Bartram, 2005; Bartram & Martin, 2003). The competencies used in this study, however, were only a fraction (22 competencies) selected from the entire pool; thus their content may not be sufficiently representative of the entire eight factors. Future studies may need to use more (or other) competency components, and if possible, collect a larger sample size to examine a broader spectrum of the Great Eight.

The second important limitation concerns the sample size. As has been noted in the method section, the sample size of this study may not be ideal for factor analysis. For instance, it has been recommended that 500 or more observations are needed for performing a reliable and stable factor structure (1992). Therefore, the discrepancies between self- and supervisor-ratings, and the unexpected loadings in relation to hypotheses, may be partially due to the unstable factor structure as produced by insufficient sample size. The findings of this study need to be validated with a much larger sample.

Third, it may be argued that a more rigorous approach to investigating high-order performance structure is to perform a two-level confirmatory factor analysis,

such that 22 competencies are first subsumed to the first-order factors of the Great Eight, which are further organised into four second-order factors. This unfortunately could not be performed in this study, as the one-level confirmatory factor analysis to organise 22 competencies by eight first-order factors did not succeed in the first place (see Section 5.4.2). Nevertheless, the main interest of this thesis is to investigate the validity of a conceptual high-order structure, and the validity of a strictly defined two-level factor structure may be of less concern.

Fourth, the data of this study were collected from only one organisation in the telecommunications industry, and the employees as studied had relatively homogenous educational background and job types (engineers). This may have limited the generalisability of the results. It will be useful to validate the discovered results with samples collected from other job types and other organisations.

Finally, not all invited participants completed the questionnaires, and this caused concern that data missing may not be random. The examination of the missing pattern revealed that employees who did not respond had no differences in age, organisational tenure, and job type (manager vs. non-manager) to the employees who completed the questionnaire. However, differences in sex and departmental membership were found. Female employees responded slightly less than males ($t(411) = -2.15$, $p < .05$), and employees in the customer care team had a much higher response rate than those in the research-focused team ($t(413) = 6.15$, $p < .001$). In terms of the missing pattern about supervisor ratings, a similarly strong effect of department membership ($t(401) = 6.39$, $p < .001$) was revealed. Given that only a total of 81 female employees were invited to participate, the effect of sex may not be stable. The effect of department membership may be more systematic, and may be due to different degree of involvement in this study from the directors at these two departments. Unfortunately, there was no further concrete information to support this speculation.

Finally, this study did not control for measurement errors such as halo effect or leniency effect. These idiosyncratic rater variances may be analysed only when there is more than one rater per rater group (e.g. at least two supervisors) so that shared variance and unique variance in ratings can be partitioned apart. Clearly, with data being collected only from the self and one supervisor, a more sophisticated

analysis could not be conducted in this study. Future studies need to collect more raters in each rater group, possibly using a 360-degree rating approach, to control for these idiosyncratic rater biases.

5.6. Conclusion

Based on the inductively derived, recently proposed performance taxonomy of the Great Eight performance framework, this study finds that a four-factor structure stands at the high-level of generality, and can be used to succinctly and comprehensively profile the entire performance domain. This four-factor structure fitted self-rated and supervisor rated performance similarly well, and can be mapped onto the deductively derived, three-factor performance model proposed by Griffin et al. (2007). This provides good evidence that a synergy can be drawn across performance taxonomies. Having established the construct validity of this high-order, four-factor structure, I then turn to the next chapter, which discusses the prediction of work performance from individual differences in the Big Five personality traits.

CHAPTER 6: EMPIRICAL STUDY 2

BIG FIVE PERSONALITY AND PERFORMANCE:
A NOMOLOGICAL NET AND A PROCESS VIEW OF VALIDATION

6.1. Overview

By using competencies representing the inductively derived Great Eight framework, the previous chapter supported that a four-factor structure, comprising interpersonal, cognitive/proactive, task and adaptive performance factors serves as the most appropriate high-order structure of performance. The establishment of this content- and construct-valid performance taxonomy provides a foundation for further empirical investigation of the relationship between performance factors and other psychological antecedents, such as personality. This current chapter thus moves towards the predictor domain by proposing a nomological net to link this structure to the well-established, Big Five personality framework (Research Question 2). Moreover, by drawing on the process view in conceptualising work performance (Bartram et al., 2010; Binning & Barrett, 1989; Vallance et al., 1953), this chapter tests the proposition that specific performance (i.e. factors of performance taxonomy) is the mediator that links personality and global level of performance. This not only helps to disentangle the process of how personality traits are translated into global level performance outcomes, but also reveals whether a more direct relationship can be built between personality antecedents and specific performance, rather than global performance.

Figure 6.1 presents the positioning of this chapter in the whole thesis, with the grey-shaded areas indicating the focus of this chapter. As can be seen, this chapter addresses the relationships linking Big Five personality taxonomy and two types of performance constructs, criterion taxonomy (specific performance) and global performance. This study uses the same dataset as Study 1.

Figure 6.1. The positioning of Study 2.
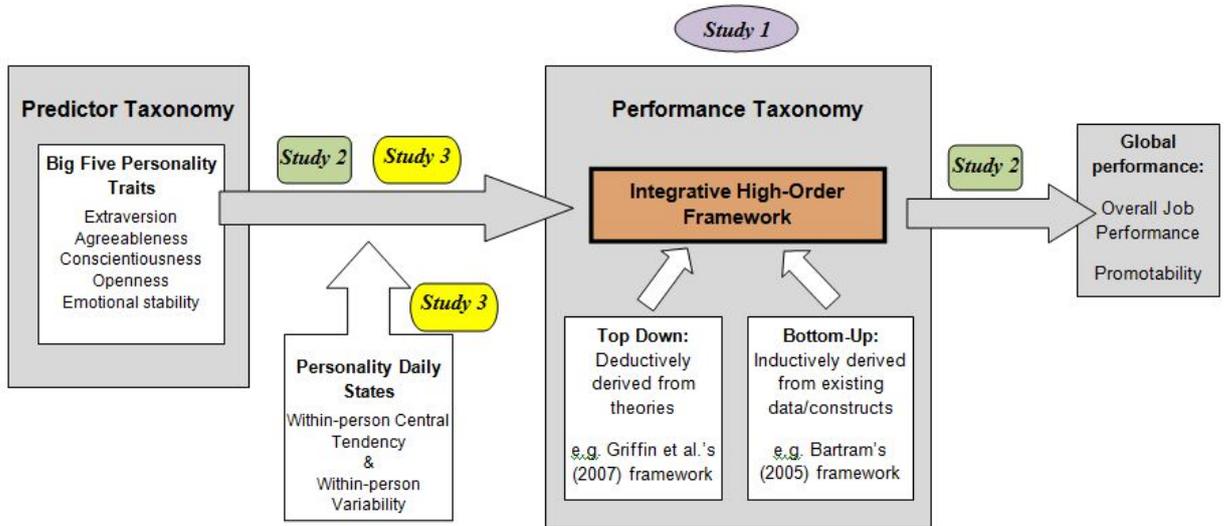
6.2. Literature and Hypotheses

6.2.1. Big Five personality and four-factor performance: Establishing a nomological net

As discussed in the literature chapters, many earlier studies that explored personality – performance relationships tend to focus predominantly on global or composite measures of performance, such as overall job proficiency or training proficiency (Barrick & Mount, 1991; Salgado, 1997; Tett et al., 1991). However, global or composite performance constructs are ill-defined and insensitive measures of job performance, and using them would obscure the fine-grained relationships between personality constructs and performance constructs (Bartram et al., 2010; Hough, 2001). It is thus necessary to go beyond the reliance on these ultimate criteria, and to use more clearly defined and psychologically meaningful performance measures, such as specific performance, as addressed by performance taxonomies. Linking performance taxonomy to a taxonomy in the predictor domain, such as the Big Five personality traits, can help contribute to the establishment of a nomological

net that can serve as a conceptually sound framework for validation studies (Hough, 2001; Schneider & Hough, 1995).

Chapter 3 (literature review II) has reviewed earlier attempts to link the Big Five personality and performance by using specific performance, such as the task – contextual performance taxonomy. Hurtz and Donovan (2000) provided a meta-analysis by organising multiple criteria against this performance framework, yet their findings were mixed as to whether there was a clear differentiation between the three factors of task, job dedication, and interpersonal facilitation. However, Hogan and Holland's (2003) meta-analysis organising performance outcomes into *getting along* and *getting ahead*, and Bartram's (2005) meta-analysis organising performance constructs under the Great Eight framework, provided more positive findings, such that a finer differentiation of the criteria domain led to validity gains, and to a clearer picture of personality – performance relationships (see Chapter 3). These results show the merit of partitioning global performance constructs into more refined components.

In the following section, I will draw on the four-factor high-order performance structure, as revealed in the previous study, and link it to the Big Five personality taxonomy. This is to explore whether one-to-one relationships can be found between these two taxonomies, and whether a nomological net can be built. I will discuss how factors in the two taxonomies are conceptually related, and generate a series of hypotheses to be empirically tested.

I expect that the first factor in this four-factor structure, the interpersonal performance aspect, will be most strongly related to two of the Big Five traits, extraversion and agreeableness. This is due to that these two traits concern one's dispositional tendency in social interactions. Extraversion describes such tendencies as being assertive, gregarious, and seeking out and the enjoyment of the companionship of others (Barrick & Mount, 1991; Watson & Clark, 1997). Therefore, highly extraverted individuals may take an active role in interpersonal relationships in the workplace, such as initiating contact, communicating with confidence and building relationships. Agreeableness describes such tendencies as being friendly, likable, cooperative, and empathetic in social interactions (Barrick & Mount, 1991; Graziano & Eisenberg, 1997; R. Hogan, 1983). Besides, the data of

this study have been collected from Chinese workplace, and being agreeable is in line with such Chinese cultural values on harmony-seeking and relationship-building (Bond, 1996). Therefore, agreeableness may be particularly appreciated in Chinese workplaces and may thus predict interpersonal performance.

Evidence about the empirical linkage between interpersonal performance and these two personality traits can also be found in past research. Van Scotter and Motowildo (1996) found that *interpersonal facilitation*, one of the two aspects of contextual performance, related strongly to extraversion and agreeableness. Hurz and Donovan's (2000) and Hogan and Holland's (2003) meta-analysis respectively showed that agreeableness had a stable and positive relationship with the *interpersonal facilitation* aspect and with the *getting along* aspect of performance (sample-size weighted mean observed correlation at .11 and .12, respectively). Barrick et al.'s (2001) second-order meta-analysis showed that both extraversion and agreeableness had a positive relationship with *teamwork* (sample-size weighted mean observed correlation at .08 and .17, respectively), a performance outcome that may be arguably related to interpersonal performance. Furthermore, evidence is also available from the research findings associated with the Great Eight performance framework, which is the basis of the four-factor performance structure as currently studied. The previous chapter has found that interpersonal performance is essentially composed of competencies in *UCF1 leading and deciding*, *UCF2 supporting and coordinating*, and *UCF3 interacting and presenting* of the Great Eight framework. Bartram (2005) indicated that extraversion is the personality antecedent of UCF1 and UCF3, and that agreeableness is the personality antecedent of UCF2. Therefore, it is reasonable to expect that the interpersonal factor as jointly determined by these three UCF dimensions will be most strongly predicted by the two Big Five traits, extraversion and agreeableness. I thus propose:

> *Hypothesis 1a: The interpersonal factor in the four-factor performance structure will be most strongly and positively predicted by extraversion and agreeableness among the Big Five traits.*

For the second factor, cognitive/proactive performance, it is proposed that openness to experience is the most relevant dispositional antecedent, due to the fact that openness to experience is the only trait among the Big Five that concerns

cognitive competence (i.e. cognitive performance) and innovative tendency, a concept relating to proactive performance (Parker & Collins, 2010). Openness to experience was previously named as intellect, which is defined as the ability to learn and the capacity to handle information and knowledge (Morris, 1976). Evidence about the cognitive component of openness also comes from research findings which show that it positively relates to psychometric measures of intelligence and other cognitive abilities (McCrae, 1987). Moreover, the broad domain of openness to experience contains such facets as imaginative, original, novelty-seeking and artistic (McCrae & Costa Jr., 1985), which are clearly associated with the proactive, change-oriented aspect of performance. In a recent study that uses Griffin et al.'s (2007) performance model, Neal et al. (in press) found that among the Big Five, openness was the most predictive trait among the Big Five in relating to individuals' proactive performance.

In addition to the evident effect of openness to experience, it is also proposed that agreeableness will show a negative relationship with the cognitive/proactive performance factor. Neal et al. (in press) found that agreeableness negatively predicted individual-level proactivity and argued that highly agreeable individuals tend to conform to established norms and are thus less likely to challenge the status quo and to bring about changes. Therefore, these people will be less likely to display proactive behaviours.

The previous chapter revealed that cognitive/proactive performance factor attracts most of the competencies in *UCF5 creating and conceptualising* and *UCF8 enterprising and performing*, some competencies in *UCF4 analysing and interpreting*, and the *deciding* aspect of *UCF1 leading and deciding*. Bartram (2005) indicated that openness to experience is the personality antecedent of UCF4 and UCF5, and that agreeableness is the personality antecedent of UCF8 yet in a negative direction (see Table 3.2 in Chapter 3 for details). Such results are in line with those found by Neal et al. (in press). Therefore, I hypothesise:

> *Hypothesis 1b: The cognitive/proactive factor in the four-factor performance structure will be most strongly predicted by openness to experience and agreeableness among the Big Five traits. Openness to experience will*

positively predict cognitive/proactive performance while agreeableness
would negatively predict cognitive/proactive performance.

I expect the third factor, task performance, to be most strongly predicted by the conscientiousness trait. Among the Big Five, conscientiousness is perhaps the most studied trait in relation to work performance, based on the consistently found results from meta-analysis that conscientiousness is the best personality predictor of employees' overall job performance across various study settings and job types (Barrick & Mount, 1991; Barrick et al., 2001; Hough, 1992; Salgado, 1997; Tett et al., 1991). Conscientiousness refers to conformity to rules and socially prescribed impulse control, and contains such facets as achievement, persistence, order, duty, responsibility, restrain, among others constructs that are closely associated with the qualities required on most jobs (J. Hogan & Ones, 1997). Therefore, it is not surprising that conscientiousness had the highest validity among the Big Five in predicting work outcomes.

When specific performance domains rather than overall job proficiency are considered, task performance should be most directly related to conscientiousness, as this domain concerns an individual's effectiveness in planning, implementing and completing tasks, as required in the core part of one's job, and is thus conceptually associated with the content of conscientiousness such as being persistent, organised, achievement oriented, dutiful and responsible. Although researchers studying the task versus contextual performance taxonomy suggested that the personality antecedents associated with conscientiousness tended to predict task domain less well than the contextual domain (Motowidlo & Van Scotter, 1994), or with a similar magnitude of the contextual domain (Hurtz & Donovan, 2000), later studies that used more refined performance factors presented a different picture. Allworth and Hesketh (Allworth & Hesketh, 1999) by using task, contextual, and adaptive performance taxonomy suggested that conscientiousness related most strongly to the task factor. Neal et al. (in press) who used proficiency (task), adaptivity, and proactivity performance taxonomy also showed that conscientiousness related most strongly to the proficiency (task) factor.

The previous chapter found that the task performance factor was predominantly loaded by competencies in *UCF6 organising and executing* and

secondly by some competencies in *UCF4 analysing and interpreting* of the Great Eight framework. Given that UCF6 was suggested to be preceded by the conscientiousness trait in Bartram's (2005) meta-analysis, it is reasonable to believe that the task performance as mainly constituted by UCF6 competencies would also be most strongly predicted by conscientiousness. Although UCF4 is expected to be predicted by openness to experience (Bartram, 2005), I do not expect openness to be a particularly strong predictor for the task performance aspect in this four-factor framework. This is due to the fact that UCF4 loads both on the cognitive/proactive factor and the task factor, which may indicate that it contains both a cognitive component and a task-related component. Therefore, once its cognitive component has been covered in the cognitive/proactive factor, which is expected to be preceded by openness to experience, the remainder of this UCF factor should not strongly relate to the openness trait. Taken together, I propose:

> *Hypothesis 1c: The task factor in the four-factor performance structure would be most strongly and positively predicted by conscientiousness among the Big Five traits.*

Finally, in regards to the adaptive performance factor, I expect emotional stability (i.e., negative neuroticism) and openness to experience to be the primary personality antecedents. Adaptive performance is about one's ability to cope with uncertainties, altering behaviour to meet the new demands of the environment, and adjusting oneself from work-related pressure and setbacks (Allworth & Hesketh, 1999; Bartram, 2005; Pulakos et al., 2000). Allworth and Hesketh (1999) indicated that adaptive performance has both a cognitive component that is about transferring skills and learning to the new work contexts, and an emotional component that is about adjusting oneself to the changing demands and holding positive self-regard throughout. These two components are in line with the connotation of openness to experience and emotional stability. Empirical evidence of these two traits as antecedents of adaptive performance can be found in Griffin et al. (2007), who revealed that openness to change is a useful predictor of individual adaptivity, and from Neal et al. (in press) who revealed that emotional stability predicted individual adaptivity.

As found in the previous chapter, the adaptive factor is essentially composed of competencies in UCF7 adapting and coping in the Great Eight framework. In the conceptualisation and development of the Great Eight, Bartram (2005) suggested that the personality antecedent for UCF7 is emotional stability. However, the above conceptualisation of adaptive performance indicates that it is also reasonable to expect openness to experience to have a direct relationship with adaptivity. Therefore, I propose:

> *Hypothesis 1d: The adaptive factor in the four-factor performance structure would be most strongly and positively predicted by emotional stability and openness to experience among the Big Five traits.*

The hypothesised relationships, as discussed above, are summarised and presented in the top half of Table 6.1. It should be noted that these proposed hypotheses focus on identifying the personality – performance pairs that are most conceptually related. It does not imply that the non-hypothesised personality – performance pairs would show zero relationships. For instance, it will not be surprising to observe the ubiquitous effect of conscientiousness in relating to multiple performance outcomes, rather than solely to task performance, given that conscientiousness was found to be the most predictive personality trait across study contexts and on various job outcomes (e.g., Barrick et al., 2001; Hurtz & Donovan, 2000; Neal et al., in press). However, it is reasonable to expect that its strongest linkage would be with the task performance aspect rather than other non-task performance aspects.

6.2.2. Personality and global performance

As discussed in the literature chapter (e.g. Section 2.2.1 in Chapter 2), while using more differentiated, psychologically meaningful measures of performance can provide a more complete picture of the relationship between predictors and criteria, global performance measures are nonetheless important, given that they provide economically-useful information to assist organisations in making personnel decisions (Borman, 1991; Brogden & Taylor, 1950; Nagle, 1953; F. L. Schmidt & Kaplan, 1971; Thorndike, 1948; Toops, 1944).

Earlier meta-analyses of personality – performance relationships have provided a good deal of collective knowledge about the prediction of personality on global or composite performance outcomes, and these studies tend to show that conscientiousness is the most predictive trait among the Big Five that consistently predicts overall job performance across job types (Barrick & Mount, 1991; Hough, 1992; Salgado, 1997; Tett et al., 1991). For instance, Barrick and Mount (1991) found conscientiousness to have an average true score correlation of $r = .23$ with job proficiency across occupations after being corrected for range restriction and measurement errors (observed $r = .13$). Salgado (1997), in his European samples, also found that the strongest predictor of job proficiency ratings was conscientiousness, despite having a slightly lower correlation (corrected $r = .16$, observed $r = .10$). In splitting conscientiousness into achievement and dependability, Hough (1992) found that achievement had the highest prediction on overall job performance (uncorrected $r = .19$) and dependability also positively correlated overall job performance yet with a much smaller magnitude (uncorrected $r = .07$). Barrick et al.'s (2001) second-order meta-analyses further confirmed that among the Big Five, conscientiousness consistently had the strongest effect on various types of job performance outcome, with the average of true score correlation at scale level ranging between .20 and .30 (observed r ranging from .10 to .15).

Apart from conscientiousness, meta-analysis findings also revealed that emotional stability has a consistently positive relationship with global performance (Barrick et al., 2001; Hough, 1992; Hurtz & Donovan, 2000; Salgado, 1997; Tett et al., 1991). For instance, Salgodo (1997) indicated that emotional stability was the second most predictive trait in relating to supervisor ratings of overall job performance (corrected $r = .12$, observed $r = .08$). Hough (1992) found emotional stability (as measured by adjustment) to be the second most predictive trait in relating to overall performance (uncorrected $r = .11$), next to achievement (a facet of conscientiousness). Tett et al. (1991) found that among the Big Five, only emotional stability displayed non-zero correlations with performance. Hurtz and Donovan (2000) found that emotional stability was the second best predictor when all occupations and all performance outcomes were aggregated. The true operational validity of emotional stability was .13 (observed $r = .09$), and was second only to conscientiousness (true operational $r = .20$, observed $r = .14$).

In comparison, the other three traits seem to have much less consistent validity, and show a more context-dependent pattern in relating to overall job performance. For instance, openness to experience and agreeableness appear to be least predictive of job proficiency based on several meta-analyses, despite the fact that openness to experience is useful in training contexts and agreeableness is useful in customer service roles (Barrick & Mount, 1991; Salgado, 1997). Extraversion also shows a rather inconsistent pattern, as it predicts job proficiency for managers and sales but not for other occupations (Barrick & Mount, 1991; Hurtz & Donovan, 2000). Therefore, in the context of this study in which samples were drawn from job incumbents in a high-technology company, I do not hypothesise these three personality traits to be particularly important for overall job performance. Taken together, I propose:

> *Hypothesis 2a: Overall job performance will be most strongly and positively predicted by conscientiousness, and second most strongly and positively predicted by emotional stability.*

Scholars have also made distinctions between overall job performance (OJP) and promotability (Robertson, Baron, Gibbons, MacIver, & Nyfield, 2000; Robertson, Gibbons, Baron, MacIver, & Nyfield, 1999). Unlike OJP, which focuses on assessing individual's proficiency on the current job (i.e. task performance), the promotability construct has a future-oriented nature as it evaluates the likelihood of an employee to further advance in the organisation. Promotability can be considered as an indicator of potential career success, a construct which has been clearly differentiated from job performance (Bourdreau, Boswell, Judge, & Bretz Jr., 2001; Judge, Bono, Ilies, & Gerhardt, 2002; Ng, Eby, Sorensen, & Feldman, 2005).

However, in comparison to overall job performance, much less evidence about the personality antecedents of promotability is available. Conceptual linkage may be drawn between promotability and two of the Big Five personality traits: openness to experience and extraversion. More open individuals tend to have more divergent thinking, and create innovative ways to solve problems or to improve the status quo (McCrae, 1987), while more extraverted individuals are more energetic and confident, and may thus have better social and interpersonal skills. While neither of these two traits is particularly strongly related to overall job performance as found

in meta-analyses results, both seem to be important when employees move up the career ladder to take up managerial positions (Judge et al., 2002). The positive relationship of these two traits with promotability was explicitly indicated by Robertson and colleagues (Robertson et al., 2000; Robertson et al., 1999). In particular, they found that promotability was most strongly related to the proactivity-related competencies on innovation, creativity, decisiveness, motivation, and persuasiveness; they further found that promotability was positively related to extraversion and openness traits. In a meta-analysis on career success, Ng et al. (2005) found that extraversion was the best predictor among the Big Five of objectively measured promotion, and that openness predicted salary, which is another frequently used indicator of career success.

A third personality trait that may be argued to predict promotability is agreeableness, but in a negative direction. Agreeable employees may focus more on getting along with others, rather than getting ahead of others (J. Hogan & Holland, 2003; Oh & Berry, 2009), and may be perceived as docile and easily manipulated (Ng et al., 2005). As a result, they may be less favourably considered when promotion decisions are made. Empirical studies also support the fact that agreeableness had a negative association with promotability as measured by supervisors' ratings (Robertson et al., 2000; Robertson et al., 1999) and with promotion as measured objectively (Bourdreau et al., 2001; Ng et al., 2005).

The effect of the remaining two traits on promotability is less clear. First, conscientiousness has a controversial effect on promotability. On the one hand, conscientiousness leads to better job performance, which should be taken into account when promotion decisions are made (Ng et al., 2005) and when an employee's leadership qualities are evaluated (Judge et al., 2002). On the other hand, conscientiousness was found to negatively relate to promotability-related competencies (Robertson et al., 2000; Robertson et al., 1999), possibly due to the thought that conscientious individuals may be less creative and less flexible. Boudreau et al. (2001) also showed that for high-level executives, conscientiousness had zero or sometimes even negative relationships with both extrinsic and intrinsic career success. Given such contrasting results, I choose not to hypothesise a directional relationship between conscientiousness and promotability. Second, it is

also unclear about the effect of emotional stability on promotability, as there is little conceptual linkage between these two constructs. While emotional stability certainly has a value in overall job performance, as argued earlier, and may thus indirectly relate to one's chance of being promoted (Ng et al., 2005), this less straightforward effect may not be present when overall performance is controlled for. Therefore, I do not hypothesise a direct relationship between emotional stability and promotability. Taken together, I propose:

> *Hypothesis 2b: Promotability will be most strongly and positively predicted by openness to experience and extraversion among the Big Five. Additionally, it will be negatively predicted by agreeableness.*

The hypothesised relationships between Big Five personality traits and two global performance constructs are shown in the bottom half of Table 6.1. It should be noted that while I only posit the personality traits that should have the strongest association with the two global performance outcomes, other traits may also display a non-zero relationship. However, the conceptual linkages from other traits to global performance are not particularly strong as compared to those hypothesised traits.

Table 6.1. Hypothesised relationships between the Big Five traits and performance outcomes (specific and global performance)

	Performance factor	Big Five personality trait(s)
Specific performance	Interpersonal	Extraversion Agreeableness
	Cognitive/proactive	Openness to experience (-) Agreeableness
	Task	Conscientiousness
	Adaptive	Emotional stability Openness to experience
Global performance	Overall job performance	Conscientiousness Emotional stability
	Promotability	Openness to experience Extraversion (-) Agreeableness

Note: (-) indicates a negative relationship

6.2.3. Integrating specific and global performance: A process view of prediction

As pointed out in the literature chapter (Section 2.2.1), specific performance and global performance may stand at different positions in the predictive process. Global performance may be rather remote outcomes that cannot easily be predicted by psychological antecedents (Bartram et al., 2010; Binning & Barrett, 1989; Robertson, 1994; Vallance et al., 1953). Moreover, organisations differ in the type of behaviours they value, thus the weight given to the same behaviours in deriving global performance judgment is different across organisations and job types (Bartram et al., 2010; Binning & Barrett, 1989; Conway, 1999; Mitchell, 1983; Robertson, 1994; Tett & Burnett, 2003). This may explain why personality typically shows low or non-significant relationships with overall performance (Morgeson et al., 2007), and that meta-analysis findings shows large cross-study disparity in regards to the validity of the personality traits against overall performance (e.g., Barrick & Mount, 1991; Bartram, 2005).

In comparison, specific performance constructs, which are based on and aggregated from behavioural indicators, are more psychologically meaningful, and can thus be more directly linked to individually different characteristics such as personality traits. The earlier section (Section 6.2.1) of this chapter has proposed a nomological net linking the four-factor higher-order performance structure and the Big Five personality structure. Following the logic that specific job behaviours are more proximal constructs than global performance outcomes (Binning & Barrett, 1989; Vallance et al., 1953), it can be expected that personality traits are first translated into trait-relevant behaviours at work; if these types of behaviours are valued by the organisation, then these behaviours will be further reflected in overall performance ratings. In this way, personality traits do not exert a direct relationship on global, overall performance, but rather, their effect is translated through specific performance factors that are conceptually related to personality traits. These arguments suggest that a mediation effect may be present to translate personality traits into global job performance.

Such a process view towards personality – global performance has been indicated by several researchers. For instance, Robertson (1994) proposed a process such that personality constructs are translated into work competencies; further, these

competencies would combine and interact with job demands and work situations to influence overall performance. Tett and Burnett's (2003) interactionistic model is also essentially built along the main chain of personality → behaviours (i.e. behaviourally based specific performance factors) → performance outcomes (i.e. global or composite performance). Similarly, Bartram et al. (2010) explicitly reiterated the need to move beyond simple examination of personality trait – overall job performance (OJP) relationships and to focus on a two-stage alignment in validation studies. They proposed to consider job components that are conceptually aligned with traits as key intervening factors in the trait – OJP relationships.

While such a process view of validation has been conceptualised, surprisingly few studies have empirically tested this mediation effect. This may be due to the fact that many researchers are primarily interested in the ultimate criterion of job performance, and thus overlook more differentiated performance components, or that a conceptually concordant network between personality and specific performance components has yet to be established, thus appropriate mediators are not clearly identifiable. However, it is necessary to empirically explore this missing link. A successful discovery of this mediation would not only provide some insight into the predictive process of each personality trait, but also showcase the practice of how the two types of performance constructs, specific performance and global performance, should be linked and integrated. Therefore, this current study intends to fill this gap by testing this mediation effect.

In particular, the following mediation effects are posited and tested. For overall job performance (OJP), I have drawn from earlier meta-analysis results to propose that conscientiousness and emotional stability will be the strongest personality predictors (Barrick & Mount, 1991; Hough, 1992; Hurtz & Donovan, 2000; Salgado, 1997; Tett et al., 1991). Based on the hypothesised point-to-point relationship between these two traits and specific performance, I further hypothesise that their effects on OJP will be fully mediated by the two specific performance factors that are conceptually related to them. That is, the effect of conscientiousness on OJP will be fully mediated by task performance, and the effect of emotional stability on OJP will be fully mediated by adaptive performance. First, conscientious employees are more likely to work hard on assigned core tasks and achieve

organisational expectations, which will make them excel on the task performance aspect. Since task-related performance should be the most important component in judging overall performance (Bartram, 2005; Conway, 1999; Rotundo & Sackett, 2002), the effect of conscientiousness on OJP ratings is thus expected to go entirely through ratings on task performance. The same logic is applied to emotional stability. Emotionally stable employees are better at adjusting themselves to changing job demands, and thus perform well on the adaptive aspect of performance. Due to the fact that today's jobs typically involve changes to the job and to the context where the job is completed (Allworth & Hesketh, 1999; M. A. Griffin et al., 2007; Hesketh & Neal, 1999), employees with higher adaptivity may be considered as performing better overall.

For promotability, I expect similar full mediation effects to occur in regards to openness to experience, extraversion and negative agreeableness, which are the hypothesised personality trait predictors of this global performance aspect (see hypothesis 2b and Table 6.1). I expect that these three latent traits will be translated directly into their corresponding specific performance; that is, cognitive/proactive and interpersonal performance in the four-factor structure. Because competencies associated with cognitive/proactive and interpersonal performance showed the strongest relationship to overall promotability (Robertson et al., 1999), these two performance aspects may further translate the effect from latent personality traits onto the global perception of overall promotability. It should be noted that the prediction of agreeableness on promotability is only expected to go through the cognitive/proactive performance factor but not through interpersonal performance. This is due to the fact that earlier studies which point to the negative implication on promotability from agreeableness tend to focus on its less proactive nature, rather than its more interpersonal nature (e.g., Bourdreau et al., 2001; Ng et al., 2005). Taken together, the following hypotheses are offered:

Hypothesis 3a: Task performance will mediate the prediction of conscientiousness on overall job performance.

Hypothesis 3b: Adaptive performance will mediate the prediction of emotional stability on overall job performance.

Hypothesis 3c: Cognitive/proactive performances will mediate the prediction of openness to experience on promotability.

Hypothesis 3d: Interpersonal performance will mediate the prediction of extraversion on promotability.

Hypothesise 3e: Cognitive/proactive performance will mediate the negative prediction of agreeableness on promotability.

Figure 6.2 gives a visual presentation of these hypothesised full mediation relationships. It should, again, be noted that this figure is only a simplified presentation of the entire complex relationships and paths that are omitted from it do not necessarily have zero relationships. The purpose of positing a simple model is to produce a clear pattern by focusing on a small number of paths that have strongest associations.

Figure 6.2. Proposed mediation model in linking personality and global performance
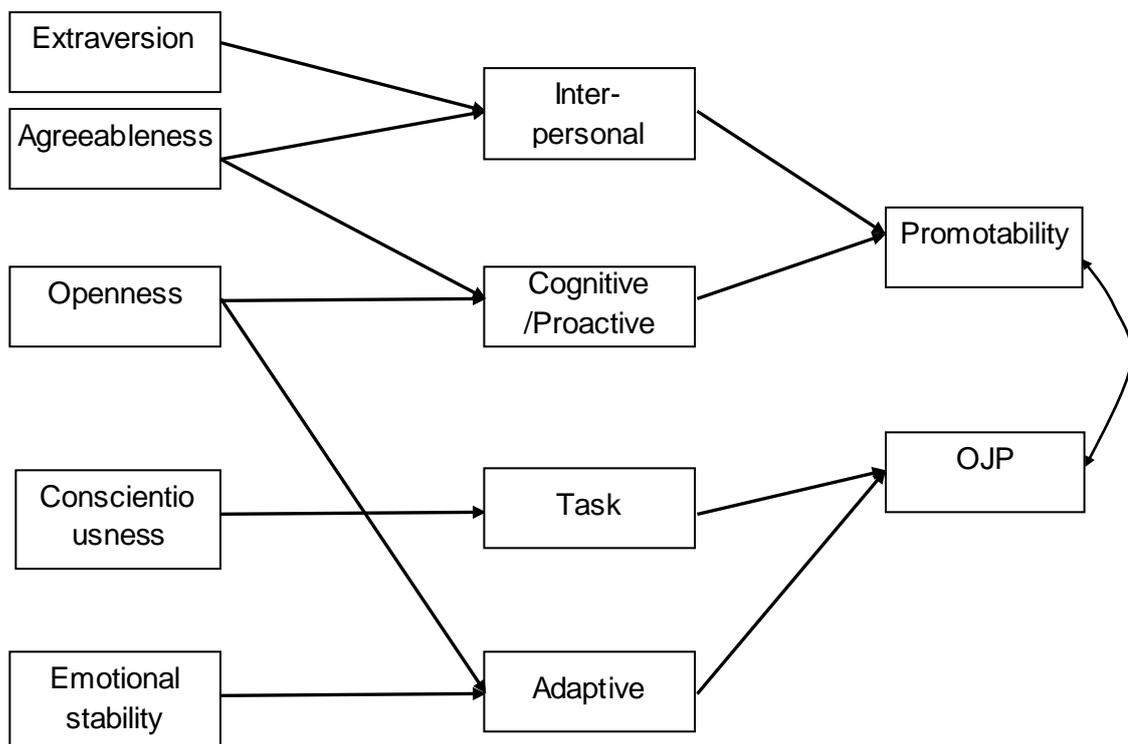
Note:
a) OJP = Overall job performance
b) The predictors are allowed to intercorrelate; the mediators are allowed to intercorrelate; these paths were omitted for clarity purpose.

6.3. Method

6.3.1. Data collection and participants

Participants of this study were the same as in Study 1. The data collection procedure for the specific performance measure (UCF) has already been described in Study 1 (Section 5.3). The two global performance measures were collected at the same time as the UCF measures, although it should be noted that global performance items were placed at the end of the performance questionnaire so as to allow raters to derive an overall judgment after having evaluated specific performance. In this way, the time sequence of specific performance and global performance is ensured. The data collection of the personality measure occurred about one month before collecting the performance measures. This is to ensure the time sequence such that personality data are obtained before performance data. All participants were sent unique usernames and passwords to log into the online test system, so as to complete the personality measure. A total of 280 completed questionnaires on the personality measure were obtained, making a response rate of 67.47% (against 415 sent invitations in total). The personality measure being used (Occupational Personality Questionnaire) contains an embedded measure to check for the consistency of a test respondent's responses across all items. Based on this check, 4 participants' answers were found to be insufficiently consistent throughout the questionnaire, indicating the possibility of random responses; therefore, their responses were excluded from the final dataset.

Individuals' personality scores were then matched to their performance ratings scores on the four high-order factors. The matched sample size of valid data between personality and self-rated performance was 205; the matched sample size of valid data between personality and supervisor-rated performance was 135-136[8]. Once the matching across different instruments was completed, all participants' names were deleted from the database so as to ensure confidentiality.

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[8] Sample size between personality and supervisor-rated specific performance was 136; sample size between personality and supervisor-rated global performance was 135.

6.3.2. Measures

6.3.2.1. Personality measure

This study used the Occupational Personality Questionnaire (OPQ), a well-established personality questionnaire that has been used for decades in personality assessment. The OPQ used in this study is the ipsative version (OPQ32i) that employs a forced-choice ipsative scale, based on Item Response Theory. Forced-choice scale has been found to be more resistant to uniform response bias (M. W.-L. Cheung & Chan, 2002) and response distortion effect, such as 'faking good' (Baron, 1996). It also reveals the more precise standing of an individual on the latent trait (measured by theta (θ) scores), and provides operational validities better than or at least equal to normative scales (Bartram, 2007; Christiansen, Burns, & Montgomery, 2005). The OPQ32i contains 104 blocks with 3 items in each block, and respondents are required to select one 'most like' and one 'least like' item in each block.

OPQ32i has 32 scales to encompass the broad domain of personality that is beyond the content of Big Five, yet its scale scores can also be easily converted into Big Five personality scores. Twenty five out of the total 32 scales are used to convert OPQ scores into the Big Five, using the computing algorithms provided by the test publisher. The organisation of the 25 scales into Big Five is shown in Appendix C. Cronbach's alpha of all OPQ scales ranged from .68 to .93 with this sample, with a median of .86. The composite reliability of the Big Five dimensions was .95 for extraversion, .88 for openness to experience, .94 for emotional stability, .90 for agreeableness, and .93 for conscientiousness.

6.3.2.2. Performance measure

Specific performance. Scores on the four factors were derived by aggregating scores of the competencies that have been found to cluster under the same factor. The exploratory factor analysis results from the previous study were used as the basis for this aggregation. The slight discrepancy between self and supervisor scores was reconciled by selecting the consistent patterns and by taking into account of the conceptual meanings. Specifically, the first interpersonal factor was derived by averaging scores on UCF1.2, UCF1.3, UCF2.1, UCF2.3, UCF3.1, UCF3.2, UCF3.3, UCF3.4; the second cognitive/proactive factor was derived by averaging scores on

UCF1.1, UCF4.1, UCF4.3, UCF5.1, UCF5.2, UCF8.2; the third task factor was derived by averaging scores on UCF2.2, UCF4.2 and the three UCF6 competencies. The fourth, adaptive factor was derived by averaging the two UCF7 competencies. UCF8.1 striving to achieve was excluded from the mapping due to that this competency loaded on different factors in self-ratings (on cognitive/proactive) and in supervisor ratings (on task performance, see Table 5.7). Given that there is reason to believe this competency can contain both task-related and proactive-related meanings, this competency was excluded to avoid confusion. Appendix D presents the organisation of the UCF competencies into the four-factor high-order structure. Four self-reported performance ratings and four supervisor-reported performance ratings were computed separately. Cronbach's alpha was .98, .97, .94, .89 for interpersonal, cognitive/proactive, task, and adaptive performance factors with self-ratings and .97, .95, .93, .70 for the same four factors with supervisor ratings.

Global performance. Overall job performance (OJP) was measured by four items selected from the scale used by Robertson and colleagues (Robertson et al., 2000; Robertson et al., 1999). Promotability was measured by two items selected from the scale used by Robertson et al. (2000). The items used are shown in Appendix B. The response scale was a 7-point Likert scale, with 1 indicating strongly disagree and 7 indicating strongly agree. Cronbach's alpha for OJP was .87 with self-reported data and .91 with supervisor-reported data. Cronbach's alpha for promotability was .78 with self-reported data and .88 with supervisor-reported data. The Chinese version of these two measures was used. Items were first translated by myself, and then reviewed and approved by five other experienced work psychologists.

6.3.2.3. Control variables

The same control variables as used in study 1 were again used here. These include: employees' age, sex, tenure with the current organisation, organisational level (dummy-coded as managers versus non-managers) and departmental membership (dummy-coded for the two divisions).

6.3.3. Data analysis of mediation effect

The proposed mediation hypotheses were tested via path analysis, which is a useful technique to analyse multiple causality (Wolfle, 2003). I first conducted single mediation analysis on each hypothesis, and then tested the entire model so that all variables are estimated together, thus controlling for the intercorrelations among variables and providing more parsimonious results. Given that the sample size of this study is relatively small, I did not use structural equation modelling (SEM). Although SEM can better estimate and control for measurement error on the latent variable, it involves more parameters to be estimated and thus needs larger sample size to obtain enough power (Little, Cunningham, Shahar, & Widaman, 2002; MacCallum, Browne, & Sugawara, 1996).

I conducted the analysis separately for self-rated and supervisor-rated performance. The results across the two analyses will be compared and discussed. Analyses were conducted in Mplus version 5.1.

6.4. Results

6.4.1. Descriptive statistics

6.4.1.1. Personality and self-report performance

Table 6.2 presents descriptive statistics and intercorrelations of the study variables. Where self-report performance is concerned (below diagonal), satisfactory correlations between personality traits and hypothesised performance factors can be found. On the four specific performance factors, five out of the seven hypothesised relationships were supported (r ranging from .19 between openness to experience and adaptive performance to .55 between extraversion and interpersonal performance, all $ps < .01$); the only exceptions were that agreeableness did not relate to hypothesised interpersonal performance ($r = .02$, *n.s.*) or to cognitive/proactive performance ($r = -.04$, n.s.). On the two global performance measures, three out of the five hypothesised relationships were supported: conscientiousness correlated most strongly and positively with overall job performance (OJP) ($r = .14$, $p < .05$);

openness to experience ($r = .18$, $p < .01$) and extraversion ($r = .29$, $p < .01$) correlated significantly and positively with promotability. Emotional stability was positively related to OJP yet the relationship was below the .05 significance level ($r = .11$, *n.s.*). Agreeableness did not strongly and negatively relate to promotability, as hypothesised ($r = -.04$, *n.s.*).

6.4.1.2. Personality and supervisor-rated performance

When supervisor rated performance constructs are concerned, the hypothesised personality – performance relationships were much weaker. Among all seven hypothesised paired relationships regarding specific performance (hypotheses 1a to 1d), only extraversion – interpersonal performance and openness to experience – cognitive/proactive performance showed positive and moderate correlations, yet these values failed to reach significance level ($r = .12$ and .13, respectively, both *n.s.*). Unexpectedly, the hypothesised pairs which were positive and significant in self-ratings, that is, conscientiousness – task performance, emotional stability – adaptive performance, openness – adaptive performance, showed zero or even slightly negative relationships here ($r = -.05$, .00, and -.04, respectively, all *n.s.*). Agreeableness again did not relate to interpersonal performance and cognitive/proactive performance ($r = -.02$ and .06, respectively, both *n.s.*), similar to those found by using self-rating of performance. In relating to the two global performance measures, personality traits also had weak and insignificant effect. Overall job performance correlated with conscientiousness at .05 and with emotional stability at -.01 (both *n.s.*). Promotability correlated with openness to experience at .11 and with extraversion at .08 (both *n.s.*); it also positively related to agreeableness at .11 (*n.s.*), which was in a direction opposite to expectation (hypothesis 2b).

Table 6.2. Mean, standard deviation (S.D.) and intercorrelations among study variables (N=208 in analysis associated with self-report performance, N=135-136 in analysis associated with supervisor-rated performance).

	Self Mean	Self S.D.	Supervisor Mean	Supervisor S.D.	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
1. Age	33.67	4.49	33.70	4.23		-.11	.75**	.37**	.42**	-.05	-.16	-.01	-.06	.03	.08	-.04	.08	.00	-.07	-.11
2. Sex (M=0, F=1)	.16	.36	.15	.36	-.04		-.10	-.25**	.02	.07	.02	-.06	.00	-.08	-.02	-.21*	-.04	.07	-.02	-.03
3. Org Tenure	8.66	4.33	9.08	4.29	.69**	-.07		.35**	.41**	-.09	-.09	.01	-.16	-.05	.17	.05	.10	-.04	-.04	-.08
4. Department (0/1)	.71	.43	.76	.43	.42**	-.24**	.36**		.19*	.12	-.06	.19*	-.12	.07	.09	.00	.11	-.09	-.13	-.14
5. Org Level (0/1)	.31	.46	.30	.46	.37**	-.12	.37**	.21**		-.02	.05	-.06	-.03	-.12	.15	.20*	.07	-.03	-.14	.01
6. Big 5 – Extraversion	-.01	.51	-.05	.52	-.05	.04	-.06	.08	-.07		.50**	.52**	.15	.12	**.12**	-.07	-.01	-.12	.02	**.08**
7. Big 5 – Openness	-.12	.62	-.14	.64	-.13	-.03	-.08	-.03	-.02	.48**		.23**	-.04	.11	.12	**.13**	.00	**-.04**	.08	**.11**
8. Big 5 – Emotional stability	.16	.48	.19	.48	-.04	.03	.01	.17*	-.05	.55**	.23**		-.06	.15	.04	-.05	-.06	**.00**	**-.01**	.03
9. Big 5 – Agreeableness	.13	.37	.10	.37	-.18*	.06	-.18*	-.16*	-.10	.13	-.01	04		.17*	**-.02**	**.06**	.07	.05	.07	**.11**
10. Big 5 – Conscientiousness	.18	.40	.15	.38	.07	.05	-.04	.03	-.12	.06	-.02	.14*	.13		-.08	-.01	**-.05**	.05	**.05**	.13
11. Interpersonal	3.61	.49	3.68	.47	.12	-.02	.09	.17*	.04	**.55****	.26**	.37**	**.02**	.14*		.70**	.71**	.34**	.46**	.60**
12. Cognitive/Proactive	3.50	.51	3.56	.48	.15*	-.15*	.06	.15*	.01	.43**	**.38****	.23**	**-.04**	.19**	.83**		.63**	.33**	.54**	.60**
13. Task	3.93	.37	3.96	.44	.15*	-.07	.05	.14*	.00	.27**	.09	.19**	.05	**.27****	.68**	.69**		.48**	.58**	.56**
14. Adaptive	3.63	.46	3.72	.45	-.05	.08	-.07	-.03	-.11	.18**	**.19****	**.29****	.10	.16*	.47**	.44**	.54**		.47**	.45**
15. Overall job performance	6.10	.72	5.76	.82	.00	-.12	-.06	.03	-.01	.13	.14	**.11**	-.03	**.14***	.47**	.49**	.49**	.39**		.70**
16. Promotability	5.70	1.02	5.31	1.05	.02	-.12	-.09	.01	-.01	**.29****	**.18****	.19**	**-.04**	.10	.55**	.58**	.42**	.29**	.62**	

Note:
a) * $p < .05$, ** $p < .01$, two-tailed.
b) Hypothesised relationships between Big Five personality traits and performance outcomes are bolded and underscored.
c) N=136 between supervisor-rated four-factor performance and other variables; N=135 between supervisor-rated global performance and other variables.
d) Correlations below diagonal are based on self-report performance; Correlations above diagonal are based on supervisor-rated performance.
e) The dummy coding for the Department variable: research-oriented product division = 0 and quality control and customer care division = 1; the dummy coding for the Org Level variable: non-manager = 0 and manager = 1.

6.4.1.3. Self-report and supervisor-report performance

Using the matched self – supervisor data (N = 135-136), I then computed the correlation of self-rated performance and supervisor-rated performance on the performance measures. These results are presented in Table 6.3 with coefficients along the diagonal indicating self-supervisor correlations on the same performance constructs. As can be seen, for the four specific performance factors, paired self-supervisor correlations (along the diagonal, average $r = .16$ across 4 paired relationships) were better than the non-paired correlations (off the diagonal, average $r = .06$ across 12 non-paired relationships). This provides evidence about the construct validity of the four-factor performance measure.

Also interesting to note from Table 6.3 is that less agreement was in place between employees and their supervisors in rating the two global performance measures, in comparison to their ratings on the four specific performance factors. It seems that employees and their supervisors understood overall job performance (OJP) and promotability differently, such that self-rated OJP correlated more strongly with supervisors' perception of promotability ($r = .17$, $p < .05$), rather than with supervisors' perception of OJP ($r = .07$, $n.s.$).

Table 6.3. Correlation between self-rated performance and supervisor rated performance (N=136 on the four specific performance factors; N=135 on the two global performance outcomes).

		Supervisor					
		Inter personal	Cognitive /proactive	Task	Adaptive	OJP	Promo tability
Self	Interpersonal	**.17⁺**	.10	.16⁺	.04	.04	.04
	Cog/proactive	.01	**.12**	.13	.02	.11	-.01
	Task	.03	.06	**.20***	.07	.05	-.11
	Adaptive	-.07	-.02	.02	**.13**	-.01	-.06
	OJP	.04	.09	.09	.07	**.07**	-.06
	Promotability	.10	.14	.18*	.16⁺	.17*	**.04**

Note:
a) * $p < .05$, + $p < .10$, two-tailed.
b) Corresponding relationships between self and supervisors are bolded and underscored.

6.4.1.4. Control variables and performance

The effect of control variables on self-reported performance outcomes was not substantial. Age showed a positive relationship with cognitive/proactive performance and task performance, showing that older employees rated themselves slightly more positively on these two performance aspects (both $r = .15, p < .05$). Sex had a negative relationship with cognitive/proactive performance ($r = -.15, p < .05$), showing that females rated themselves less favourably on this aspect. Departmental membership had a positive effect on the first three specific performance aspects ($r = .14$ to $.17$, all $p < .05$), showing that employees in the customer care and quality control department rated themselves higher on interpersonal, cognitive/proactive, and task performance. The remaining two background variables, organisational tenure and organisational level (manager versus non-manager) had no relationship with performance outcomes.

In relating to supervisor-rated performance, only two out of the five control variables, sex and organisational level (manager versus non-manager) had a significant relationship with cognitive/proactive performance factor ($r = -.21$ and $.20$, respectively, both $ps < .05$), showing that male and those holding managerial positions were rated higher by their supervisors on this performance factor.

Following Becker's (2005) suggestions that control variables that are uncorrelated with the dependent variables should not be included in analysis as they may reduce statistical power of the analysis, I thus employed in further regression and path analysis only those control variables that significantly related to outcome variables. Therefore, only age, sex and departmental membership were included in the analysis of self-report performance, and only sex and organisational level were included in the analysis of supervisor-report performance.

6.4.2. Unique effect of personality traits

6.4.2.1. Personality and self-report performance

Hierarchical regression analyses were then conducted to explore whether the hypothesised personality trait(s) can demonstrate unique and independent effect on each performance outcome (hypotheses 1 & 2). In the first step of these regression analyses, three control variables were entered. In the second step, all Big Five traits were entered. Table 6.4a shows the regression results in predicting each of the six performance outcomes.

On the four specific performance outcomes, after controlling for background variables, most of the hypothesised personality traits predictors showed strong and unique effect on the corresponding performance factors (β ranging from .16, $p < .05$, to .49, $p < .01$). Exceptions were associated with agreeableness, which had a null effect on interpersonal and on cognitive/proactive performance ($\beta = -.03$ and $-.07$, both $n.s.$). This is consistent with the correlation analysis. However, it can also be noted that extraversion displayed a universal effect on multiple performance factors. It strongly predicted cognitive/proactive and task performance, in addition to its conceptually related interpersonal performance. This shows that more extraverted employees tended to rate themselves pervasively higher on various performance dimensions. As a whole, these results partially supported hypotheses 1a, 1b and 1c, and fully supported hypotheses 1d.

On the two global performance outcomes, some of the hypothesised traits also displayed a significant and unique relationship. Conscientiousness significantly and positively predicted overall job performance ($\beta = .15$, $p < .05$); extraversion significantly and positively predicted overall job performance ($\beta = .26$, $p < .01$). In comparison, other hypothesised traits (i.e. emotional stability predicting OJP, openness and negative agreeableness predicting promotability) failed to show a significant and unique effect, possibly due to that their variance in predicting the outcomes being shared with the two significant traits. As a whole, hypotheses 2a and 2b were both partially supported.

6.4.2.2. Personality and supervisor-rated performance

Similarly, hierarchical regression analyses were conducted to examine the independent and unique effect of Big Five traits on the respective performance outcomes as rated by supervisors. These results are shown in Table 6.4b. Interestingly, openness to experience now emerged as a significant predictor of cognitive/proactive performance ($\beta = .23$, $p < .05$), supporting hypothesis 1b. However, this effect seemed to be brought up by the negative effect of extraversion, which predicted cognitive/proactive performance at $\beta = -.20$ ($p < .10$). Extraversion also showed a negative relationship in predicting adaptive performance ($\beta = -.21$, p $< .10$). Patterns on the other trait – performance relationships were not much different from those revealed in the correlation analysis. Taken together, except the marginal support for hypothesis 1b, none of the hypothesised personality – performance relationships (h1 and h2) were supported with supervisor ratings of performance.

In the next section, I will examine the mediation hypotheses (h3a to h3e) focusing on self-reported performance. With supervisor-rated performance, since there were no direct relationships between the predictor (self-reported Big Five personality traits) and the mediator (supervisor-reported four specific performance factors), mediation analysis could not be carried out.

Table 6.4a. Hierarchical regression of all personality traits predicting self-rated performance (N=203)

	Interpersonal		Cognitive/Proactive		Task		Adapt		OJP		Promotability	
	Step 1	Step 2	Step 1	Step 2	Step 1	Step 2	Step 1	Step 2	Step 1	Step 2	Step 1	Step 2
Control												
Age	.05	.11	.12[+]	.17**	.12	.14[+]	-.06	.00	-.01	.00	.03	.05
Sex	.02	-.02	-.13[+]	-.15*	-.04	-.08	.08	.06	-.12	-.13[+]	-.13[+]	-.15*
Dept	.16*	.07	.06	.00	.08	.04	.01	-.05	.00	-.03	-.03	-.09
Personality												
Extraversion		**.49****		.34**		.25**		-.06		.07		**.26****
Openness		.03		**.24****		-.02		**.16***		.09		**.05**
Emotional stability		.08		-.02		.03		**.28****		**.04**		.04
Agreeableness		**-.03**		**-.07**		.03		.07		-.06		**-.08**
Conscientiousness		.10		.18**		**.24****		.12		**.15***		.10
R^2	.03	.34	.05	.32	.03	.18	.01	.13	.01	.06	.02	.12
ΔR^2		.31		.27		.15		.12		.05		.10
Est/S.E.	1.35	6.39**	1.65	5.98**	1.37	3.54**	.71	2.99**	.84	1.92[+]	.93	2.87**

Note:
a) [+] $p < .10$, * $p < .05$, ** $p < .01$, two-tailed;
b) All regression coefficient values are standardised (β);
c) Hypothesised personality predictors are bolded and underscored;
d) Two employees' age was missing, thus total number of sample in this analysis is 203.

Table 6.4b. Hierarchical regression of all personality traits predicting supervisor-rated performance (N=135-136)

	Interpersonal		Cognitive /Proactive		Task		Adapt		OJP		Promotability	
	Step 1	Step 2	Step 1	Step 2	Step 1	Step 2	Step 1	Step 2	Step 1	Step 2	Step 1	Step 2
Control												
Sex	-.06	-.07	-.19*	-.19*	-.03	-.03	.06	.07	-.04	-.04	-.03	-.03
Org Level	.14	.13	.17*	.16+	.07	.06	-.03	-.02	.14+	-.15+	.00	.01
Personality												
Extraversion		**.12**		-.20+		.00		-.21+		-.05		**-.01**
Openness		.06		**.23***		.02		**.05**		.12		**.13**
Emotional stability		-.02		.02		-.05		**.09**		**-.02**		-.01
Agreeableness		**-.02**		**.09**		.08		.09		.07		**.10**
Conscientiousness		-.08		.01		**-.05**		.04		**.02**		.12
R^2	.02	.05	.07	.12	.01	.02	.01	.03	.02	.04	.00	.04
ΔR^2		.03		.05		.01		.02		.02		.04
Est/S.E.	.09	1.38	1.69	2.29	.46	.75	.42	1.11	.83	1.13	.15	1.22

Note:
a) ** $p < .01$, * $p < .05$, + $p < .10$, two-tailed;
b) N=136 between four-factor performance and all other variables; N=135 between two global performance measures and all other variables;
c) All regression coefficient values are standardised (β);
d) Hypothesised personality predictors are bolded and underscored.

6.4.3. Testing the mediation hypotheses

To explore whether a predictive process can be found such that personality traits predict the judgment of global performance through the judgement of specific, trait-relevant performance factors, I first tested the five single mediation models, as hypothesised in h3a to h3e, using multiple regression analysis. After controlling for the three background variables, significant full mediation effects were found for four out of the five mediation models, supporting hypotheses 3a to 3d.

In predicting overall job performance (OJP), the direct effect of conscientiousness (β = .14, p < .05) was fully mediated by task performance (β dropped to .01, *n.s.*, Sobel's test = 3.51, p < .01, Figure 6.3a), and the direct effect of emotional stability (β = .12, p < .10) was fully mediated by adaptive performance (β dropped to .01, *n.s.,* Sobel's test = 3.55, p < .01, Figure 6.3b). In predicting promotability, the direct effect of openness to experience (β = .18, p < .01) was fully mediated by cognitive/proactive performance (β dropped to -.05, *n.s.,* Sobel's test = 5.72, p < .01, Figure 6.3c), and the direct effect of extraversion (β = .30, p < .01) was fully mediated by interpersonal performance (β dropped to -.01, *n.s.,* Sobel's test = 6.13, p < .01, Figure 6.3d). The mediation effect of negative agreeableness on promotability was not present, due to the fact that agreeableness did not relate to the mediator (i.e. cognitive/proactive performance). The four supported mediation effects are visually presented in Figure 6.3a – 6.3d (hypotheses 3a to 3d).

Figure 6.3a. Mediation path of conscientiousness predicting overall job performance (OJP) – hypothesis 3a.
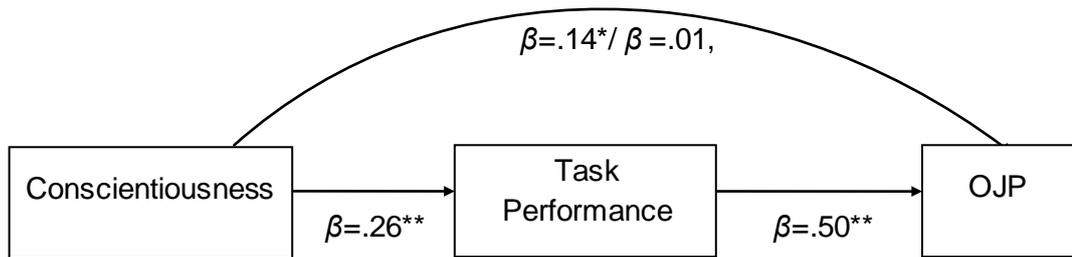
Figure 6.3b. Mediation path of emotional stability predicting OJP – hypothesis 3b.
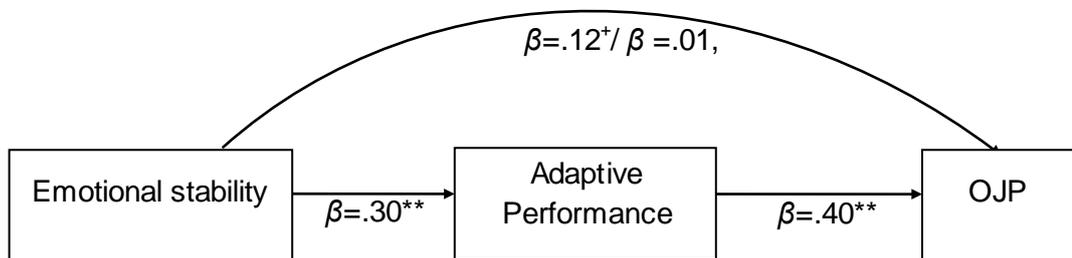
Figure 6.3c. Mediation path of openness predicting promotability – hypothesis 3c.
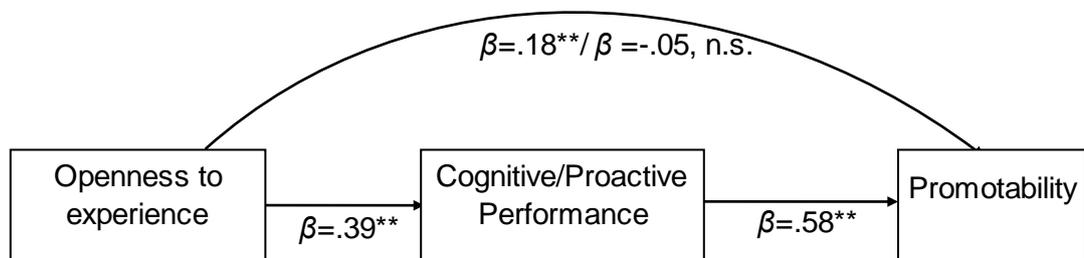
Figure 6.3d. Mediation path of extraversion predicting promotability – hypothesis 3d.

So as to further gauge mediation effects and to generate a holistic picture about predictive processes, it is necessary to simultaneously test the entire model by including all Big Five personality traits and all performance factors (i.e. Figure 6.2). The following structural models were tested: a) A model with only direct effects from Big Five traits to their hypothesised global performance outcomes. The four specific factors were allowed to remain in the model, yet without any path leading to or stemming from them; b) A model with only indirect effects from Big Five traits to their hypothesised specific performance factors, and from specific performance factors to global performance outcomes. There were no direct paths directly linking personality traits to global performance outcomes; c) A model with both hypothesised direct effects and indirect effects. In all of these models, the predictors (five personality traits) were allowed to intercorrelate, and the mediators (four specific performance factors) were allowed to intercorrelate. This is a reasonable approach in multiple-mediator models according to Preacher and Hayes (2008).

As can be seen in the top half of Table 6.5, model a) with only direct effects showed a rather poor model fit (χ^2 = 297.278, df = 45, χ^2/df = 6.601, CFI = 0.693, RMSEA = 0.165, SRMR = 0.166), suggesting that it is not acceptable to posit Big Five traits as directly relating to global performance without going through specific performance factors. Model b) with only indirect effects showed rather good fit (χ^2 = 75.845, df = 27, χ^2/df = 2.809, CFI = 0.941, RMSEA = 0.094, SRMR = 0.104). Model c) with both direct and indirect effects (χ^2 = 73.691, df = 22, χ^2/df = 3.349, CFI = 0.937, RMSEA = 0.107, SRMR = 0.105) showed slightly poorer fit than, yet was not significantly different from, model b) ($\Delta\chi^2/df$ = 0.431, $n.s.$). This shows that adding paths of direct effect do not contribute to the model fit, and thus a model with

only indirect effect is most appropriate. This model (Model b) is thus used as the basis to evaluate hypothesised mediation effects.

Table 6.5. Model fit results for testing the entire mediation model using self-reported performance

Model	χ^2	df	Ratio χ^2/df	$\Delta\chi^2/\Delta df$	CFI	RMSEA	SRMR
Original Models:							
Model a): Only direct effects	297.278	45	6.606	---	.693	.165	.166
Model b): Only Indirect effects	75.845	27	2.809	---	.941	.094	.104
Model c): Direct and indirect	73.691	22	3.349	.431	.937	.107	.105
Revised Model:							
Revised model d): add 3 paths from personality to specific performance	32.694	24	1.362	14.384**	.989	.042	.044

Note:
a) ** $p < .01$;
b) $\Delta\chi2/\Delta df$ is to test model differences as compared to Model b (only indirect effects).

Figure 6.4 presents the coefficients of the mediation paths of the entire model. Most of the expected indirect effect paths were significant with only three exceptions: agreeableness did not predict interpersonal performance ($\beta = -.04$, *n.s.*) and cognitive/proactive performance ($\beta = -.05$, *n.s.*); and openness did not predict adaptive performance ($\beta = -.08$, *n.s.*). Test of indirect effect showed that the standardised indirect effect from conscientiousness to overall job performance (OJP) through task performance was .044 ($p < .05$), and from emotional stability to overall job performance (OJP) through adaptive performance was .031 ($p < .05$). For promotability, the standardised indirect effect from extraversion through interpersonal performance was .085 ($p < .01$), and from openness through cognitive/proactive performance was .084 ($p < .01$). These four mediation effects were tested using the bootstrapping procedure suggested by Preacher & Hayes (2008), and were found to be significant (where the 95% Confidence Interval does not include zero) after being resampled for 1000 times. The bootstrapping results are provided in the top half of Appendix E.

Figure 6.4. Path coefficients of the proposed full mediation model
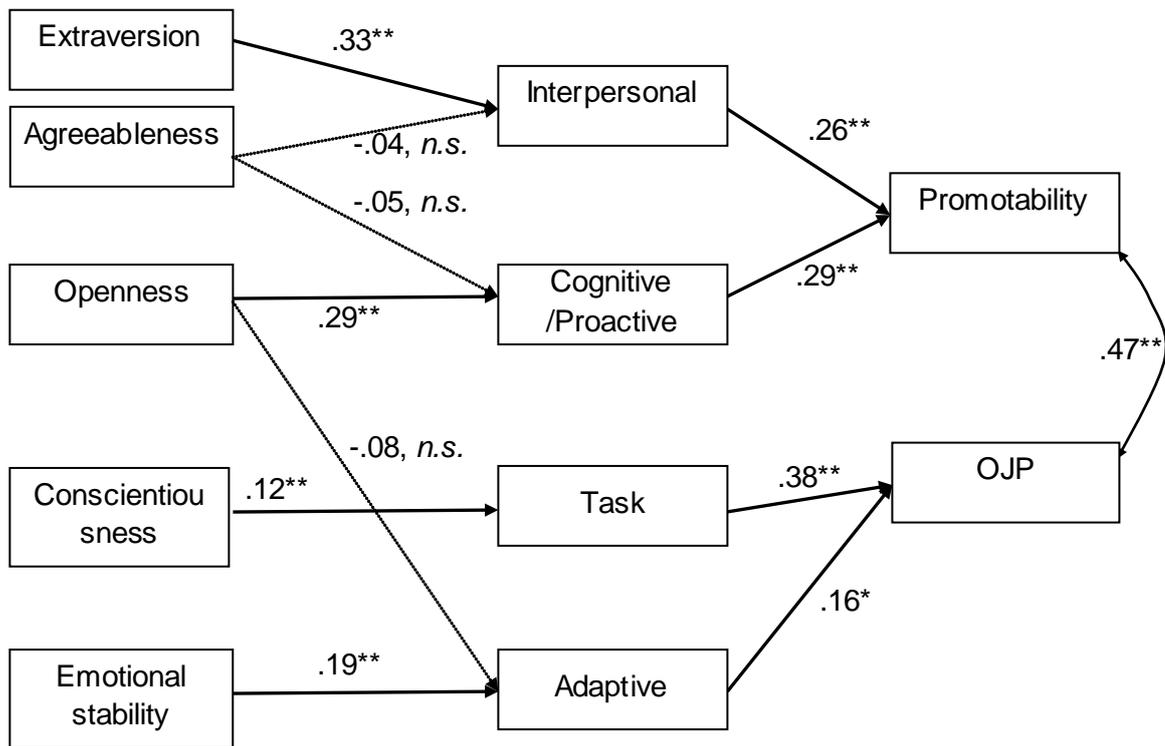
Note:
a) ** *p* < .01, * *p* < .05;
b) Effects of three background variables were controlled, yet were omitted from the above figure for clarity purpose;
c) Observed variables (denoted by square block) were used;
d) All predictors (personality traits) were allowed to intercorrelate, and all mediators (four specific performance factors) were allowed to intercorrelate. These paths were omitted from the above figure for clarity purpose.

Although the above results provided good support to the proposed mediation model linking all personality traits and all performance outcomes, the fit results of Model b) is still slightly below excellent level, especially on two indices of CFI and SRMR, which should ideally be > .95 and < .10 respectively (see Section 5.4.2 of Chapter 5 for details). This suggests that improvements can be made. Essentially, the proposed model is rather restrictive, For instance, I forced some personality traits to predict only one specific performance factor, while the correlation and regression results of this study have shown that extraversion related not only to interpersonal performance but also to cognitive/proactive and task performance, and that conscientiousness related not only to task performance but also to

cognitive/proactive performance (see Section 6.4.1 and 6.4.2). Therefore, forcing these two traits to predict only one corresponding specific performance factor may reduce the fit of the model.

Based on these *post hoc* observations, I tested a revised model by adding the missing paths from personality traits to specific performance, including two paths from extraversion to cognitive/proactive and to task performance, and from conscientiousness to cognitive/proactive performance. Model fit results of this revised model are shown in Table 6.5.

As can be seen in Table 6.5, the revised models achieved satisfactory fit results and significantly improved the originally proposed model (in comparison to Model b, $\Delta\chi 2/\Delta df = 14.384$, $p < .01$). The path coefficients based on this revised model are shown in Figure 6.5. As can be seen, the newly added paths (extraversion – cognitive/proactive, extraversion – task, conscientiousness – cognitive/proactive) all appeared significant. The other originally hypothesised paths showed similar patterns to those in Model b), although with slightly larger coefficient values. Bootstrapping results (the bottom half of Appendix E) showed that all previously tested mediation effects remained significant in the context of this less restrictive and more parsimonious model. However, it should be stressed that this revised model was tested on a *post hoc* basis, and the newly added paths may be unique to this sample and without strong theoretical underpinnings. Therefore, this revised model only serves as a reference, rather than the main focus of analysis.

Figure 6.5. Revised mediation model linking personality and global performance
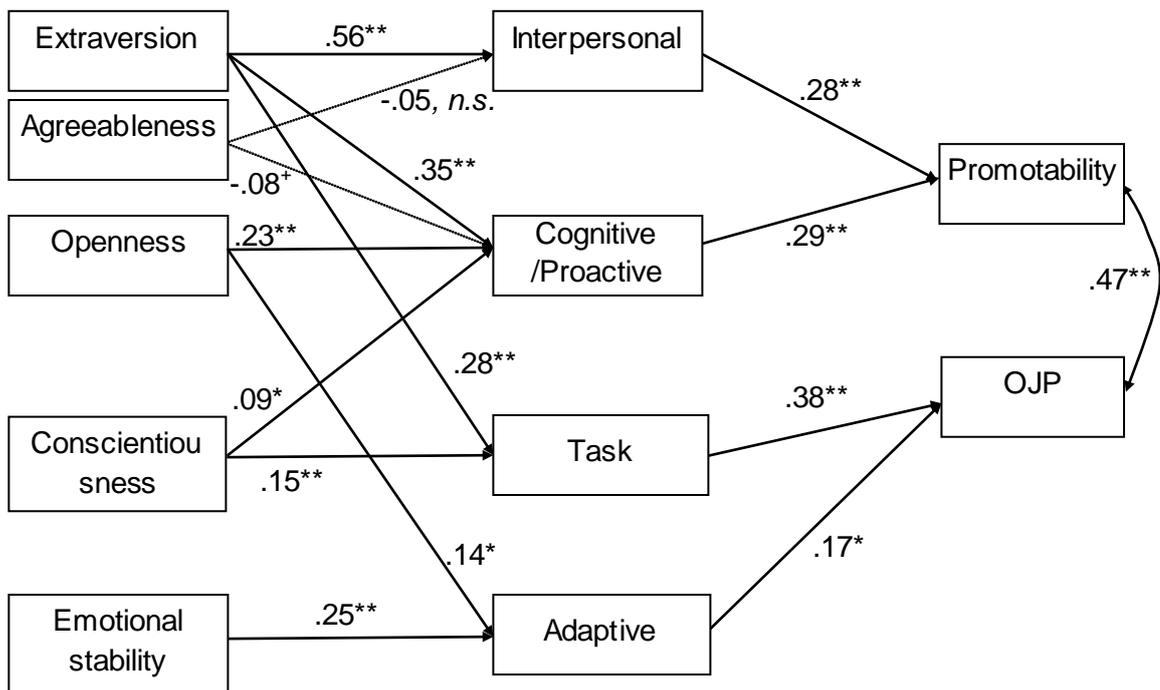
Note:
a) ** $p < .01$, * $p < .05$, + $p < .10$;
b) Effects of three background variables were controlled, yet were omitted from the above figure for clarity purpose;
c) Observed variables (denoted by square block) were used;
d) All predictors (personality traits) were allowed to intercorrelate, and all mediators (four specific performance factors) were allowed to intercorrelate. These paths were omitted from the above figure for clarity purpose.

6.4.4. Follow-up analysis with supervisor-rated performance

Given the weak relationships between Big Five personality traits and supervisor-rated performance, I conducted some follow-up analyses in an attempt to explain the underlying reasons. First, I looked into the facet-level of the Big Five traits, so as to see whether the null relationship at the broad factor level of personality might be due to the potential cancelling out effect among the facets of the Big Five. The correlations between the performance outcomes and the personality facets in the OPQ that measure the Big Five are shown in Table 6.6.

As can be seen, the relationships between the facets of the Big Five and performance outcomes are also rather marginal in this sample. Even by releasing the

significance level to .10 (two-tailed), only 7.3% of bivariate correlations in the table achieved significance level. This is only slightly above the chance level (i.e., significant correlations are expected 5% of the time simply due to chance, based on alpha equal to .05). Moreover, the hypothesised personality – performance relationships were not particularly stronger than non-hypothesised relationships, showing that the hypothesised personality – performance nomological net is not supported when supervisor-rated performance is concerned.

Table 6.6. Correlations between facets of Big Five and supervisor-rated performance (N=135-136)

		Interpersonal	Cognitive/Proactive	Task	Adapt	OJP	Promotability
Extraversion	Outgoing	**.17+**	-.03	.01	-.16+	.02	**.07**
	Affiliative	**.07**	-.02	.04	.00	.01	**-.03**
	Socially confident	**.05**	-.11	-.05	-.10	-.01	**.01**
	Persuasive	**.10**	-.04	-.04	-.12	-.02	**.10**
	Controlling	**.02**	-.08	-.09	-.07	-.02	**.05**
	(-) Emotionally controlled	**-.02**	.01	-.04	-.04	-.09	**-.12**
Openness	(-) Conventional	-.15+	**-.12**	-.05	**-.03**	-.06	**-.17+**
	Conceptual	-.02	**.02**	-.02	**.02**	.05	**.06**
	Variety seeking	.21*	**.21***	.05	**.02**	.16+	**.10**
	Innovative	.04	**.07**	-.05	**-.14**	.02	**.05**
	Behavioural	-.06	**-.05**	-.07	**-.11**	-.05	**-.01**
Emotional Stability	Relaxed	.08	.07	.00	**.03**	**-.01**	.00
	(-) Worrying	.03	.08	.11	**.05**	**.01**	-.02
	Tough minded	-.04	-.04	.02	**.14**	**.02**	.06
	Optimistic	.06	-.02	-.06	**-.01**	**-.01**	.00
	Socially confident	.05	-.11	-.05	**-.10**	**-.01**	.01
Agreeable	Caring	**-.02**	**-.02**	.02	-.02	.08	**.08**
	Trusting	**-.08**	**-.03**	-.04	.02	.03	**.05**
	(-) Competitive	**.03**	**-.05**	-.05	-.08	-.04	**-.03**
	Democratic	**.03**	**.14**	.09	.02	.04	**.13**
	(-) Independent minded	**-.04**	**-.02**	-.09	-.11	-.01	**-.01**
Conscientious	Conscientious	-.02	.03	**.04**	.15+	**.02**	.08
	Detail conscious	.05	.05	**.07**	.03	**.01**	.08
	Vigorous	-.17*	-.08	**-.08**	.06	**.13**	.15+
	Forward thinking	-.07	-.05	**-.16+**	-.10	**-.07**	-.01
	Achieving	-.07	-.03	**-.10**	-.07	**.06**	.10

Note:
a) * $p < .05$, + $p < .10$, two-tailed;
b) Hypothesised relationships are bolded and underscored;
c) N=136 with the four specific performance factors and N=135 with the two global performance factors.

Second, I speculated that the hypothesised personality – performance relationships might have been moderated by some important variables, and I thus evaluated the potential moderating effect of all background variables in this study. That is, two job type moderators – departmental membership (product department and customer department) and organisational level (manager versus non-managers), sex, age and organisational tenure. The first three variables are dichotomous, so it was straightforward to contrast the correlations between two groups. The age and tenure were continuous variables, and I thus trichotomoised these two variables and compared the highest 1/3 to the lowest 1/3. Table 6.7 shows the hypothesised personality – performance relationships as organised by these five moderators. Fisher's Z scores were calculated to assess the significance of difference between two correlations under comparison.

As can be seen in the table, rather contrasting personality – performance relationships were revealed by comparing different subgroups as organised by background variables. Several relationships were in the opposite direction across the two groups, which possibly cancelled out the total effect when all participants were grouped together. For instance, conscientiousness had a rather negative relationship with supervisor ratings of task performance in the product department ($r = -.39$, $p < .05$), while the same relationship was close to zero in the customer department ($r = .04$, *n.s.*). With the organisational level moderator, extraversion had a positive relationship with the hypothesised interpersonal performance with non-managerial employees ($r = .24$, $p < .05$) while the same relationship turned slightly negative in the manager group ($r = -.11$, *n.s.*). With the sex moderator, emotional stability highly and positively correlated to its conceptually concordant adaptive performance only in the female group ($r = .42$, $p < .10$) but not in the male group ($r = -.06$, n.s.), possibly due to that supervisors had different expectations for female and male subordinates in terms of their emotional stability. Overall, it seems clear that all background variables show moderating effect on certain personality – performance relationships.

Table 6.7. Background variables as moderators in the relationships between self-reported personality and supervisor rated performance

	Department			Org Level			Sex			Age			Tenure		
	Product (N=33)	Customer (N=102-103)	Z	Non-manager (N=95)	Manager (N=40-41)	Z	Male (N=115-116)	Female (N=20)	Z	Low (N=45)	Hi (N=43-44)	Z	Low (N=46)	Hi (N=46)	Z
Specific performance															
Extraversion – Interpersonal	.02	.15	-.63	.24*	-.11	1.84[+]	.12	.21	-.36	.12	-.07	.87	.21	.18	.14
Agreeableness – Interpersonal	.15	-.05	.97	-.01	-.03	.10	-.04	.15	-.73	.05	.04	.05	.20	.00	.94
Openness – Cognitive/Proactive	.08	.14	-.29	.08	.18	-.53	.13	.21	-.32	.23	-.20	1.99*	.14	.12	.09
Agreeableness – Cog/Proactive	.20	.02	.88	.14	-.09	1.20	.02	.19	-.66	.25[+]	.11	.66	.29*	-.07	1.71[+]
Conscientiousness – Task	-.39*	.04	-2.17*	-.03	-.06	.16	-.08	.29	-1.46	-.05	-.01	-.18	.09	-.01	.46
Emotional stability – Adaptive	-.16	.09	-1.21	.12	-.30[+]	2.23*	-.06	.42[+]	-1.95[+]	.20	-.21	1.89[+]	.17	-.12	1.36
Openness - Adaptive	-.09	-.03	-.29	.08	-.23	1.63	.00	-.27	1.06	-.08	.01	-.41	.05	-.09	.65
Global performance															
Conscientiousness – OJP	-.24	.11	-1.71[+]	.02	.06	-.21	.06	-.05	.42	-.13	.10	-1.05	-.08	.22	-1.41
Emotional stability – OJP	.06	.00	.29	.06	-.19	1.30	.00	-.05	.19	.11	-.23	1.56	.15	-.07	1.03
Openness – Promotability	.18	.09	.44	.27**	-.16	2.25*	.19*	-.34	2.10*	.15	-.26[+]	1.89[+]	.15	-.05	.93
Extraversion – Promotability	.03	.11	-.39	.20*	-.24	2.30*	.09	-.04	.50	.14	-.20	1.56	.00	.01	-.05
Agreeableness – Promotability	.22	.07	.74	.12	.10	.10	.09	.22	-.51	.29[+]	.03	1.22	.35*	-.07	2.02*

Note:
a) ** $p < .01$, * $p < .05$, [+] $p < .10$, two-tailed;
b) Product = research-oriented product division; Customer = Customer care and quality control; OJP = Overall job performance;
c) In the case where sample sizes are indicated as a range (e.g. N=102-103 in the Department variable), the larger value of this range applies to specific performance factors, and the smaller value applies to the global performance factors.

6.4.5. Summary

By using self-rated performance as the performance criteria, I found support for the hypothesised differential effects of Big Five personality traits in predicting specific performance factors, and for the full mediation effects such that personality predicts global performance ratings as mediated by specific performance factors. This suggests that it is reasonable to posit a nomological net linking personality taxonomy and performance taxonomy, and to expect a predictive process to occur in translating personality traits to ultimate performance criterion. Most of the hypothesised relationships were supported, except those associated with the agreeableness trait, which seems to be unrelated to any performance outcome. An additionally unexpected result found in the above analysis was the strong effect of extraversion on multiple performance outcomes. It is not clear whether this is a result unique to this sample, or generalisable to other contexts.

By using supervisor-rated performance as the criterion, the hypothesised relationships were almost entirely un-supported. Personality traits appeared to have rather weak relationships with all performance outcomes. The follow-up analysis indicates that such findings could be partially explained by potential moderating variables, which may have obscured the personality – performance relationships under different conditions. These findings will be discussed in more detail in the next section.

6.5. Discussion

This study mainly explored two issues. First, I investigated the personality antecedents for factors of the high-order performance structure, as found in Study 1 (Chapter 5). I explored whether a nomological net can be built such that one-to-one relationships can be found between the Big Five personality taxonomy and the four-factor high-order performance taxonomy. Second, I explored whether personality traits predict global performance outcomes through the mediation path of trait-relevant, specific performance factors. The findings revealed different pictures by using self-rated performance and supervisor-rated performance. When self-rated performance was used as criterion, relatively satisfactory one-to-one relationships were found between personality and performance, and most of the full mediation effects were found as hypothesised. When supervisor-rated performance was used as the criterion, however, these hypothesised relationship received little support. This shows that there is a more straightforward relationship between self-reported personality and self-rated performance, yet the relationship with supervisor-reported performance may be affected by multiple other intervening factors and the predictive process may thus be much more complex than expected. These findings are discussed in more detail as follows.

6.5.1. Implication from self-reported performance: Big Five personality and Four-Factor high-order performance

The promising findings when performance was perceived by employee themselves demonstrate that it is possible to build a nomological net linking personality taxonomy and performance taxonomy. Though not ideal, a good level of one-to-one matching between personality and performance factors was observed, showing that employees can well differentiate between different performance domains in a way that is in good alignment as they differentiate personality factors. Such good alignment may indicate that the Big Five personality taxonomy and the four-factor performance taxonomy stand at a similarly general level in the psychological space, thus fulfilling the requirement to align the bandwidth of psychological constructs (J. Hogan & Roberts, 1996).

The less ideal one-to-one matching between personality and self-rated performance mainly occurred to the extraversion trait, which had a universal effect on more than its corresponding performance domain (i.e. interpersonal). This may be due to the fact that extraversion has a strong affective component that contributes to the feeling of being positively and actively engaged, which can be reflected by such facets as excitement, enthusiasm, and confidence that are contained in the broad extraversion factor (Tellegen, 1985; Watson & Clark, 1997). Therefore, an extraverted individual is likely to possess a general tendency to positively perceive his/her job performance. Additionally, it may be that extraversion may reflect certain attributes that are important in performing in the Chinese context. Indigenous research on personality has revealed that there is a unique social potency factor in Chinese personality, which tends to correlate highly with extraversion (F. M. Cheung et al., 1996). Empirical research has found that this social potency factor had a universal effect on all leadership competency factors (F. M. Cheung & To, 2005). Therefore, it may be the case that social potency, which has been tapped into by the measure of extraversion, is the underlying factor that causes a prevalent effect on all performance dimensions. Furthermore, research on response distortion has shown that individuals with high extraversion can have an 'alpha-bias' or 'egoistic bias' in judging themselves and can thus produce a 'superhero' type of self-favouring images and overclaim their competence (Paulhus, 1998; Paulhus & John, 1998). Therefore, the strong and ubiquitous effect of extraversion on self-rated performance, as found in this study, may actually be due to the effect of unconscious, self-deceptive enhancement. This potentially confounding effect needs to be better disentangled in future studies.

The null effect of the agreeableness trait on all performance outcomes is also worth mentioning. Although I hypothesised agreeableness to be conceptually related to interpersonal performance, and agreeableness may be especially important in the Chinese cultural context, such a hypothesis was not supported with empirical data. Most earlier meta-analyses have found rather low observed correlations between agreeableness and job performance, except when the performance outcome relates to teamwork, or when the job context involves interpersonal interactions such as in customer service roles (Barrick & Mount, 1991; Barrick et al., 2001; Hurtz & Donovan, 2000; Mount et al., 1998; Salgado, 1997). In this study, which drew

samples from electronic engineers whose jobs may be more technically oriented than interpersonally oriented, it is possible that agreeableness is not a particularly important trait to perform well on the job. Although one of the two departments was a customer-oriented (i.e. customer care and quality control) division in which employees may need to be in direct contact with clients, their job role may focus more on solving technical problems, rather than interacting with people. Another possible explanation is that agreeableness may be more useful in predicting team-level or organisation-level performance outcomes, rather than individual-level performance outcomes, as this trait may contribute to the broader organisational context in which work is completed. For instance, Neal et al. (in press) found that while agreeableness did not predict individual-level performance factors, it did predict team-level proficiency.

6.5.2. Implication from self-reported performance: The mediation process in predicting global performance

Using self-reported performance, I found a satisfactory mediation effect, such that the prediction from personality on global performance outcomes was fully mediated by trait-relevant specific performance factors. Specifically, conscientiousness and emotional stability, the two traits that were found in meta-analysis findings to be most predictive of overall job performance (Barrick & Mount, 1991; Hough, 1992; Hurtz & Donovan, 2000; Salgado, 1997; Tett et al., 1991), were found to first exert their influence upon their conceptually concordant specific performance factors, task performance and adaptive performance; and because these two performance aspects are likely valued in overall performance judgment, they further carry the effects to overall performance ratings. Likewise, openness to experience and extraversion first projected their influence onto their conceptually concordant specific performance factors, cognitive/proactive performance and interpersonal performance. As these two aspects are considered important for managerial positions (Judge et al., 2002), the effects were further translated into ratings on promotability.

These results provide empirical support to earlier conceptualisation as to the process model linking personality and global performance outcomes (Bartram et al.,

2010; Robertson, 1994; Tett & Burnett, 2003), suggesting it is reasonable to expect that global performance is rather remote outcomes and is a weighted combination of specific performance factors. Furthermore, these results demonstrate the value of differentiating specific performance and global performance, and positing them at different predictive stages, rather than treating them as the equivalent, interchangeable performance outcomes.

6.5.3. Personality and supervisor-rated performance

Contrary to my expectations, the supervisor ratings of performance had a rather weak and non-significant relationship with personality trait predictors. The only two relatively supportive findings were between extraversion and interpersonal performance, and between openness to experience and cognitive/proactive ($r = .12$ and .13, respectively, both n.s.). While these values failed to reach significant levels possibly due to insufficient power to detect significant effects in a small sample (N = 136), they were of comparable or higher magnitude as those reported in meta-analysis results. For instance, Barrick et al. (2001) in their second-order meta-analysis reported extraversion and openness to have sample-weighted observed correlations with supervisor ratings of job performance at .11 and .03.

Particularly surprising was the null and even slightly negative association between conscientiousness and its conceptually related task performance. This contradicts earlier findings where this trait was suggested as most predictive of overall job performance (Barrick & Mount, 1991; Barrick et al., 2001; Hurtz & Donovan, 2000) and of task performance (Allworth & Hesketh, 1999; Neal et al., in press). Such null relationships could hardly be enhanced by looking into the facet-level of conscientiousness (Table 6.6). I also examined the raw scores of conscientiousness (and other traits as well) and performance outcomes, and found no particular evidence of ceiling or floor effects, suggesting that the zero relationships cannot be attributed to reduced power associated with low variability on study variables.

In the following section, I discuss several potential explanations as to these generally disappointing results between personality traits and supervisor rated performance.

First, it may be the case that an individual's latent personality traits cannot easily and directly transfer into observable work behaviours that can be observed by raters (e.g. supervisors) other than the self. Raters may not always have the opportunities to observe ratees' work behaviours (Warr, 2000), and they make performance judgments based on the degree to which the ratees meet their expectation and promote their agenda (R. Hogan & Shelton, 1998). These considerations highlight the fact that correlations are rarely high even if raters and ratees rate on the same constructs. Conway and Huffcutt's (1997) meta-analysis on multisource performance ratings reported an average uncorrected correlation of .22 between self- and supervisor-judgment. A similar correlation (mean $r = .21$) was reported by Warr and Bourne (1999) in a UK-based sample where 360-degree assessment data were used, and the authors indicated that the correlations between employees' self-ratings and their supervisors' ratings on the same behavioural constructs are typically below .30.

In descriptive analysis (Section 6.4.1), I found that correlations between self and supervisor on the same specific performance constructs (i.e. average self-supervisor r on the four high-order factors was .16) were better than the correlations between self-reported personality and supervisor rated performance (average $r = .06$ on 7 hypothesised relationships), with the most evident gain on the task performance factor ($r = .20$, $p < .05$, in comparison to $r = -.05$, $n.s.$, between conscientiousness and supervisor rated task performance). However, it should also be noted that these values were still not impressive. Therefore, we could expect that when selves and supervisors are rating on different constructs (i.e. self-report of personality and supervisor report of performance), the relationships could be even weaker. This echoes Warr and Bourne's (1999) conclusion that it is more realistic to use .30 rather than 1.00 as the expected maximum validity of personality predictors when correlating self-report personality with other-report performance.

Section 6.4.1 also indicates that stronger agreements between self and supervisors were obtained in rating specific performance, rather than global performance. Such a result indirectly shows the value of using specific performance factors, rather than global performance outcomes as the mainly interested criterion,

since a more subjectively and contextually viable judgment may be more strongly attached to global performance, rather than to specific performance.

Second, as already partially addressed in the follow-up analysis (Section 6.4.4), it is likely that important moderators are overlooked by simply relating personality to performance outcomes. The existence of moderators in personality – performance relationships is widely acknowledged, and moderators can exist in a wide range of individually or situationally different constructs (Schneider & Hough, 1995). For instance, job type is considered in all meta-analyses as an important moderator in personality – performance relationships, due to the fact that different personality traits are valued in different job contexts (Barrick & Mount, 1991; Barrick et al., 2001; Hurtz & Donovan, 2000). An example is that extraversion trait may be more important for managerial and people-oriented roles than for other jobs.

In the follow-up analysis (Section 6.4.4), I compared the personality – supervisor rated performance relationships across different subgroups, as organised by all five background variables. Rather contrasting relationships were revealed. Several relationships were in the opposite direction across the two groups, which possibly cancelled out the total effect when all participants were grouped together. For instance, conscientiousness had a rather negative relationship with supervisor ratings of task performance in the product department ($r = -.39$, $p < .05$), while the same relationship was close to zero in the customer department ($r = .04$, $n.s.$). It is possible that the research and development type of job in the product department focuses more on innovation and creativity, which may be lacking among conscientious individuals (King, Walker, & Broyles, 1996; Patterson, 2002; Robertson et al., 2000).

It should be noted that the comparisons as carried out were based on highly unbalanced group size and sometimes with very few samples in one of the two groups under comparison. Therefore, any conclusion based on these results would seem premature. However, it is clear that although this sample was drawn from a single organisation, and was composed of employees with very similar background (i.e. engineers), there could be important moderators that affect the predictive patterns of personality traits. This result indicates that it is necessary to consider various potential moderators, and to collect large samples from as homogeneous

occupational groups as possible, so that a more refined and subtle understanding of personality and performance can be gained.

Third, the weak relationship between personality traits and supervisor-rated specific performance factors shows that other individual difference constructs may be more important than personality variables for certain performance domains. This may be especially true for the task performance domain, which has been found to be not very well predicted by personality constructs, but rather, by job knowledge, skills and cognitive ability, among others (Borman & Motowidlo, 1993; Hough, 1992; Hurtz & Donovan, 2000; J. W. Johnson, 2003; Motowildo et al., 1997). Hunter, Schmidt and colleagues, in particular, repeatedly showed that cognitive ability is the best predictor of job performance (Hunter & Hunter, 1984; F. L. Schmidt & Hunter, 2004; F. L. Schmidt & Hunter, 1998). Furthermore, motivational constructs can play important roles in predicting performance outcomes, and some motivational variables, such as self-efficacy and goal setting, are especially important in linking the distal predictor of personality to work behaviours (Barrick, Mount, & Strauss, 1993; J. W. Johnson, 2003; Latham & Locke, 1991; Mitchell & Daniels, 2003).

Fourth, although supervisor ratings tend to be regarded as the most useful performance criteria, it is not an entirely reliable measure that is free from error. Indeed, researchers have found that there is a large amount of idiosyncrasy when ratings are obtained from one single supervisor, and supervisors' ratings also suffer from the halo effect, which leads to inflated ratings across different performance domains (Cooper, 1981; Hunter, 1983; Viswesvaran et al., 2005). In this study context, the quality of the supervisor ratings data is unclear as it is not guaranteed that all responses were carefully and conscientiously provided by individual supervisors. Given these potential errors associated with ratings collected from a single person, it is thus more desirable to obtain ratings from multiple observers, and ideally also from multiple sources. Recent practice such as using 360-degree rating to provide a comprehensive view about ratees' performance has been welcomed, and it has been found that the predictive validity of personality traits can be substantially enhanced when peer, subordinate, and self-ratings on performance dimensions were added to supervisor ratings (Oh & Berry, 2009).

The above listed arguments are merely tentative speculations about the unsatisfactory findings in terms of the relationship between employees' self-reported personality and their supervisors' perception of job performance. Although not tested, the results here indicate that the prediction from self-reported personality to supervisor-rated global performance may be far less straightforward than the hypothesised mediation effect. This is due to the fact that the first stage of the mediation, that is, from personality to supervisor ratings of specific performance, is already hard to achieve. While the importance of conceptual congruence between personality taxonomy and performance taxonomy should not be understated, it may be the case that establishing a successful nomological net is greatly dependent on important moderators that affect the relationships of each personality trait – performance factor pair (Hough, 2001; Schneider & Hough, 1995).

6.5.4. Summary of implications

This study found mixed results as to the findings associated with the use of self-rated performance and supervisor-rated performance. Although self-reported performance tends to be downplayed and discouraged by scholars, due to concern with potential common method bias when the predictor and criterion are from the same source (Campbell, 1982; Podsakoff, MacKenzie, Lee, & Podsakoff, 2003), it is necessary to recognise that self-ratings do provide unique and valid information about an individual's work performance (Conway & Huffcutt, 1997), and sometimes relate more strongly to external criteria than other raters' ratings (Lance, Teachout, & Donnelly, 1992). Moreover, scholars have pointed out that other-report is not necessarily superior to self-report, as measuring two variables by different rater sources can lead to missing shared method effects, and may thus attenuate the relationship (Conway & Lance, 2010). These considerations highlight the need to use both self-report and supervisor-report in performance ratings. These methodological implications will be further discussed in the general discussion chapter (Chapter 8).

Further, an alternative option that can be considered in personnel selection research may be to move beyond personality assessment and directly asking individuals to report their own perception on performance constructs that organisations intend to measure (e.g., competencies). In this way, conceptual alignment can be more easily made between the predictor construct (self-report) and

the criterion construct (supervisor-report), and better predictive validity can be obtained against supervisors' perception of performance.

6.5.5. Limitations

There are several limitations to this study. First of all, the discovered mediation effect between self-reported personality and self-reported performance was statistically derived and does not have strong causal implications. Although performance was measured at a certain period after personality was measured, the measurement of specific performance and global performance was nevertheless conducted at the same time point. Therefore, causal relationships between the study variables, especially between specific performance and global performance, are not guaranteed. While the proposed direction of mediation is conceptually valid, other mediation patterns, such as reversing the position of the mediators and the outcomes can also generate statistically valid mediation effects. A more desirable study design should use longitudinal or experimental design to better disentangle this mediation effect.

Also associated with the mediation effect by using self-ratings, is the problem of multicollinearity existing in this sample. In particular, two of the four mediators, interpersonal and cognitive/proactive, were highly correlated with each other ($r = .83$, $p < .01$). Given that the presence of multicollinearity may suppress the unique effect of individual mediators (Preacher & Hayes, 2008), it is likely that the discovered mediation effects were underestimated.

Third, this study did not include any contextual variables, which are of critical importance in personality – performance relationships. For instance, trait activation theory suggests that personality traits are cued by situational factors; thus different behaviours may be expressed in different situations, albeit being underpinned by the same personality traits (Tett & Burnett, 2003). Therefore, the supported and unsupported effects in this study could be better disentangled and explained if more situational variables were considered.

6.6. Conclusion

In this study, I proposed a nomological net linking the Big Five personality taxonomy to the four-factor high-order performance taxonomy and tested it with job incumbents' data collected from a Chinese organisation. The findings found relatively good support for this proposed nomological net where self-report personality and self-report performance were concerned. The results also indicate that when self-report performance was used, there was a full mediation relationship linking personality, specific job performance and global job performance, supporting the arguments that personality are translated into global performance as mediated by specific performance domains, which are conceptually related to personality traits. The proposed nomological net was not supported when supervisor-rated performance was used as the criterion. Some tentative explanations were offered, yet it is suggested that a lot more need to be learnt about the complex process as to how employees' self-report personality are translated into supervisors' perception of specific job performance.

Clearly, the results from one single study may not offer sufficient support to the proposed nomological net, as the discovered effects may be sample-specific and that using only one personality measure cannot help generalise the results to a broader context. Therefore, the next study intends to validate the proposed personality – performance relationships in a different sample and by using two different personality instruments. Furthermore, the next study intends to shed some light on the value of incorporating the dynamic perspective of personality into researching the nomological net between personality and performance.

CHAPTER 7: EMPIRICAL STUDY 3

BIG FIVE PERSONALITY AND PERFORMANCE:

THE NOMOLOGICAL NET AND IMPLICATIONS FROM PERSONALITY STATES

7.1. Overview

The previous study has proposed and tested a nomological net that links the Big Five personality taxonomy and the four-factor high-order performance taxonomy. The purpose of this third study is twofold. First, I intend to validate the proposed nomological net in a different sample, by using different personality instruments. Second, I intend to explore the potential of enhancing the relationship between personality traits and specific performance factors, by drawing on the dynamic perspective in conceptualising personality. Specifically, I propose that personality can be considered not only as a trait-level construct, but also as a state-level construct. Using data collected from a diary study, I explore the merit of personality states in predicting work performance (Research Question 3). Figure 7.1 presents the positioning of this chapter in the whole thesis, with the grey-shaded areas indicating the content of this chapter. As can be seen, this chapter focuses on the relationship between personality and specific performance constructs, as well as the intervening variables of this linkage.

Figure 7.1. The positioning of Study 3
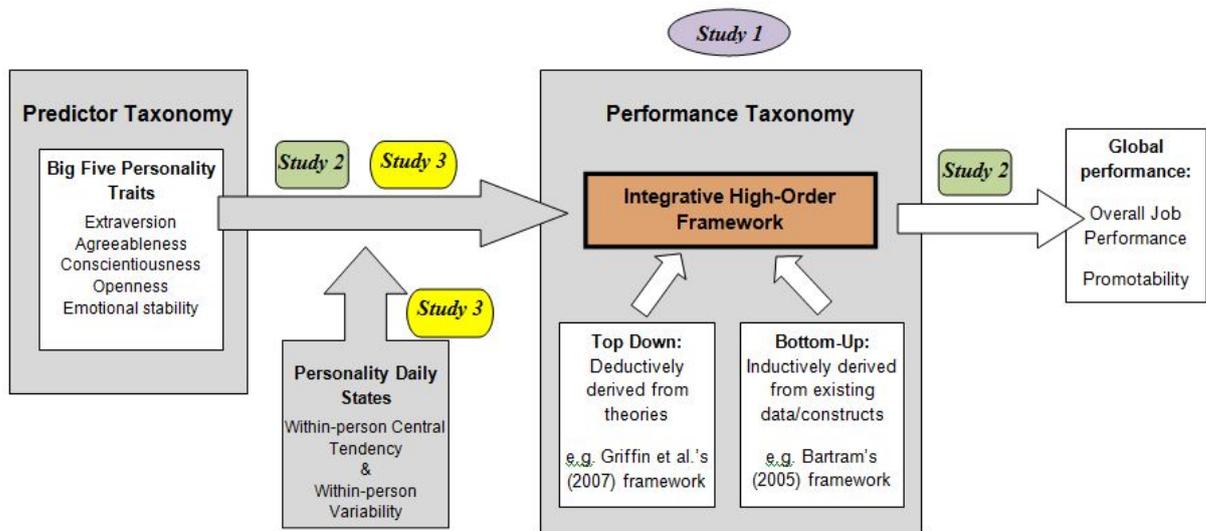
7.2. Literature and Hypotheses

7.2.1. The interactionistic approach to personality

As discussed in Chapter 3 (Section 3.6), although meta-analysis results have pointed out that personality traits are valid and reliable predictors of work performance, only rather modest relationships between traits and performance outcomes have been revealed, leaving the majority of variance in performance terms remain unexplained (Guion & Gottier, 1965; Mischel, 1968; Morgeson et al., 2007; Pervin, 1994).

Chapter 3 also discussed the fact that such insufficient prediction is partially due to that the trait approach considers personality as fixed, de-contextualised traits and tends to overlook the malleable, dynamic nature of personality and does not consider variability within an individual (McCrae & Costa, 1990; Tett & Guterman, 2000). As an alternative, several process-oriented, interactionistic theories reconceptualise personality as a cognitive-affective system, composed of multiple cognitive-affective units that are readily enacted by situational cues (Mischel & Shoda, 1995, 1998), or as a distribution curve as composed of momentary personality (Fleeson, 2001). Such conceptualisations provide more insight into the dynamic

psychological functioning within an individual, and may thus shed new light on the link between personality and performance in work contexts.

In this study, I thus incorporate the interactionistic perspective in studying the relationship between personality and specific performance. In particular, I adopt Fleeson's (2001) theory that conceptualises personality as a density distribution of momentary (daily) states. In his conceptualisation, Fleeson (2001) argued that an individual would display all levels of all traits in everyday life, and aggregating all expressed states into a density distribution would profile the frequency of this person's standings at all levels on the latent trait. Fleeson further indicated the two principal parameters that depict this distribution: 1) the central location which represents the aggregated mean of personality state across many occasions; 2) the width which represents the within-person variability of personality state. In this study, I collect data on these two important parameters to examine firstly, to what extent personality traits can be manifested in daily personality states and whether the variability of states represents a stable between-person different characteristic, and secondly, whether within-person variability of personality states can offer meaningful prediction on performance outcomes, over and above the effect of personality traits and the aggregated mean of personality states. In the following sections, I will present the arguments that lead to my main hypotheses.

7.2.2. Traits, states and the central tendency and variability of states

The interactionistic approach considers personality at both the trait level and state level. The trait-level personality depicts personality as a general disposition that facilitates individuals' consistent behaviours across situations. The state-level personality represents the same feelings, behaviours and experiences described by relevant traits (e.g. on the Big Five domains), yet applied to a shorter duration such as a specific moment or a specific day (Fleeson & Gallagher, 2009). Therefore, personality state is the product of both latent traits and situational characteristics specific to the sampled moment, and it thus embodies the fluid and malleable nature of personality and contains additional information above what is contained in the trait (Fleeson, 2001; Fleeson & Leicht, 2006; Mischel & Shoda, 1995, 1998; Nesselroade, 1991).

While underpinned and determined by personality traits, personality state has been found to have distinct features. For instance, Beckmann, Wood and Minbashian (2010) found that while neuroticism and conscientiousness usually correlated negatively at the between-person level, such that those who are less neurotic tend to be more conscientious, this relationship was reversed at the within-person level, such that when individuals experience neurotic feelings they would tend to engage in conscientious behaviours. This suggests that personality state-level constructs are unique constructs, rather than simply a momentary mirroring of personality traits, and thus need to be studied in greater depth.

Fleeson's (2001) density distribution theory suggests that while an individual's specific personality state may be highly susceptible to situational cues and is difficult to predict solely by personality trait, the aggregation of all momentary states should reflect a person's most frequently displayed, central tendency of behaviour, that is, the latent trait. This proposition has received support from several diary studies. By aggregating self-recorded behaviours and experiences over a number of days, the mean of the aggregated daily states can be well predicted by relevant traits (Church et al., 2008; Epstein, 1979; K. D. Wu & Clark, 2003). Fleeson and Gallagher's (2009) meta-analysis of diary studies shows that this relationship is frequently higher than .40, providing support for the arguments of traits being manifested in the central tendency of momentary states. Although a correlation between the trait and mean of states at .40 may not appear high, it should be pointed out that this moderate correlation is what we should expect, as state-level constructs contain substantial information about the situation that is distinctive of a specific moment (e.g., Bolger et al., 2003). Taken together, I expect that by recording individuals' personality states across days, the central tendency of states would positively relate to the relevant traits, and the correlation will be moderately high on all Big Five dimensions.

> *Hypothesis 1a: Personality traits on each big five dimension will correlate positively and significantly with the aggregated mean scores of corresponding personality states.*

In addition, individuals differ not only in terms of their relative standing on latent traits, but also in the extent to which these traits vary in every day expression.

This idea is embodied in the concept of interindividual differences of intraindividual variability (Mroczek & Spiro, 2003). Historically, intraindividual variability was considered to be error variance that needed to be minimised. However, for some time now, researchers have noticed that while some individuals behave more or less the same across time, others vary greatly in response to situational cues. In other words, intraindividual variability may represent systematic difference of individual characteristic and should thus be recognised as a central and stable aspect of personality (Bem & Allen, 1974; Borkenau & Ostendorf, 1998; Fiske & Maddi, 1961; Fleeson, 2001; Larsen, 1989; Mischel & Shoda, 1995, 1998). In Fleeson's (2001) density distribution theory, this variability concept is depicted as the width (i.e. standard deviation) parameter of the state distribution curve, and was found to be independent from traits, and relatively stable over time.

It is important to test whether the variability of personality states represents a systematic, individually different characteristic or whether it is the result of random fluctuations. Intraindividual consistency or variability is expected to be shaped by certain stabilising forces that 'serve to return states towards a more-or-less fixed level' (Fleeson & Jolley, 2006, p. 46) and I hypothesise that these stabilising forces may be associated with personality traits of emotional stability and openness to experience. Emotional stability taps self-control of emotion, stress and anxiety, which may help reduce individuals' emotional and behavioural fluctuations across situations (Eysenck & Wild, 1996). Openness to experience represents cognitive flexibility and receptivity to new information (McCrae & Costa Jr., 1997), which may relate to the 'functional flexibility' (Paulhus & Martin, 1988) that allows individuals to flexibly adjust their own behaviours to respond to situational cues. The proposition of these two traits being associated with intraindividual variability is consistent with the two competing views about the nature of variability. Baird, Le and Lucas (2006) have summarised variability as being either considered to reflect a flexible tendency of appropriately responding to changing situations (i.e. openness to experience), or having a negative connotation as being unable to maintain self-coherence, or even indicating pathology (i.e. neuroticism). Some further evidence about the relationship between variability and these two traits can be drawn from a recent study by Sherman, Nave and Funder (2010), who showed that behaviourally consistent individuals tend to be conservative (less open) and more emotionally

stable. Therefore, I expect emotional stability and openness to experience to be two personality traits that relate to the characteristics underlying intraindividual variability.

> *Hypothesis 1b: There exist systematic interindividual differences in intraindividual variability of personality states. Among the Big Five traits, emotional stability and openness to experience will most closely relate to intraindividual variability, such that more neurotic and more open individuals will display higher variability across occasions.*

7.2.3. Personality traits, states and performance

As noted at the beginning of this chapter, one of the aims of this study is to validate the point-to-point relationships between the Big Five personality traits and the four performance factors, as found in the previous study. In Study 2 (Chapter 6) I provided and tested a nomological network, proposing that interpersonal performance will be most strongly predicted by personality traits of extraversion and agreeableness; cognitive/proactive performance will be most strongly predicted by openness to experience and negative agreeableness; task performance will be most strongly predicted by conscientiousness; and adaptive performance will be most strongly predicted by emotional stability and openness to experience. These relationships are illustrated in the first two columns of Table 7.1. In this study with a different sample (MBA sample), I will use the same 22 competencies, as used in the previous two studies, and will thus apply the same mapping key to convert these competencies into a four-factor performance framework. To validate the personality – performance nomological net, I will employ two different Big Five trait measures, and will expect the same personality – performance relationships to be found. Therefore, I hypothesise:

> *Hypothesis 2a: The Big Five personality traits will differentially relate to the factors in the high-order performance framework as tested in Study 2 and as illustrated in Table 7.1.*

Since the sample was full-time MBA students, I also collected the students' course grade, which can serve as an independent measure of academic performance.

Past literature tends to show that conscientiousness and openness to experience may be the two personality traits among the Big Five that are most important for academic performance. First, Noftle and Robins's (2007) meta-analysis on personality and academic performance revealed that among the Big Five, conscientiousness had the most consistent and positive relationship with Grade Point Average and with course grade, by using various personality instruments. Second, there has been evidence from earlier meta-analyses that openness to experience trait is especially useful in predicting training and learning outcomes (Barrick & Mount, 1991; Barrick et al., 2001; Salgado, 1997). Barrick et al.'s (2001) second-order meta-analysis indicates that openness to experience has the highest relationship with training performance. Since the current study is in an academic context, and the performance being assessed is a measure of training and learning outcome, I anticipate that conscientiousness and openness to experience will have the strongest effect among all the Big Five traits.

> *Hypothesis 2b: Course grade will be predicted by personality traits of conscientiousness and openness to experience.*

Finally, I explore whether intraindividual variability of personality states might add meaningful information to the prediction of work performance, over and above personality traits and mean-level personality states. The concept of the intraindividual variability of personality states derives its meaning from the dynamic interactions between dispositional traits and situations, and may capture important sources of variance that are independent from traits. Therefore, it has the potential to provide additional information about an individual and accordingly, to strengthen the linkage between personality and performance outcomes. As noted above in relation to h1b, consistency or variability in personality states might be underpinned by some 'stabilising forces' (Fleeson & Jolley, 2006) which I expect to associate with personality traits of emotional stability and openness. In addition, I speculate that these forces will regulate individuals' sensitivity and reactivity to changing situations, such that certain aspects of behaviour are regularly inhibited and others are more freely expressed. These regulatory forces function in such a way as to help individuals find an optimal fit between the self and the environment. Since research on self-control and self-regulation has shown that individuals who habitually regulate

their behaviours tend to adapt better to the outside world, achieve better performance, and live a happier life (Rothbaum, Weisz, & Snyder, 1982; Tangney, Baumeister, & Boone, 2004), it may be anticipated that intraindividual consistency or variability of momentary personality states, as an explicit demonstration of the internal regulatory forces, will also have implications for work performance outcomes.

Some empirical research provides evidence for including intraindividual variability into researching the effect of personality states on performance outcomes. In cognitive and developmental psychology areas, intraindividual variability has been found to contain valuable information above the mean-level information in relating to human functioning in various domains, including intelligence, reaction time, memory, among others (Ghisletta, Nesselroade, Featherman, & Rowe, 2002). Behavioural stability has also been revealed to facilitate self and others' agreement in judging the target person's personality, with higher self-other agreement found among more consistent persons (Biesanz, West, & Graziano, 1998). A recent study focusing on momentary, task-contingent conscientiousness showed that state-level conscientiousness is independent from trait-level conscientiousness, and predicts adaptive performance over and above trait conscientiousness (Minbashian et al., 2010). This provides further evidence that state-level personality has important implications for performance outcomes. In the light of these studies, I hypothesise that the intraindividual variability of personality states will have incremental value in explaining work performance, at least for some performance domains. Since there has been no previous evidence suggesting the existence and direction of these relationships, I will test this hypothesis in an exploratory manner.

Hypothesis 3: Intraindividual variability of personality states will predict work performance over and above personality traits and aggregated mean-level personality states.

7.3. Method

7.3.1. Participants and data collection procedure

Data were collected from 98 full-time MBA students attending an elective module of 'leading self, career, and others' at a business school in China. As part of the course requirement, the students completed two Big Five personality trait measures, Hogan Personality Inventory (HPI) and Page Work Behaviour Inventory (PWBI), at the beginning of the module. Then, on each of the eight sessions of this module throughout a month, participants were invited to voluntarily complete a Daily Behaviour Questionnaire (DBQ) to report their experienced personality states on the Big Five dimensions during the previous day. The reason to cue for the previous day rather than current day was that classes usually started early in the morning, and participants may not have accumulated enough experience to provide their responses in relation to the current day. Towards the end of this course, the students were asked to complete a Universal Competency Framework (UCF) questionnaire to rate their general work behaviours on 22 competencies. Given that the students were not engaging in full-time employment when completing the performance questionnaire, they were instructed to think about and reflect on their general behavioural tendencies in all work-related contexts (including their past job, the current projects and internships if relevant). Finally, after the module finished, students' grades on this course (recorded as numeric scores between 1 and 100) were collected from the MBA office. English versions of Hogan Personality Inventory (HPI), Daily Behaviour Questionnaire (DBQ), and Universal Competency Framework (UCF) questionnaire were used. Using English questionnaire is appropriate because the teaching language of this MBA program is English. For Page Work Behaviour Inventory (PWBI), the participants were able to choose between English and Chinese, an option provided by the online survey system. HPI, PWBI, and UCF were administered online, while DBQ was distributed in paper format at the beginning of each class so that the participants can complete during the break; the completed questionnaires were then collected immediately after the class.

Most of the participants completed HPI, PWBI and UCF. Seventy students completed DBQ on at least 4 out of the 8 occasions, and diary data from these

students were selected for the final analysis. The reason for selecting 4 days as the cut-off was to ensure a reliable number of days being sampled about each individual, without over-sacrificing sample size. This procedure allowed a total number of 412 diary data to be obtained. The exact sample size on each measure is indicated in Table 7.2. The group mean of age was 30.36 years, based on 91 participants who reported age, and 62% were male.

7.3.2. Measures

7.3.2.1. Personality traits

Personality traits as measured by Hogan Personality Inventory (HPI). HPI is a widely used occupational personality scale that is based on the Big Five framework but also incorporates socioanalytical theory to provide finer-grained information beyond the Big Five (R. Hogan & Hogan, 1992). In particular, it clarifies the construct of extraversion and openness to experience by splitting each of them into two components, so that different motives of 'getting ahead' and 'getting along' can be distinguished. HPI contains 7 major scales, including: *Adjustment* measuring Big Five emotional stability/negative neuroticism; *Ambition* and *Sociability* measuring Big Five extraversion; *Interpersonal sensitivity* measuring Big Five agreeableness; *Prudence* measuring Big Five conscientiousness; *Inquisitiveness* and *Learning approach* measuring Big Five openness to experience. HPI has 206 items keyed on a yes or no dichotomous scale. The reported scores on the 7 dimensions are percentile scores, standardised against the population norm provided by the test publisher. Item-level data of this sample were not available to me, but the instrument manual reports the scales' internal consistency to range from .71 to .89 (R. Hogan & Hogan, 1992).

Personality traits as measured by Page Work Behaviour Inventory (PWBI). PWBI is an occupational personality scale assessing individuals' work behaviours on the Big Five dimensions (Page, 2009). The PWBI measures Big Five by 224 items keyed on a 5-point Likert scale (from strongly disagree to strongly agree). The reported scores on the Big Five dimensions are standardised scores (ranging from 25 to 75) compared against the population norm provided by the test publisher. The Chinese and English versions of PWBI have been found to have equivalent internal consistency (Liang & Yang, 2006) and high same-scale reliability across language

forms based on responses from bilingual test takers (Thompson, Hartmann, Vang, & Tubré, 2008). Cronbach's alpha ranged from .85 to .93 on the Big Five dimensions with the current sample.

7.3.2.2. Personality states

Daily personality states were measured by a Daily Behaviour Questionnaire (DBQ), whose items were selected from Church et al.'s (2008) 50-item, dichotomously scored (yes/no) questionnaire. Since DBQ assesses daily behaviours on the Big Five dimensions, it is appropriate to use it as a measure of personality daily state. What should be noted is that the behavioural term used to assess daily state is in a broad sense, and includes actions, feelings, and thoughts, and is thus aligned with the ABC (affective, behavioural, and cognitive) content of personality trait terms (Pytlik Zillig, Hemenover, & Dienstbier, 2002). To shorten the original questionnaire to half of its length so as to enhance participation rate, a trial study was conducted with 7 MBA students who were not part of this sample. They ranked the order of the items in each dimension, based on how relevant the behaviour described was relevant to MBA's daily life. The five items that were ranked highest and that had highest standard deviation in each Big Five dimension were selected for the final questionnaire. This was to ensure that the items selected were not only relevant to the sample group but could also sufficiently differentiate individuals. The items of this 25-item questionnaire are listed in Appendix F. Cronbach's alpha ranged from 0.50 to 0.68 on the Big Five dimensions. These values are slightly lower than those reported by Church et al. (2008), due to reduced number of items in each scale and the smaller number of daily experiences sampled. Although lower than the commonly accepted 0.70 cut-off, these values are considered acceptable, given that the ipsative/forced-choice format of response scale tended to attenuate scale reliabilities (Baron, 1996; Bartram, 1996; Saville & Wilson, 1991). These reliability coefficients were the highest possible, and could not be further enhanced by deleting low-reliability items.

The five DBQ items for each of the Big Five were averaged to generate a daily state score representing the Big Five on each day. Then, a cross-day mean and a cross-day standard deviation were computed in respect of the Big Five. Therefore, each participant had five cross-day mean scores that represented the central tendency

of their Big Five personality states, and five cross-day standard deviation scores that represent their intraindividual variability on the same five dimensions. An analysis of the variance composition showed that 25 – 45% of total variance was explained by within-person differences across five dimensions, suggesting a meaningful amount of intraindividual variability across time. In addition, considering that participants completed DBQ with different number of days (4-8 days), single states was centred within each individual and the results were then compared to that of using non-centred scores. Given that the results were exactly the same, I chose to report the non-centred results.

7.3.2.3. Performance

General performance was measured by the Universal Competency Framework (UCF) questionnaire developed from Bartram's (2005) Great Eight performance framework. The questionnaire used in this study assesses the same 22 competencies as used in the two previous studies (Chapter 5 and 6), although the questionnaire for this study is an earlier version of UCF, which contained 210 items. The response scale was a four-point Likert scale of 'not at all like me', 'a little like me', 'generally like me', and 'exactly like me'. Cronbach's alpha of the 22 competencies ranged from .65 to .89 with the current sample, with a mean of .84.

Given that the four-factor structure by using the selected 22 competencies has been validated in Study 1, and that the sample size of this study is insufficient to perform a trustworthy factor analysis, I decided to adopt the factor structure, as discovered from Study 1 (Chapter 5). Using the same mapping procedure as described in Study 2 (Chapter 6) and as provided in Appendix D, I mapped these 22 competencies onto four factors. Cronbach's alphas of the four performance factors were .96 on interpersonal performance, .95 on cognitive/proactive performance, .93 on task performance, and .89 on adaptive performance respectively. As hypothesised (in h2a), each of the four performance factors should relate to specific Big Five personality antecedents, as measured by the trait measures. Table 7.1 shows the hypothesised relationships between HPI, PWBI scales and the four factors of performance, as well as the objectively collected course grade outcome.

Due to the fact that HPI uses more refined personality dimensions than the Big Five dimensions, such that openness and extraversion were each split into two facets, more refined hypotheses need to be developed concerning the relationships between HPI dimensions and performance dimensions. In particular, two specific hypotheses were developed, as follows. Regarding the relationship between openness to experience and adaptive performance, I expect that only the *inquisitiveness* facet but not the *learning approach* facet in the HPI will be the predictor of adaptive performance. Regarding the relationship between openness to experience and course grade (Hypothesis 2b), I expect that only the *learning approach* facet but not the *inquisitive* facet in the HPI will be the predictor of adaptive performance. This is due to the fact that the inquisitive facet addresses such openness-related tendency of being imaginative and quick-witted, seeking novelty and independent thinking, while the learning approach facet is specifically separately from the broad openness dimension to assess how well one is likely to perform in schools and training environment (R. Hogan & Hogan, 1992). Therefore, the content of inquisitiveness is more in line with the cognitive component of adaptive performance, such that individuals with a more inquisitive mind may be more open towards change, while the learning approach facet should have stronger conceptual linkage to academic performance (course grade). Making these finer hypotheses may contribute to a clearer picture of the link between personality and performance.

Table 7.1. Hypothesised relationship between personality traits and performance

	Performance factor	Hypothesized personality traits	Corresponding HPI scales	Corresponding PWBI scales
1	Interpersonal	Extraversion	Ambition Sociability	Extraversion
		Agreeableness	Interpersonal Sensitivity	Agreeableness
2	Cognitive /Proactive	Openness	Inquisitiveness Learning Approach	Openness
		(-)Agreeableness	(-)Interpersonal Sensitivity	(-)Agreeableness
3	Task	Conscientiousness	Prudence	Conscientiousness

| 4 | Adaptive | Emotional Stability Openness | Adjustment Inquisitiveness | Emotional Stability Openness |
| 5 | Course Grade | Conscientiousness Openness | Prudence Learning approach | Conscientiousness Openness |

Note: (-) indicates a negative relationship; all other relationships are expected to be in positive direction.

7.3.2.4. Control variables

The previous study (Chapter 6) indicated a possible explanation for the ubiquitous effect of extraversion on self-rated performance outcomes as being that extraverted individuals are more likely to have an egoistic, self-enhancement bias that leads to the tendency to over-assess oneself (Paulhus, 1998; Paulhus & John, 1998). Self-deceptive enhancement has been suggested to represent unintentional distortions that lead to high self-report ratings and possibly threaten test validity (Paulhus, 1984, 1991), and it has been found that self-deceptive enhancement tends to affect the relationship between personality and job performance (Berry, Page, & Sackett, 2007). Therefore, it is necessary to control this confounding variable in investigating personality – performance relationships. In this study, I used the Self-Deceptive Enhancement (SDE) scale, as contained in the Page Work Behaviour Inventory (PWBI), to capture this individual characteristic. SDE in PWBI is measured by 14 items keyed on 1-5 Likert scale, and lower values indicate a higher degree of over assessing oneself. Cronbach's alpha was 0.76 with the current sample.

7.4. Results

7.4.1. Personality traits and personality states

Table 7.2 presents the mean and standard deviation of each study variable and their intercorrelations. Before examining the hypothesised relationships, I first looked at the intercorrelations among the four high-order performance factors. The four factors intercorrelated moderately, ranging from .23 to .68 (average r = .38).

This shows that the four factors are distinct from each other, which is an indication of good internal discriminant validity of the performance structure.

Regarding h1a, it can be seen that personality traits showed a moderate relationship with the mean scores of relevant personality states. For Hogan Personality Inventory (HPI, see variables 4-10 versus variables 16-20 in Table 7.2), Pearson correlation coefficients ranged from .19 (*n.s.*) between learning approach trait and the mean of openness state, to -.58 ($p < .001$) between adjustment trait and the mean of neuroticism state; the average absolute correlation across the 7 corresponding relationships between trait and state mean was .30. For Page Work Behaviour Inventory (PWBI, see variables 11-15 versus variables 16-20 in Table 7.2), Pearson correlation coefficient ranged from -.22 ($p < .10$) between agreeableness trait and mean of disagreeableness state, to -.48 ($p < .001$) between emotional stability trait and mean of neuroticism state; the average absolute correlation across 5 corresponding relationships between trait and state mean was .38. These results were moderately high, as expected, yet were slightly lower than those found in other diary studies (Fleeson & Gallagher, 2009). However, considering that only a small number of daily experiences were sampled in the current study (once a day across 4 – 8 days) while other studies often sampled participants' experiences several times a day and across one to two weeks, the results found here did provide support for the hypothesised relationships between trait and the central tendency of state (h1a).

To test h1b, I examined the intercorrelations between personality traits and the variability of daily personality states. I calculated the partial correlation between these two sets of constructs, by controlling for the mean of the corresponding personality states. This is due to that the relationship between sample mean and variance being subject to the ceiling effect, such that individuals with very high or very low mean scores on state personality may have low within-person variation, while individuals with moderate mean scores (near the centre of the scale) can produce either high or low within-person variation (M. A. Griffin, Tesluk, & Jacobs, 1995). The partial correlation coefficients are shown in parentheses underneath the unpartialled values in Table 7.2 (see variables 4-10 versus variables 21-25 when HPI was used, see variables 11-15 versus variables 21-25 when PWBI was used). I found consistent relationships between the openness traits and variability of states, across

the two personality trait measures. However, the relationships were in different direction as hypothesised. After controlling for the relevant mean of states, HPI inquisitiveness correlated with intraindividual variability on disagreeableness and conscientiousness ($r = $ -.27 and -.28 respectively, both $ps < .05$); PWBI openness correlated with intraindividual variability on extraversion ($r = $ -.24, $p < .05$) and conscientiousness ($r = $ -.34, $p < .01$). These results suggest that contrary to my expectations, more open individuals were more consistent, rather than more variable across time. No relationship between the emotional stability traits (HPI adjustment and PWBI emotional stability) and variability of states was found.

7.4.2. Personality traits and performance

Based on intercorrelation table there is support for hypothesis 2a, in which one-to-one relationships between personality traits and four performance factors were proposed. Where HPI is concerned (see variables 4-10 versus variables 26-29 in Table 7.2), interpersonal performance correlated most strongly with ambition and sociability ($r = $ .48 and .35, $ps < .01$), the two subscales of extraversion; it also correlated with interpersonal sensitivity ($r = $ .22, $p < .05$). Cognitive/proactive performance correlated most strongly with one subscale of openness, inquisitiveness ($r = $ .47, $p < .01$), though not with the other subscale learning approach ($r = $ .08, $n.s.$); it did not relate to the agreeableness dimension of interpersonal sensitivity ($r = $ .10, $n.s.$). Task performance correlated most strongly with prudence ($r = $ .45, $p < .01$). Adaptive performance correlated strongly with adjustment ($r = $ .35, $p < .01$) and inquisitiveness ($r = $ .28, $p < .01$) as expected. Additionally, it can be observed that a ubiquitous relationship between ambition (a facet of extraversion) and all performance factors was in place, which is consistent with the previous study (see Section 6.4.1).

Where PWBI is concerned (see variables 11-15 versus variables 26-29 in Table 7.2), even stronger trait – performance relationships were found. Except for agreeableness and cognitive/proactive performance ($r = $ .14, $n.s.$), all other hypothesised relationships were in place, with Pearson coefficients ranging from .40 (between agreeableness and interpersonal performance) to .71 (between conscientiousness and task performance). The hypothesised trait(s) had the highest correlations with relevant performance factor in all occasions.

For the objective measure course grade, I hypothesised that the most predictive Big Five traits would be conscientiousness and openness to experience (h2b). This received some support. When HPI was used, learning approach, the subscale of openness in HPI, showed the strongest relationship with course grade ($r = .21$, $p < .05$), and conscientiousness had the second strongest relationship although it failed to reach significance level ($r = .16$, *n.s.*). When PWBI was used, the strongest relationship came from extraversion ($r = .21$, $p < .05$), which was unexpected. Conscientiousness, again, had the second strongest yet non-significant relationship ($r = .16$, *n.s.*). Openness in PWBI did not strongly relate to course grade ($r = .08$, *n.s.*).

The background and control variables also showed some effect on performance. Age negatively correlated with cognitive/proactive and task performance, as did sex. This indicated that older, female participants rated themselves lower on these two performance aspects. However, sex had a positive relationship with course grade, showing that females achieved better academic performance when objectively assessed. The egoistic bias of self-deceptive enhancement negatively related to task and adaptive performance. Due to the lower value of this variable meaning a stronger tendency towards overly positive self-assessment, this result indicated that those having stronger self-enhancement bias tended to over-rate themselves on task and adaptive performance dimensions, but not on interpersonal and cognitive/proactive performance dimensions. Given that all three control variables had some effect on performance outcomes, they were all included in further regression analyses, for the same reason described in Section 6.4.1.4 of Chapter 6.

Table 7.2. Descriptive statistics and intercorrelations among personality traits, mean and variability of personality states, and performance

		Mean	S.D.	1	2	3	4	5	6	7	8	9
Control	1. Age	30.36	3.47									
	2. Sex (M=0, F=1)	.38	.49	-.09								
	3. Self-deception enhancement	47.90	6.60	-.05	.23*							
Personality trait - HPI	4. Adjustment (ES)	37.28	25.71	-.04	-.14	-.54**						
	5. Ambition (E)	37.82	26.67	-.09	-.16	-.45**	.41**					
	6. Sociability (E)	56.39	23.30	-.12	-.23*	.10	-.19	.26*				
	7. Interpersonal Sensitivity (A)	30.32	24.87	-.03	-.13	-.25*	.36**	.29**	.08			
	8. Prudence (C)	33.47	26.38	.19	-.04	-.35**	.49**	.19	-.36**	.16		
	9. Inquisitiveness (O)	56.28	26.65	-.09	-.20	-.01	.06	.07	.34**	.15	-.11	
	10. Learning approach (O)	59.56	25.62	-.12	.20	-.09	.26*	.32**	.04	.09	.09	.19
Personality trait - PWBI	11. Emotional stability	46.77	10.47	.04	-.21*	-.67**	.68**	.50**	-.04	.36**	.32**	.17
	12. Extraversion	50.53	8.17	.00	-.14	-.27**	.12	.55**	.37**	.18	-.04	.19
	13. Openness	46.28	8.20	-.09	-.22*	-.26**	.26*	.35**	.15	.23*	-.08	.53**
	14. Agreeableness	44.73	9.00	-.01	-.10	-.27**	.37**	.13	-.03	.44**	.22*	.21*
	15. Conscientiousness	37.09	9.82	.14	-.03	-.51**	.42**	.34**	-.17	.25*	.59**	.06
State Mean (aggregated mean)	16. Neuroticism	.34	.21	-.09	-.05	.43**	**-.58****	-.23	.22	-.16	-.26*	.05
	17. Extraversion	.60	.19	-.11	-.14	-.14	.10	**.24**	**.23**	.14	-.08	.36**
	18. Openness	.58	.20	-.27*	-.09	-.14	.03	.18	.22	.26*	-.05	**.37****
	19. Disagreeableness	.25	.14	-.03	-.10	.26*	-.42**	-.15	.21	**-.25***	-.45**	.13
	20. Conscientiousness	.52	.22	.05	-.15	-.25*	.05	.20	.05	.23	**.27***	.17

(Table 7.2 Cont.)

		Mean	SD	1	2	3	4	5	6	7	8	9
State Variability (standard deviation)	21. Neuroticism	.23	.11	.00	.05	.06	-.27*	.05	.17	-.02	-.08	.06
							(-.04)	(.16)	(.09)	(.05)	(.03)	(.05)
	22. Extraversion	.20	.10	.09	-.10	.07	-.07	-.13	-.09	.03	.04	-.23
							(-.05)	(-.09)	(-.05)	(.06)	(.03)	(-.17)
	23. Openness	.20	.08	.21	-.14	.00	.17	-.09	-.04	.12	.08	.06
							(.18)	(-.05)	(.02)	(.19)	(.07)	(.17)
	24. Disagreeableness	.21	.09	-.05	-.08	.06	-.21	.06	.02	-.12	-.31*	-.18
							(-.03)	(.14)	(-.08)	(-.01)	(-.14)	(-.27*)
	25. Conscientiousness	.20	.07	.18	-.02	.10	-.11	-.19	-.11	.11	.02	-.25*
							(-.12)	(-.23)	(-.12)	(.07)	(-.03)	(-.28*)
Performance	26. Interpersonal	1.87	.36	-.02	-.02	.08	.13	**.48****	**.35****	**.22***	-.13	.27**
	27. Cognitive/Proactive	1.84	.38	-.38**	-.45**	.00	.14	.44**	.21*	.10	-.13	**.47****
	28. Task	1.83	.37	-.35**	-.30**	-.46**	.23*	.30**	-.17	.06	**.45****	.06
	29. Adaptive	1.97	.44	-.10	-.17	-.42**	**.35****	.37**	.03	.16	.00	**.28****
	30. Course grade (1-100)	92.83	2.62	-.05	.23*	-.04	.11	.09	-.04	-.03	.16	.01

(Table 7.2 Cont.)

		10	11	12	13	14	15	16	17	18	19
Personality trait - PWBI	11. Emotional stability	.26*									
	12. Extraversion	.14	.32**								
	13. Openness	.24*	.55**	.54**							
	14. Agreeableness	.22*	.45**	.35**	.45**						
	15. Conscientiousness	.23*	.57**	.24*	.34**	.48**					
State mean (aggregated mean)	16. Neuroticism	-.01	**-.48****	-.06	-.11	-.19	-.40**				
	17. Extraversion	.22	.16	**.37****	.23	.17	.11	.02			
	18. Openness	**.19**	.12	.26*	**.40****	.34**	.13	.16	.44**		
	19. Disagreeableness	-.09	-.32**	.04	.05	**-.22**	-.45**	.58**	.27*	.34**	
	20. Conscientiousness	.19	.16	.09	.08	.23	**.43****	.03	.45**	.52**	.15
State variability (standard deviation)	21. Neuroticism	-.04	-.12	.04	-.09	-.04	-.14	.41**	.06	.27*	.29*
		(-.04)	(.10)	(.07)	(-.05)	(.04)	(.03)				
	22. Extraversion	-.18	-.02	-.13	-.28*	-.04	-.11	-.04	-.22	-.25*	-.13
		(-.14)	(.02)	(-.06)	(-.24*)	(.00)	(-.09)				
	23. Openness	.12	.12	.06	-.07	.09	.03	.06	.00	-.25*	-.16
		(.18)	(.16)	(.13)	(.03)	(.19)	(.07)				
	24. Disagreeableness	-.07	-.10	.03	.00	-.21	-.27*	.27*	.13	.05	.43**
		(-.04)	(.04)	(.01)	(-.02)	(-.14)	(-.10)				
	25. Conscientiousness	.07	-.19	-.21	-.31**	.03	-.06	.16	.03	-.12	.07
		(.04)	(-.22)	(-.23)	(-.34**)	(-.01)	(-.15)				
Performance	26. Interpersonal	.02	.35**	**.63****	.46**	**.40****	.17	-.03	.37**	.46**	.19
	27. Cognitive/Proactive	**.08**	.30**	.40**	**.58****	.14	.14	-.17	.22	.42**	.16
	28. Task	.22*	.44**	.08	.25*	.26*	**.71****	-.28*	.06	.29*	-.21
	29. Adaptive	.23*	**.56****	.35**	**.54****	.29**	.26*	-.29*	.34**	.31**	-.15
	30. Course grade (1-100)	.21*	.14	.21*	.09	.12	.16	.10	.16	-.02	.02

(Table 7.2 Cont.)

		20	21	22	23	24	25	26	27	28	29
State variability	21. Neuroticism	.08									
	22. Extraversion	-.05	.14								
	23. Openness	-.06	-.03	.11							
	24. Disagreeableness	.01	.28*	.10	-.06						
	25. Conscientiousness	.16	-.11	.21	.25*	-.06					
Performance	26. Interpersonal	.17	.18	-.09	.12	.04	.23				
	27. Cognitive/Proactive	.19	.01	-.12	-.02	.10	-.35**	.68**			
	28. Task	.40**	-.06	-.07	-.01	-.18	-.04	.23*	.26**		
	29. Adaptive	.07	-.15	-.29*	.04	-.28*	-.32**	.47**	.38**	.25*	
	30. Course grade (1-100)	.03	.01	-.12	-.10	.11	-.39**	.09	-.12	.08	.21*

Note:
a) ** $p < 0.01$; * $p < 0.05$; two-tailed;
b) N=91 for age; N=98 for sex; N=94 for HPI and course grade; N=96 for WBI and UCF; N=70 for state variables (mean and variability);
c) Between HPI and state variability, and between WBI and state variability, correlation coefficients in parentheses represent correlations after relevant state means were controlled;
d) The hypothesised relationships between traits and central tendency of states, and between traits and performance dimensions are bolded and underscored;
e) For HPI traits (variables 4 – 10), the parentheses after each HPI scale name provide the corresponding Big Five dimension. ES = Emotional stability; E = Extraversion; A = Agreeableness; C = Conscientiousness; O = Openness to experience;
f) Score range: HPI: 1-100; PWI: 25-75; Personality states: 0-1; Four performance factors: 0-3.

To test whether the hypothesised trait had a unique and independent effect in relating to specific performance outcomes in the direction, as hypothesised in 2a, I performed regression analyses by entering all Big Five traits together in predicting each of the four performance factors, after controlling for age, sex and self-enhancement bias. Table 7.3a and 7.3b separately present the regression results by using HPI and PWBI respectively.

It may be seen that the hypothesised trait(s) did emerge as significant predictors, and often the strongest predictors across the four performance dimensions. Stronger relationships were found by using PWBI, as virtually all relationships were exactly in line with what was expected, the only exception being that agreeableness did not significantly predict cognitive/proactive performance ($\beta = -.15$, *n.s.*). When HPI was used, interpersonal performance was predicted by the ambition facet ($\beta = .42$, $p < .01$) but not the sociability facet ($\beta = .05$, *n.s.*) of extraversion, and was not predicted by interpersonal sensitivity ($\beta = .05$, *n.s.*). Cognitive/proactive performance was predicted by the inquisitiveness facet ($\beta = .44$, $p < .01$) but not the learning approach facet ($\beta = -.06$, *n.s.*) of openness to experience, and was not predicted by interpersonal sensitivity ($\beta = -.08$, *n.s.*). Task performance was well predicted by the relevant traits of prudence ($\beta = .40$, $p < .01$). Adaptive performance was predicted by both adjustment ($\beta = .28$, $p < .05$) and inquisitiveness ($\beta = .32$, $p < .01$) as expected.

Overall, the results across the two analyses did provide support for the unique and independent effect of personality traits in relating to specific performance outcomes (hypothesis 2a), and also showed the value of differentiating the Big Five into more specific facets as made available by HPI. For instance, only the inquisitiveness facet but not the learning approach facet predicted cognitive/proactive performance, and only ambition but not sociability predicted interpersonal performance. These results reflect the complex nature of the Big Five, and demonstrate the value of using finer-grained facets. Moreover, it seems that HPI ambition, one of the two facets of extraversion, displayed a ubiquitous effect on several performance domains, even after self-enhancement tendency was controlled. Ambition was found to strongly predict cognitive/proactive performance ($\beta = .48$, $p < .01$) as well as adaptive performance ($\beta = .33$, $p < .01$), in addition to its hypothesised interpersonal performance ($\beta = .42$, $p < .01$).

Table 7.3a. Regression of Big Five measured by HPI on four performance factors

		Interpersonal		Cognitive/Proactive		Task		Adaptive	
		Step 1	Step 2	Step 1	Step 2	Step 1	Step 2	Step 1	Step 2
Control	Age	-.06	.05	-.08	.03	.07	.01	-.18	-.08
	Sex	-.36**	-.21*	-.43**	-.30**	.10	.05	-.01	.08
	Self-deception	-.27**	-.22	-.20*	-.13	-.49**	-.41**	-.32**	-.11
HPI trait	Adjustment (ES)		-.02		-.06		-.27*		**.28***
	Ambition (E)		**.42***		.48**		.16		.33**
	Sociability (E)		.05		-.22*		-.12		-.21
	Interpersonal Sensitivity (A)		**.05**		**-.08**		-.06		-.04
	Prudence (C)		-.26*		-.26**		**.40***		-.27*
	Inquisitiveness (O)		.18		**.44***		.12		**.32***
	Learning Approach (O)		-.13		**-.06**		.16		-.02
F		8.71**	4.52**	9.78**	7.40**	8.32**	3.36*	3.94*	3.82**
		(3,81)	(7,74)	(3,81)	(7,74)	(3,81)	(7,74)	(3,81)	(7,74)
R^2		.24	.47	.27	.57	.24	.42	.13	.36
ΔR^2			.23**		.30**		.18**		.23**

Note:

a) ** $p < 0.01$; * $p < 0.05$; two-tailed;

b) Complete sample size is $N = 85$;

c) Hypothesised personality trait predictor(s) are bolded and underscored;

d) For HPI traits, the parentheses after each HPI scale name provide the corresponding Big Five dimension. ES = Emotional stability; E = Extraversion; A = Agreeableness; C = Conscientiousness; O = Openness to experience.

Table 7.3b. Regression of Big Five measured by WBI on four performance factors

		Interpersonal		Cognitive/Proactive		Task		Adaptive	
		Step 1	Step 2	Step 1	Step 2	Step 1	Step 2	Step 1	Step 2
Control	Age	-.06	-.02	-.06	.00	.06	-.02	-.18	-.13
	Sex	-.36**	-.27**	-.44**	-.33**	.09	.02	.01	.11
	Self-deception	-.27**	-.17	-.19	-.15	-.48**	-.09	-.32**	.07
PWBI trait	Emotional Stability		-.01		-.14		.04		**.46****
	Extraversion		**.47****		.11		-.16		.06
	Openness		.07		**.59****		.13		**.37****
	Agreeableness		**.22***		**-.15**		-.12		-.05
	Conscientiousness		-.16		-.02		**.75****		-.03
F		8.87**	11.62**	10.13**	9.75**	8.38**	14.33**	4.08**	10.52**
		(3,85)	(5,80)	(3,85)	(5,80)	(3,85)	(5,80)	(3,85)	(5,80)
R^2		.24	.56	.26	.54	.23	.62	.13	.47
ΔR^2			.32**		.28**		.39**		.35**

Note:
a) ** $p < 0.01$; * $p < 0.05$; two-tailed;
b) Complete sample size is $N = 89$;
c) Hypothesised personality trait predictor(s) are bolded and underscored.

7.4.3. Incremental validity of personality states

As per hypothesis 3, I performed a series of hierarchical regression analyses to examine the incremental effects of personality states on performance outcomes over personality traits. The analysis were performed on participants who reported at least four days of daily personality states, and thus the sample size was reduced for this set of analysis, in comparison with previous analyses. Three control variables (age, sex and self-deceptive enhancement) were entered in Step 1; personality trait(s) that are conceptually related to the performance domain were entered in Step 2; cross-day mean of all Big Five states were entered in Step 3; finally, cross-day variability of all Big Five states were entered in Step 4. The last step would help explore whether variability of state could incrementally predict performance outcomes over and above trait and mean-level states. Analyses were separately conducted for HPI and PWBI, so as to cross-validate the results. Results using HPI and PWBI scales are shown in Table 7.4a and Table 7.4b respectively. Given that this set of analysis had a small sample size ($N = 60$ to 64), I released the significance level (at .10, two-tailed) so as not to miss any meaningful effect that may fail to reach standard significance level (.05) due to reduced power.

As can be seen in Step 2 of each regression analysis in Table 7.4a and 7.4b, most of the relevant personality trait(s) appeared as significant predictors and significantly increased the variance (R square) of the performance outcome. The following exceptions can be observed. First, agreeableness did not predict cognitive/proactive performance in the two sets of analysis (interpersonal sensitivity in HPI and agreeableness in PWBI had β of -.08 and -.15, respectively, both *n.s.*). The effect of agreeableness on interpersonal performance was also inconsistent across the two sets of analysis, as interpersonal sensitivity in HPI showed no effect ($\beta = .02$, *n.s.*) yet agreeableness in PWBI showed positive and significant effect ($\beta = .21$, $p < .05$). Second, in predicting course grade, none of the hypothesised personality traits showed strong enough and unique effect with this reduced sample size, in comparison to the earlier analysis with complete sample. The strongest effect came from conscientiousness in PWBI ($\beta = .24$) yet this was just slightly beyond

significance level (p = .12)[9]. Other three personality traits (openness to experience in WBI, learning approach and prudence in HPI) failed to show strong and unique effect on course grade.

The third step in these regressions shows the additive value of individuals' central tendency of the Big Five personality states in predicting work performance outcomes, without specific hypotheses being tested. Interestingly, when HPI scales were used as trait predictors, the central tendency of openness state appeared to positively affect many self-rated performance factors. This suggests that those who are routinely more open to new experience than others may perceive themselves to be more effective in different aspects of job performance.

The last step of the regression analyses examines the incremental validity of intraindividual variability, after controlling for relevant traits and mean scores of personality states. As can be observed, the most useful predictor appeared to be variability of openness, conscientiousness and (dis)agreeableness[10] across the four dimensions. In both analyses using HPI and PWBI, the variability of openness state positively predicted interpersonal performance (β = .27, p < .05 in HPI analysis and β = .19, p < .10 in PWBI analysis). Also consistently found was the fact that variability of conscientiousness state negatively predicted adaptive performance (β = -.29, p < .05 in HPI analysis and β = -.17, p < .10 in PWBI analysis), and course grade (β = -.28 in HPI analysis and -.26 in PWBI analysis, ps < .10). Variability of conscientiousness state also negatively predicted cognitive/proactive performance in HPI analysis (β = -.21, p < .10); the same effect in the analysis using PWBI, although showed a similar pattern, failed to reach significance level (β = -.16, $n.s.$). Finally, variability of agreeableness state showed a consistent and negative effect on adaptive performance (β = -.24, p < .10 in HPI analysis and β = -.26, p < .01 in PWBI analysis).

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[9] Separate analyses by entering conscientiousness alone in the second step (i.e. deleting openness to experience) showed that its effect was slightly enhanced to reach significance level (β = .25, p < .10). This suggests that some variance of conscientiousness in predicting course grade was shared by openness to experience.

[10] The variability of disagreeableness is the same as the variability of agreeableness, thus I will use the latter in the following discussion for clarity purpose.

Interestingly, the task performance dimension seems to be most unaffected by the variability of daily personality state. Only an additional 1% (by using HPI) to 2% (by using PWBI) of variance was explained after the Big Five state variability was entered into regression, and none of the five state variability predictors showed a significant effect in predicting task performance. On the other four performance outcomes (i.e., three self-reported performance dimensions and objective course grade), state variability on Big Five dimensions greatly increased the variance accounted. The average increase across the four criteria was 9% by using HPI and 6.5% by using PWBI, suggesting that intraindividual variability on personality states reveals additional and unique information about an individual, and contributes to performance outcomes over and above traits and mean-level states.

Table 7.4a. Hierarchical regression of performance on personality traits as measured by HPI, mean and variability of personality state

		Interpersonal				Cognitive/Proactive				Task			
		Step 1	Step 2	Step 3	Step 4	Step 1	Step 2	Step 3	Step 4	Step 1	Step 2	Step 3	Step 4
Control	Age	-.12	-.10	.02	-.02	-.11	-.03	.02	.04	.07	.04	.09	.09
	Sex	-.36**	-.28*	-.27*	-.21+	-.44**	-.33**	-.38**	-.34**	.08	.09	.08	.09
	Self-deception	-.26*	-.20	-.18	-.17	-.22	-.26*	-.18	-.15	-.26+	-.25+	-.21	-.24
HPI trait	Adjustment (ES)												
	Ambition (E)		.20	.19	.24+								
	Sociability (E)		.23+	.14	.10								
	Interpersonal Sensitivity (A)		.02	-.03	-.04		-.08	-.11	-.09				
	Prudence (C)										.25*	.13	.13
	Inquisitiveness (O)						.35**	.28*	.27*				
	Learning Approach (O)						.08	.10	.11				
State mean (aggregated mean)	Neuroticism			-.14	-.18			-.31*	-.28+			-.03	.00
	Extraversion			.08	.08			-.14	-.15			.16	-.15
	Openness			.41**	.43**			.33*	.34*			.23	.26
	Disagreeableness			.13	.26+			.23	.20			-.13	-.11
	Conscientiousness			-.25*	-.24+			-.11	-.07			.26+	.24
State variability (standard deviation)	Neuroticism				.04				-.06				-.05
	Extraversion				.08				.05				.07
	Openness				.27*				.09				.01
	Disagreeableness				-.11				.15				-.04
	Conscientiousness				-.16				-.21+				.02
F		6.26**	2.83*	3.08*	1.59	8.03**	3.62*	2.66*	1.28	5.17**	7.16*	2.37+	.17
df		(3,58)	(3,55)	(5,50)	(5,45)	(3,58)	(3,55)	(5,50)	(5,45)	(3,58)	(1,57)	(5,52)	(5,47)
R^2		.25	.35	.50	.58	.29	.41	.53	.59	.21	.30	.43	.44
ΔR^2			.10*	.15*	.08		.12*	.12*	.06		.09*	.13+	.01

(Table 7.4a Cont.)

		Adaptive				Course Grade			
		Step 1	Step 2	Step 3	Step 4	Step 1	Step 2	Step 3	Step 4
Control	Age	-.17	-.10	-.03	-.04	-.05	-.06	-.05	.00
	Sex	-.01	.11	.07	.01	.17	.16	.24	.25
	Self-deception	-.29*	-.12	-.08	-.06	.06	.11	.07	.05
HPI trait	Adjustment (ES)		.35*	.23	.17				
	Ambition (E)								
	Sociability (E)								
	Interpersonal Sensitivity (A)								
	Prudence (C)						.11	.15	.12
	Inquisitiveness (O)		.32*	.22^{+}	.02				
	Learning Approach (O)						.11	.07	.11
State mean	Neuroticism			-.16	-.17			.16	.26
(aggregated	Extraversion			.20	.22^{+}			.27	.31^{+}
mean)	Openness			.27^{+}	.27^{+}			-.09	-.16
	Disagreeableness			-.09	.05			-.01	.05
	Conscientiousness			-.23^{+}	-.19			.03	.08
State variability	Neuroticism				-.14				-.09
(standard	Extraversion				-.12				.11
deviation)	Openness				.15				-.09
	Disagreeableness				-.24^{+}				-.16
	Conscientiousness				-.29*				-.28^{+}
F		2.37^{+}	8.06**	1.65^{+}	2.46*	.77	.69	.76	1.01
R^2		.11	.31	.41	.53	.04	.06	.13	.22
ΔR^2			.20**	.10	.13*		.02	.07	.09

Note:

a) ** $p < 0.01$; * $p < 0.05$; $^{+}$ $p < 0.10$; two-tailed;

b) Complete sample size is N = 62 on four rated performance dimensions, N = 60 on course grade;

c) For HPI traits, the parentheses after each HPI scale name provide the corresponding Big Five dimension. ES = Emotional stability; E = Extraversion; A = Agreeableness; C = Conscientiousness; O = Openness to experience.

Table 7.4b. Hierarchical regression of performance on personality traits as measured by WBI, mean and variability of personality state

		Interpersonal				Cognitive/Proactive				Task			
		Step 1	Step 2	Step 3	Step 4	Step 1	Step 2	Step 3	Step 4	Step 1	Step 2	Step 3	Step 4
Control	Age	-.11	-.12	-.06	-.07	-.10	-.042	-.03	-.03	.08	-.02	.00	-.01
	Sex	-.36**	-.30**	-.29**	-.25*	-.44**	-.35**	-.36**	-.33**	.07	.00	.01	.03
	Self-deception	-.25*	-.10	-.14	-.14	-.22+	-.10	-.03	-.03	-.44**	-.12	-.13	-.15
PWBI trait	Emotional Stability												
	Extraversion		.46**	.39**	.34**								
	Openness						.61**	.53**	.50**				
	Agreeableness		.21*	.22*	.21+		-.15	-.19+	-.18				
	Conscientiousness										.66**	.63**	.66**
State mean (aggregated mean)	Neuroticism			-.14	-.19			-.25*	-.27*			-.03	.01
	Extraversion			-.01	.01			-.09	-.08			-.18+	-.16
	Openness			.20	.20			.17	.19			.15	.20
	Disagreeableness			.23+	.31*			.17	.19			.08	.09
	Conscientiousness			-.18+	-.16			.02	.05			.11	.06
State variability (standard deviation)	Neuroticism				.08				.03				-.09
	Extraversion				.03				.07				.11
	Openness				.19+				.13				.00
	Disagreeableness				-.07				.04				.01
	Conscientiousness				-.15				-.16				.07
F		6.24**	16.89**	2.03+	1.25	8.10**	19.29**	1.61	1.01	5.00**	39.48**	1.23	.45
df		(3,60)	(2,58)	(5,53)	(5,48)	(3,60)	(2,58)	(5,53)	(5,48)	(4,60)	(1,59)	(5,54)	(5,49)
R^2		.24	.52	.60	.64	.29	.57	.63	.66	.20	.52	.57	.59
ΔR^2			.28**	.08+	.05		.28**	.06	.04		.32**	.05	.02

(Table 7.4b Cont.)

		Adaptive				Course Grade			
		Step 1	Step 2	Step 3	Step 4	Step 1	Step 2	Step 3	Step 4
Control	Age	-.16	-.13	-.09	-.09	-.05	-.07	-.09	-.04
	Sex	.00	.14	.13	.11	.16	.14	.21	.22
	Self-deception	-.29*	.16	.16	.13	.07	.19	.14	.10
PWBI trait	Emotional Stability		.52**	.44**	.45**				
	Extraversion								
	Openness		.43**	.39**	.27*		.05	.07	-.01
	Agreeableness								
	Conscientiousness						.24	.30	.29
State mean	Neuroticism			-.08	-.08			.18	.28
(aggregated mean)	Extraversion			.22*	.21*			.25	.30+
	Openness			.06	.08			-.17	-.18
	Disagreeableness			-.09	.06			.06	.10
	Conscientiousness			-.12	-.13			.01	.04
State variability	Neuroticism				-.08				-.09
(standard deviation)	Extraversion				-.09				.11
	Openness				.08				-.08
	Disagreeableness				-.26**				-.14
	Conscientiousness				-.17+				-.26+
F		2.30+	28.70**	1.30	2.70*	.73	1.47	.91	.93
df		(3,60)	(1,58)	(5,53)	(5,48)	(4,57)	(2,55)	(5,50)	(5,45)
R^2		.10	.55	.60	.69	.04	.08	.16	.24
ΔR^2			.45**	.05	.09*		.05	.08	.08

Note:
a) ** $p < 0.01$; * $p < 0.05$; + $p < 0.10$; two-tailed;
b) Complete sample size is N = 64 on four rated performance factors, N = 62 on course grade.

7.5. Discussion

7.5.1. Summary of findings

Using a diary study, I explored the relationship among personality traits, personality states and work performance. By using two separate, established personality instruments to measure personality traits, I was able to compare and cross-validate the results through separate analyses. The findings first showed that the earlier proposed relationships between the Big Five personality traits and the four-factor high-order performance can be well replicated in a separate sample, with different personality instruments being used. In particular, the consistent patterns occurred such that of the Big Five traits, extraversion is the antecedent for interpersonal performance; the Big Five openness to experience is the antecedent for cognitive/proactive performance and for adaptive performance; the Big Five trait conscientiousness is the antecedent for task performance; and the Big Five trait emotional stability is the antecedent for adaptive performance. These patterns support the generalisability of the earlier proposed nomological net that links personality and performance constructs. Secondly, the results with personality states being included in the picture suggest that the central tendency of individuals' aggregated daily personality states is underpinned by the latent dispositional trait, and that intraindividual variability of personality states contributes incrementally to the variance of performance outcomes, over and above personality trait and mean-level of states. State variability on openness, conscientiousness and agreeableness appeared to be especially important in predicting various domains of work performance.

7.5.2. Personality traits and work performance

The analysis using two different Big Five-based personality measures suggested that personality traits differentially related to the four high-order performance factors in the directions as proposed in Study 2 (Chapter 6). This supports that point-to-point relationships between personality traits and performance dimensions can be generalised across study contexts and personality measures.

Interestingly, when the Hogan Personality Inventory (HPI) was used, ambition, the facet of extraversion, predicted three out of the four performance factors even after self-enhancement bias was controlled (Table 7.3a). This seems to echo the findings from the previous study, as when extraversion was measured by Occupational Personality Questionnaire (OPQ), this trait also affected self-ratings of performance on several domains. However, the result in this study clarifies the fact that it is the 'getting ahead' facet, as measured by ambition, rather than the 'getting along' facet as measured by sociability (J. Hogan & Holland, 2003) in the broad extraversion domain, that contributed to this effect. It is likely that individuals who are more ambitious, competitive and socially confident tend to view their performance in a consistently positive manner. While the previous study indicated that the ubiquitous effect of extraversion (or ambition) may be attributed to an egoistic bias that produces unconscious overconfidence and lack of self-insight (Paulhus & John, 1998), this study shows that the effect of extraversion remained even after self-deceptive enhancement was controlled for. Therefore, there should be some other explanations. One of the possibilities, as mentioned before, is that extraversion, or more accurately, its ambition facet, may contain a positive affective component (Tellegen, 1985; Watson & Clark, 1997) that contributes to positive self-regard (see Section 6.5.1. in Chapter 6). As can be noticed in this study, the ubiquitous effect of extraversion was not present when the Page Work Behaviour Inventory (PWBI) was used. It may be the case that PWBI items are more behaviourally oriented than HPI, thus minimising the affective component contained in the extraversion domain, and subsequently reducing the possibility of inflation on performance ratings as induced by positive affect.

Where the performance outcome of the course grade was concerned, I found some evidence of the expected predictive validity of conscientiousness and openness to experience. First, with the reduced sample (N = 62), conscientiousness measured by PWBI showed a small predictive effect (β = .24, *n.s.* when entered together with openness to experience; β = .25, $p < .10$ when entered on its own), after demographic background and response distortion were controlled (Table 7.4b). This echoes earlier research findings which suggest that only the conscientiousness trait showed a consistent effect in relating to academic outcomes (Noftle & Robins, 2007). Second, when a

complete sample was used (N = 94), learning approach, the openness facet in HPI which is expected to relate to academic performance, showed positive correlation with course grade (Table 7.2), yet its effect was attenuated in regression analysis after control variables were entered and shared variance with prudence was partialled out (Table 7.4a). This attenuated effect was not entirely due to reduced sample size, as separate analysis with the complete sample produced only slightly improved results (learning approach had a β = .17 when entered together with prudence, and β = .18 when entered on its own, both n.s.). The result that learning approach did not relate to academic performance as strongly as expected may be due to the nature of this specific module of the MBA programme, which focused on general concepts about leadership and self-management. The teaching focus and assessment method of this course were designed to facilitate students' active self-reflection rather than requiring strong cognitive effort from them to assimilate a large volume of new knowledge. As a result, individual differences in learning approach, which is about to what extent an individual enjoys academic achievements and values formal classroom-type training (R. Hogan & Hogan, 1992), may not be a highly relevant predictor with the academic performance criterion in this context. The result here points to the need to better understand the nature of performance criteria, including academic performance criteria that appear to be more straightforward and less context-dependent than work performance criteria. In fact, Whittingham (2006) has shown that simply by dividing the courses in MBA programme into a quantitative half and a qualitative half, different personality traits would emerge as unique predictors for academic performance on these two types of courses. Therefore, future meta-analysis with academic performance may look into the different predictions from personality traits when academic programs with different nature are concerned.

The fact that PWBI demonstrated a stronger relationship than HPI in relating to all performance measures may be because HPI integrates the concept from socioanalytical theory and depicts personality in general social interactions (R. Hogan & Hogan, 1992), while PWBI is more tailored towards measuring individuals' behavioural tendencies in the work context (Page, 2009). Therefore, PWBI items are more behaviourally laden and thus may have a more direct relationship with actual work performance outcomes than HPI. Nevertheless, the patterns of relationships are in

general consistent across analyses using these two trait measures, providing cross-validation for the results.

7.5.3. Personality traits and personality states

I found that the central tendency of daily personality states was predicted by relevant personality traits, despite only a small number of occasions (4 to 8 days) being used for aggregation. Although individuals vary their behaviours across situations, they do have a relatively stable central tendency to which their behaviours routinely return, and this tendency is largely underpinned by their latent personality traits. As summarised by Fleeson and Jolley (2006), personality can be considered as 'a flexible resource that supports adaptation to the moment but resiliently returns to its contour' (p.41). In particular, the most consistent trait – state pattern across analyses with two different personality measures was found on the dimension of emotional stability, and the magnitude (around .50) was comparable to those reported in earlier studies (Church et al., 2008; Fleeson & Gallagher, 2009). This suggests that people who are more neurotic in general indeed demonstrate more emotional swings on a daily basis.

Further, I found that intraindividual variability of personality states appeared to be a stable, systematic individual difference characteristic, echoing earlier arguments that some people are more consistent, while others are more variable over time (Bem & Allen, 1974; Borkenau & Ostendorf, 1998; Fiske & Maddi, 1961; Fleeson, 2001; Larsen, 1989; Mischel & Shoda, 1995, 1998). Although the underlying forces of this variability remain to be fully discovered, it seems that personality trait openness to experience may relate to the underlying determinants of state variability. Contrary to my expectations, individuals having a higher openness trait appeared to display more consistent, rather than more variable behaviours across time. It may be the case that higher openness is associated with a wider scope of self-awareness and emotional flexibility (Coan, 1974; McCrae & Costa, 1997; Tellegen & Atkinson, 1974). Consequently, more open people may reflect on and contemplate their own experiences on a regular basis, which allows them to habitually exert self-control to stabilise their behaviour and to quickly return to their general tendency. Since the data of daily personality states in this study were collected in a retrospective manner, that is, individuals were asked to recall their

experiences about the previous day rather than to report their momentary experiences, this retrospective process may have allowed individual differences in these underlying forces to affect the way people recall information. While this speculation remains open to further investigation, the results of two separate analyses using different personality trait measures did provide some evidence that the stability of intraindividual variability could be a unique, meaningful construct.

7.5.4. Intraindividual variability of states and work performance

The finding that state variability of openness, conscientiousness and agreeableness significantly predicted several different performance dimensions has important implications. First, intraindividual variability on openness state had a positive effect on the interpersonal aspect of performance. Putting it into the Fleeson's distribution theory, this suggests that to be more effective in interpersonal interactions, one may need to possess not only generally high openness (as found in the significant effect of aggregated mean of openness state), but more importantly, a wider range of openness (i.e. variability of openness state) that can be readily evoked for meeting various situational demands. This result can be understood, considering that the interpersonal domain has long been regarded as an important component of adaptive personality functioning (Bakan, 1966; Sullivan, 1953). Being adaptive requires one to be open-minded and to readily adjust oneself to fit into the situation. Therefore, having a more malleable openness (rather than rigid openness) may indicate higher sensitivity and receptivity to social cues in one's surrounding environment, as well as higher flexibility to change oneself so as to meet others' needs.

Intraindividual variability in terms of conscientiousness state had a negative effect on adaptive performance, and the objectively assessed academic performance, and also displayed a small effect on cognitive/proactive performance. Since the adaptive and proactive domains of performance can be regarded as an important part of contextual performance that is different from the task performance domain (M. A. Griffin et al., 2007; Neal et al., in press), the results found here further prove that different domains of work performance need to be differentiated, as does the different level of conscientiousness – at the trait level and at the state level. The task performance domain

usually requires higher standing where the conscientiousness trait is concerned, as this trait provides the engine to sustain an individual to achieve assigned tasks and fulfil one's job roles (e.g., Hough, 1992; Neal et al., in press). On the other hand, the results of this study demonstrate that where other performance criteria are concerned, such as the more fluid domains including adaptive and proactive performance, higher variability of state conscientiousness could be detrimental rather than beneficial. Perhaps being conscientious only for some of the time but not other times suggests less effective self-regulation (Rothbaum et al., 1982; Tangney et al., 2004), which is not fully addressed by the conscientiousness trait *per se*, but is nonetheless important especially for the non-task aspect of performance. Although the potential detrimental effect of the conscientiousness trait on non-task domains has already been noticed (B. Griffin & Hesketh, 2005; LePine, Colquitt, & Erez, 2000; Robertson et al., 2000), little research has considered the effect of conscientiousness at the state-level. An exception from a recently completed study by Misbashian et al. (2010) has shed light on the meaningful effect of task-contingent conscientiousness at the state level in predicting individuals' adaptive performance. However, the focus of that study was not on the effect of intraindividual variability of conscientiousness state, and thus, their results could not be directly applied to interpret the findings here.

The objectively assessed academic performance of course grade, as jointly measured by several aspects during the course such as performance on writing assignments and mid-term exam, class attendance and class participation, may be a global amalgam of various performance domains, and it is thus not entirely clear which aspects among them are mostly affected by state conscientiousness. Nevertheless, the converging results from both self-reported performance and objective performance measures stressed the importance of intraindividual variability of conscientiousness state, and perhaps future research can devote more attention especially on this construct.

Also interesting was the negative effect on adaptive performance from variability of agreeableness state. It is likely that similar to the variability of conscientiousness state, being inconsistently agreeable across time also indicates less effective self-regulation in coping with and adapting to different situations. While the agreeableness trait did not

show particularly strong effect to any performance outcomes (both in this study and in Study 2), it seems that state-level agreeableness may be a meaningful predictor at least for the adaptive performance aspect.

The fact that task performance was most immune to intraindividual variability may suggest that this performance domain is most structured, well defined, predictable, and thus least susceptible to situational changes. Therefore, stable dispositional traits can be more consistently translated into steady and visible work performance. It is also possible that this performance domain is more underpinned by job knowledge, skills and general mental ability (Bartram, 2005), all of which may be more fixed personal qualities that are less affected by situations. In comparison, other performance domains may be more fluid and more likely to be influenced by a larger volume of situational cues. This could cause more dynamic and complex interactions among cognitive and affective units in the personality system (Mischel & Shoda, 1995, 1998) and make predictions solely from personality traits more difficult.

7.5.5. Limitations

There are a number of limitations of the current study. The first limitation concerns the limited number of occasions in sampling personality states. With personality states collected only from 4 to 8 days, I may not have gathered sufficient information to depict individuals' personality state distribution. Future studies need to sample more occasions from each individual, so as to generate a complete profile of personality state.

Second, the reliance on self-report measures to assess general work performance is subject to common method bias. Although I tried to mitigate this effect by controlling self-enhancement response bias, and by measuring performance at a different time as to the measure of personality, it would also have been useful to collect others' ratings as well as other independent performance measures.

Third, the sample size of most analyses in this study is small, especially on those regression analyses exploring the predictive validity of intraindividual variability on

performance. This causes concern about statistical power, which refers to "the ability of a statistical test to detect possible population effects" (Austin, Boyle, & Lualhati, 1998, p. 166). A direct effect caused by low statistic power is that a Type II error arises, which occurs when the null hypothesis is retained, based on non-significant results, while in fact the effect holds in the population (Neyman & Pearson, 1933). The implication for this study is that some significant effects of the intravariability of personality states may not be able to be detected with the small sample, and may thus leads to bias in the results.

Fourth, since individuals' episodic behaviours result from their reactions to contextual changes (Mischel & Shoda, 1995, 1998), intraindividual variability should depend on situational similarity as perceived by individuals (Sherman et al., 2010). The analysis here was based on the assumption that situational variability was similar for different individuals in this sample, which may not be the case. Therefore, a more rigorous research design should include the assessment of situational characteristics, so as to examine how personality traits are manifested differently into states in specific situations.

Fifth, it may be the case that the factor structure of the performance measure, which was developed from another sample in different occupational context (in Chapter 5), is not the most appropriate structure for this sample. Due to the limited sample size, I was not able to conduct trustworthy confirmatory factor analysis to test the model fit of the four-factor performance structure.

Finally, although the samples were drawn from MBAs who, as former and future professionals and/or managers, have had several years of working experience and should know well about their own work behaviours, the study setting is nevertheless academic-based, and is likely to cause concern. Future research should validate the findings here with samples of job incumbents in real work settings.

7.6. Conclusion

Overall, this study validates the previously found nomological network between the Big Five personality taxonomy and the four-factor high-order performance taxonomy. Moreover, the interactionistic perspective is taken into account in exploring the linkage between personality and performance. The findings support the fact that personality traits are manifested in momentary personality states, and highlight the importance of considering state-level personality in personality – performance relationships. Although this study is exploratory, there is some evidence to suggest that intraindividual variability may be an important personal characteristic that is independent of traits, and this variability can contribute unique information in predicting multiple performance outcomes. Capturing intraindividual variability will help generate a more complete profile about individuals, and build a stronger link between personality and work performance. Moreover, given that intraindividual variability has been found as a global construct that is prevalent across multiple domains and has meaningful implications (e.g., Baird et al., 2006), future studies could investigate the underlying forces and determinants of this variability. Successful discovery and explication of this construct would help design relevant psychological instruments to contribute to enhancing the validity of personality assessment.

Thus far, the three empirical studies have provided a holistic and process-oriented perspective towards understanding individual work performance. I first discovered the high-order performance taxonomy from the inductively derived performance framework Great Eight, and found there to be a synergy between this high-order model and a deductively derived performance model. This contributes to the establishment of a content- and construct- valid model that can unify different understandings about the performance domain. Based on this high-order model, I then explored its personality antecedents by linking this taxonomy to the Big Five personality taxonomy, so as to generate a nomological net between the predictor domain and the criterion domain. This nomological net was cross-validated in two different samples, by using three different personality instruments. Further, I explored two process-oriented issues. First, I identified the position of this performance taxonomy in the predictive

process between personality and global performance, and provided evidence that factors in this high-order framework can act as a mediator of the personality – global performance relationship. Second, I explored whether the linkage between the Big Five personality and high-order performance can be strengthened by the intervening variables of state-level personality constructs. In the next chapter, I will systematically discuss findings in these three studies.

CHAPTER 8: GENERAL DISCUSSIONS

8.1. Introduction

Work performance is the most critical construct in industrial and organisational psychology (Borman, 2004; Campbell, 1990; Campbell et al., 1993; K. R. Murphy & Cleveland, 1995; F. L. Schmidt & Hunter, 1992; Viswesvaran & Ones, 2000). However, it has not been sufficiently studied in the past, in comparison with constructs in the predictor domain such as personality, abilities and motivation, amongst others. Furthermore, the past findings concerning the criterion domain have shown substantial disagreement concerning the definition, content and structure of work performance (see Chapter 2 for an extensive review). Therefore, this thesis intends to contribute to a better understanding of the performance construct and argues for a shift of our focus from the predictor space to the criterion space.

The literature review about past conceptualisation and measurement of performance (Chapter 2) led me to conclude that a useful approach to unify various performance frameworks is through uncovering a high-order performance structure from inductively derived performance taxonomies, and then seeking alignment between this high-order structure and those performance taxonomies developed from a deductive, theory-driven approach. Therefore, in this thesis, I proposed to identify a high-order performance model that is both content and construct valid, and that can help unify performance taxonomies developed from different methods. Furthermore, I intended to explore the prediction from personality antecedents on factors of this high-order performance framework, using a criterion- and construct-centric perspective (Bartram et al., 2010; Hough, 2001; Schneider & Hough, 1995).

In the empirical sections of this thesis, I first revealed the existence of a four-factor high-order structure that has potential to act as a commonly agreed taxonomy for the criterion space. I then found that its four factors can be differentially predicted by the

Big Five personality traits, supporting a nomological net linking personality and performance. I also explored the value of bringing in an alternative conceptualisation of personality by including momentary personality constructs, and found that within-person variability of personality states can contribute to the prediction of performance over and above personality traits.

Overall, this thesis contributes to a refined understanding of the insufficiently studied performance domain by establishing a high-order performance framework and identifying the personality antecedents of its components, with implications both from the trait and state perspective of personality. The results shed light on the conceptualisation, measurement and prediction of work performance, and serve as a good foundation to inform future validation research. In the following sections, I will first present an overview of the three empirical studies. I will then summarise and draw findings across studies to comment on each of the three key research questions. Finally, several major limitations of this thesis, along with directions for future research are discussed.

8.2. Overview of Studies

As shown in Figure 8.1., this thesis is designed around three key research questions. Research question 1 inquires about the content and structure of the individual performance construct at the high-order level in performance hierarchy, and explores whether a high-order structure can help to build an agreement between performance taxonomies developed from two different approaches, the inductive approach and the deductive approach. Research question 2 concerns whether a nomological net can be built that links the high-order performance taxonomy to a predictor taxonomy, and this thesis focuses on a well-established predictor taxonomy, the Big Five personality framework. Research question 3 solicits the possibility to enhance the prediction on work performance from personality traits, by incorporating variables that represent the dynamic aspects of personality.

Figure 8.1. Overview of empirical studies
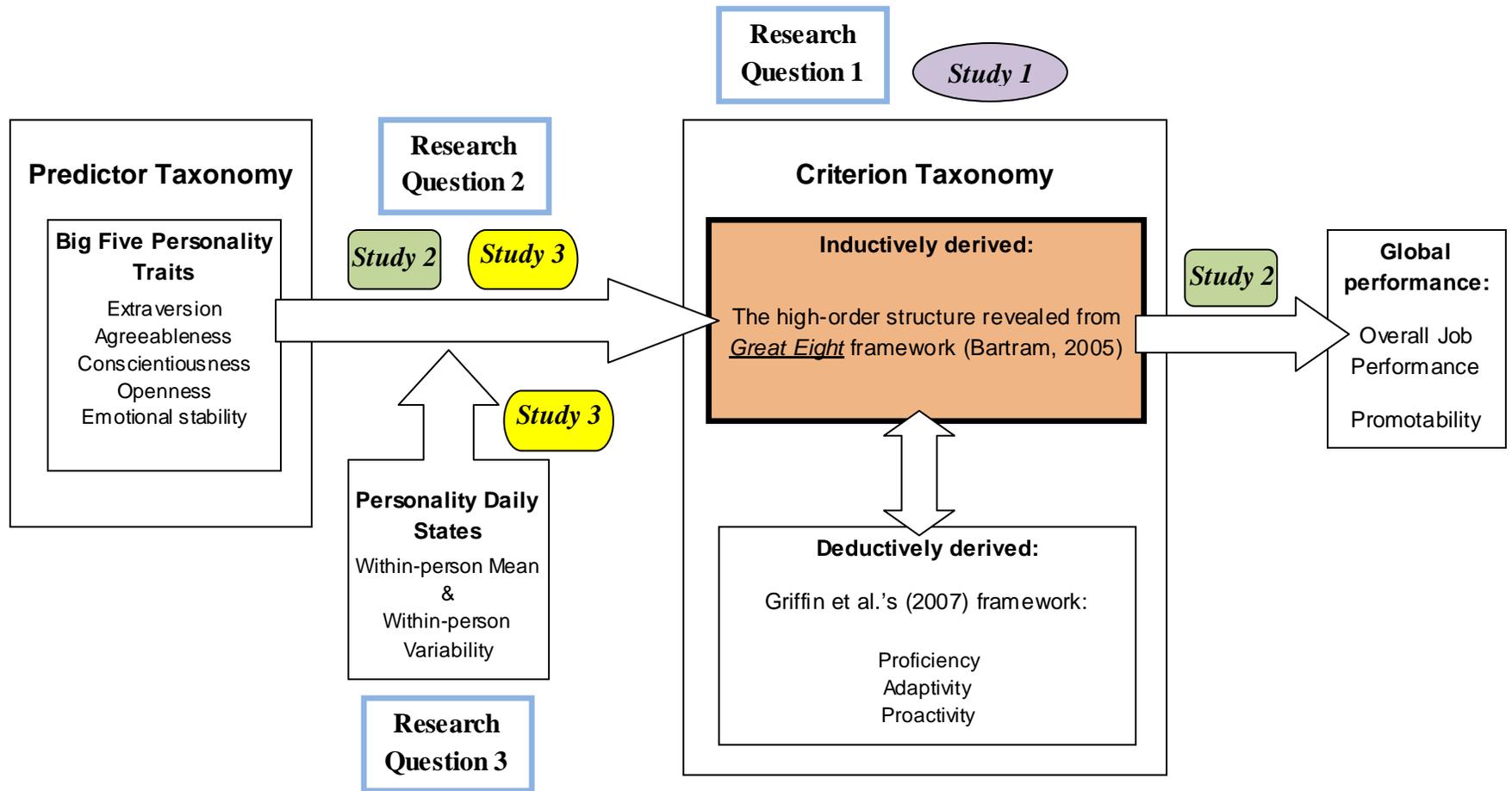
In Study 1 (Chapter 5), I used the recently developed Great Eight performance framework as the foundation for uncovering a high-order performance structure, given that the Great Eight provides a content-valid, comprehensive and up-to-date profiling of the performance domain (see Section 5.2.1). I used a cross-sectional, multi-rater source design by collecting performance ratings from employees and their direct supervisors in a telecommunications organisation. I found that a four-factor high-order structure consisting of interpersonal, cognitive/proactive, task and adaptive factors was the most appropriate structure. Furthermore, three factors of this structure can be aligned to the factors of a deductively derived performance taxonomy, thus providing evidence as to the unification of performance models developed from different approaches.

Then, I started from this four-factor high-order framework and worked backwards to reveal its corresponding personality antecedents. I investigated the possibility of building a nomological net, as suggested by Schneider and Hough (1995) and Hough (2001), between this four-factor performance structure and the well-established Big Five personality trait structure. Using a two-wave longitudinal design in Chapter 6, I found some evidence that supports such a nomological net. Additionally, I tested the inclusion of global-level performance (in contrast to the specific performance factors as measured by performance taxonomies) into the picture and showed that a mediation path can be found, such that specific performance factors can act as meaningful mediators that link personality antecedents and global performance. This helps disentangle the predictive process of personality traits and confirms the different positions of specific performance and global performance in the predictive process.

Last, in Chapter 7, I validated the proposed nomological net with a separate MBA student sample, and by using different personality instruments. Moreover, I explored the possibility of strengthening the personality – performance linkage by incorporating the dynamic perspective about personality. Using an experience sampling design by collecting daily personality states from eight time points during a month, I found that state-level personality offers meaningful additional information that is not contained in personality traits, and that including state-level personality may help enhance the prediction on work performance outcomes.

Table 8.1 provides a summary of the conceptual and methodological focus of each chapter. Conceptually, the three studies all feature a strong concentration on the performance domain, reflecting the criterion-centric perspective of this thesis. As a whole, the three chapters provide a rich profiling of performance space and disentangle personality – performance relationships. Methodologically, the three studies adopt a mixture of cross-sectional and longitudinal designs, and collect data from more than a single source, thus complementing the methodological limitations of one another. In the next section (Section 8.2), I draw upon some key findings from the empirical studies and discuss them in detail, in relation to the proposed research questions.

Table 8.1. Overview of the focus of the three empirical studies

	Study 1 (Chapter 5)	Study 2 (Chapter 6)	Study 3 (Chapter 7)
Conceptual focus			
Performance	√	√	√
Personality traits		√	√
Personality states			√
Methodology focus			
Cross-sectional	√		
Longitudinal		√	√
Multiple source	√	√	

8.3. Discussion of Key Research Findings

In this section, I primarily address the theoretical and practical implications of the findings in relation to three main research questions.

8.3.1. Research Question 1: Conceptualising and measuring performance

8.3.1.1. The four-factor high-order performance structure

Using competencies from the inductively derived Great Eight performance framework, the findings from Chapter 5 revealed that a four-factor structure stands at the high level of generality, and this structure can be mapped onto a deductive derived performance framework developed by Griffin et al. (2007). These results support my proposition that agreement can be made between performance taxonomies developed from different approaches, and that scaling them onto the same level of generality/specificity can allow meaningful comparisons and unifications to be made. As reviewed and discussed in Chapter 2 (Section 2.4), performance taxonomies developed from different approaches each show distinct features and advantages, while they may also have their own limitations. For instance, the deductively derived taxonomies typically show good construct validity, yet they might not have the same level of content validity (i.e. exhaustive coverage of the performance domain), as is the case with the inductively derived taxonomies. Therefore, a major value of this four-factor high-order structure is that it has the advantages of performance taxonomies developed from both approaches. First, it is content valid, given that it is originated from an inductive model which comprehensively represents all the essential content of individual work performance. Second, it is construct-valid, such that it provides relatively distinct performance factors, which are important for further research attempts in linking this structure to other psychological variables.

The four-factor structure includes the factors of interpersonal, cognitive/proactive, task and adaptive performance. Both the structure and the content of this framework seem to be in line with many earlier-found, high-generality taxonomies as developed from the deductive approach. As reviewed in Chapter 2 (Section 2.3.3), the taxonomies typically contain factor numbers ranging from two (e.g. task versus contextual by Borman and Motowildo (1993, 1997), getting ahead and getting along by Hogan and colleagues (Hogan & Holland, 2003; Hogan & Warrenfelz, 2003)) to five (Welbourne et al.'s (1995) five roles); thus the high-order structure revealed here seems to be well within the optimal range in terms of the number of factors. Regarding the content, most earlier studies typically include factors of task/technical and interpersonal, and to a less degree, conceptual/thinking (Table 2.4, Section 2.4). These elements are also well represented in the currently found framework. Therefore, this four-factor

structure is not restricted by the use of the Great Eight framework and the samples collected in this thesis, but may have broader generalisablity to represent the entire performance domain.

The adaptive and proactive elements, as found in this high-order structure, may be less well represented in many earlier proposed performance taxonomies. This may be primarily due to that the recognition of the increasingly complex, dynamic and changeable nature of job occurred more recently (Hesketh & Neal, 1999; Ilgen & Hollenbeck, 1991; Ilgen & Pulakos, 1999), which brought about the discovery of less task-focused, less fixed and clearly-defined, and more fluid performance aspects. For instance, only towards the end of 1990s was adaptive performance recognised as a unique performance factor (Allworth & Hesketh, 1999; J. W. Johnson, 2003); proactivity, the more active performance aspect that is supposed to help initiate positive changes to the self and the organisation, was acknowledged to be as critical as task and adaptive performance at an even later stage (M. A. Griffin et al., 2007). Therefore, it is not surprising that these two factors were not posited as independent high-order factors in most earlier proposed performance taxonomies. Nevertheless, with today's business environment turning more volatile and uncertain (Campbell, 1999; M. A. Griffin et al., 2007; Wall & Jackson, 1995), organisations must ensure that their evaluation of individual performance meets up with the changing need of the business. For instance, today's jobs frequently require people to move to unfamiliar job roles and to new teams, to take initiative beyond their assigned tasks, and to create new ways that can improve efficiency and performance. This indicates that the demand to be adaptive and proactive now becomes part of employees' daily jobs. Therefore, it seems imperative for today's organisations to include these dynamic performance aspects in selecting and developing their workforces.

I also discussed in Chapter 5 (Section 5.5.4) that the four high-order performance factors can be found in several practitioners' models that are in current use, such as Saville's WAVE, Denison leadership development model, Jack Welch's 4-E model[11], among others. From these models, there was a tendency for the four-factor performance

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[11] For references for these models, please see Section 5.5.4 in Chapter 5.

structure and the focus on fluid, dynamic aspects of performance are already beginning to be employed by practitioners. This provides practical implications for the currently proposed model, and indicates its positive potential to align academic and practical interests.

8.3.1.2. Measuring performance at different level of specificity

Chapter 5 also reports the confirmatory factor analysis results of the Great Eight structure, which displayed overly high intercorrelations among latent factors (see Section 5.4.2). This shows that employees in this study may not be able to make fine differentiation when presented with many interrelated factors (Arthur et al., 2003), and indicates that a more general structure should be present above the Great Eight factors. Based on the factor loading results, I proposed grouping the Great Eight factors into four higher-order factors (as illustrated in Figure 5.4).

However, as already discussed in Chapter 5 (Section 5.5.4), such results cannot be interpreted as indicating that the Great Eight is not useful. More general performance frameworks and more differentiated performance frameworks are valuable in different contexts, and the choice between them should depend on the purpose of the performance frameworks. Kurz and Bartram (2002) have pointed out that if the purpose is more research-oriented, such as to parsimoniously profile the performance domain so as to build relationships with other psychological constructs, then more general, high-order structures with distinguishable factors is more desirable. If the purpose is more practical-oriented, such as to construct items, build behavioural anchors, and facilitate the development of performance plans, then more differentiated frameworks can provide finer-grained details about an individual and should thus be chosen. Therefore, both types of performance frameworks are needed, though we can perhaps build better alignment across them and use them more flexibly. For instance, as pointed out by Scullen et al. (2000) and also shown in this thesis, when working together with clients and using performance models for practical purposes, we can organise a large volume of differentiated performance factors into a simple framework. The four-factor structure as proposed here can serve this purpose. This simple framework can be presented to clients

to help them more easily make sense of employees' performance, while ratings on differentiated performance factors such as the Great Eight can also be supplied for clients to probe into more refined details. In fact, many competency models that are used in practice do take this integrated perspective such that they provide performance information at both high-order level and more specific, finer-grained level, although their high-order structure do not necessarily coincide with the four-factor structure proposed here. Given that the four-factor structure has been found to be theoretically and practically generalisable, it can be used as a commonly agreed high-order framework of the performance space so that it is equivalent to the Big Five structure in the personality space.

8.3.1.3. Global performance and specific performance

This thesis adopts the psychological definition of work performance, which conceptualises performance as behaviour-oriented constructs and partitionable into multiple specific, psychologically meaningful dimensions (e.g. Borman, 1983; Campbell, 1990; Campbell et al., 1993; J. W. Johnson, 2003; Motowildo et al., 1997). I argue that this perspective is more instrumental in facilitating our understanding about the work performance domain, and in making more accurate predictions from psychological antecedents. However, I also recognise the value of using global-level performance, given that they may provide economic values that are useful for organisations to make personnel decisions.

In Chapter 6, I investigated the relationship between the two types of job performance as associated with two definitions, specific and global performance. In line with my hypothesis, the economic definition of performance tends to generate rather remote performance outcomes (e.g. overall job performance and promotability) that are difficult to link directly to personality trait antecedents. Their linkage is fully mediated through trait-relevant, specific performance factors that are generated through the psychological definition of performance. By disentangling this process of prediction, I provide empirical support for earlier propositions, which suggest positing specific performance and global performance as separate constructs that stand at two stages in

the predictive process (Bartram et al., 2010; Binning & Barrett, 1989; Tett & Burnett, 2003; Vallance et al., 1953). This result also lends support to the goal of focusing on specific performance factors as the main study variables, due to the fact that global performance is more remotely and loosely linked to psychological antecedents than specific performance, and is more likely to be affected by multiple additional considerations, such as situational factors that cannot be explained by antecedents. It is thus recommended to researchers and practitioners to measure both specific and global performance when collecting performance data, as they are not interchangeable performance indicators and can together contribute to better understanding about the raters' judgment process.

8.3.2. Research Question 2: The relationship between personality and performance

8.3.2.1. A nomological net by using personality and self-rated performance

The second main interest of this thesis has been to build a nomological net between the high-order performance taxonomy and a personality taxonomy. Chapter 6 links the four-factor performance framework as identified in Chapter 5, to the well-established Big Five personality framework, as measured by Occupational Personality Questionnaire (OPQ). Chapter 7 validates the same linkage in a separate sample by using two different Big Five personality measures, the Hogan Personality Inventory (HPI) and Page Work Behaviour Inventory (PWBI). Table 8.2 presents the findings of personality – self-rated performance relationships across these two samples, by using the three different Big Five-based personality instruments. The patterns consistent across all analyses are placed in bold. The patterns inconsistent across all analyses, for instance, the positive effect of extraversion on non-interpersonal dimensions only in Chapter 6, and the negative effect of prudence (i.e. conscientiousness in Hogan Personality Inventory) in predicting non-task related performance only in Chapter 7, are considered as sample- or instrument-specific and are thus not emphasised here. Figure 8.2 summarises these consistent patterns yet presents them in a more visual manner.

Table 8.2. Personality and self-reported performance across studies

	Study 2 (Chapter 6) Telecom company employees	Study 3 (Chapter 7) MBA students	
	OPQ (N=205)	HPI (N=96)	PWBI (N=98)
Interpersonal	**Extraversion (β = .49**)**	**Ambition (EX, β = .42**)** Prudence (CO, β = -.25*)	**Extraversion (β = .44**)** Agreeableness (β = .22*)
Cognitive /Proactive	**Openness to experience (β = .24**)** Extraversion (β = .34**) Conscientiousness (β = .18**)	**Inquisitiveness (OP, β = .44**)** Ambition (EX, β = .48**) Sociability (EX, β = -.21*) Prudence (CO, β = -.26**)	**Openness to experience (β = .60**)**
Task	**Conscientiousness (β = .24**)** Extraversion (β = .25**)	**Prudence (EX, β = .38**)** Adjustment (ES, β = -.31*)	**Conscientiousness (β = .77**)**
Adaptive	**Emotional stability (β = .28**)** **Openness to experience (β = .16*)**	**Adjustment (ES, β = .29*)** **Inquisitiveness (OP, β = .33**)** Ambition (EX, β = .34*) Prudence (CO, β = -.27*)	**Emotional stability (β = .49**)** **Openness to experience (β = .39**)**

Note:

a) Hypothesised and consistently found personality predictors are bolded. Results here are after background variables were controlled;

b) OPQ = Occupational Personality Questionnaire; HPI = Hogan Personality Inventory; PWBI = Page Work Behaviour Inventory;

c) As the scale name of HPI may be less familiar to readers, the corresponding Big Five dimensions of these scales are indicated in parentheses. EX = Extraversion, CO = Conscientiousness, OP = Openness to experience, ES = Emotional stability.

Figure 8.2. A proposed nomological net between Big Five personality traits and four-factor high-order performance
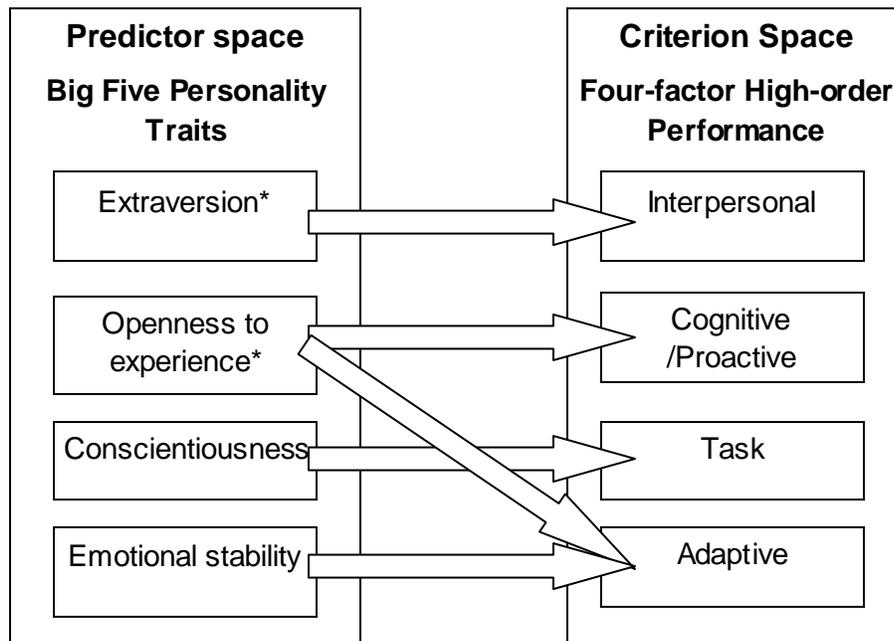
Note: * If facet-level scales are available, it could be the ambition/potency facet of extraversion, and the inquisitiveness facet of openness to experience that contribute to the relationships in this figure.

As can be seen in Table 8.2, when performance is rated by individuals themselves, some consistent patterns across various analyses can be found. Most of these consistent relationships are in line with the hypotheses (See Section 6.2.1 and 7.2.3 for hypothesised relationships), suggesting that a good level of alignment between personality framework and performance framework can be built both conceptually and empirically. Such an alignment may indicate that the two taxonomies as examined in this thesis stand at the same level of generality in the psychological space, thus fulfilling the requirement of aligning bandwidth in building relationships between predictors and criteria (J. Hogan & Roberts, 1996). The establishment of this nomological net can provide conceptual foundation for personality – performance linkage, which has been suggested by many researchers as a critical means of promoting validity (Guion & Gottier, 1965; Hough, 2001; Schneider & Hough, 1995; Tett et al., 1991).

It may be noticed from Figure 8.2 that the agreeableness dimension of the Big Five personality is not represented in this proposed nomological net. While agreeableness was hypothesised as negatively relating to cognitive/proactive performance and positively relating to interpersonal performance (See Section 6.2.1 and 7.2.3 for hypothesised relationships), these hypotheses were not well supported by the empirical data of this thesis. When cognitive/proactive performance was considered, agreeableness showed a consistently insignificant relationship in the analyses ($r = -.07$ by using OPQ in Chapter 6, $r = .10$ by using HPI and $r = .14$ by using PWBI in Chapter 7, all *n.s.*), which suggests that it is not appropriate to expect agreeable individuals to display less strong cognitive/proactive performance. When interpersonal performance was considered, agreeableness had a .02 relationship with self-rated interpersonal performance in Chapter 6, where an engineer sample was used (see Table 6.2), which does not support the hypothesis. However, In Chapter 7 where an MBA sample was used, agreeableness correlated positively with self-rated interpersonal performance ($r = .22, p < .05$ with HPI and $r = .40, p < .01$ with PWBI), which supported the hypothesis, yet its independent and unique effect was only found by using PWBI ($\beta = .22, p < .05$, shown in Table 8.2) but not by using HPI ($\beta = .05$, *n.s.*).

The mixed results reflect the complex relationship between agreeableness and work performance, and such complexity has been reported in past meta-analyses, in which other-rated and/or objective performance measures were used as the criterion. On the one hand, several earlier meta-analyses in which global-level performance measures were used report that the relationships between agreeableness and performance outcomes are generally weaker than those found on other traits, and are frequently not generalisable across occupations (e.g., Barrick & Mount, 1991; Salgado, 1997). On the other hand, later meta-analyses that use more behaviourally defined performance tend to provide a different picture by showing that agreeableness was a meaningful personality antecedent in predicting several performance aspects, including organisational citizenship behaviour (Chiaburu et al., in press; Hurtz & Donovan, 2000; Organ & Ryan, 1995), counterproductive work behaviour (Berry, Ones, & Sackett, 2007), and teamwork or team performance (Barrick et al., 2001; Bell, 2007).

Some tentative explanations have been offered in the discussion section of Chapter 6 (Section 6.5.1), which posit that the study context has important implications for the effect of agreeableness. It is likely that agreeableness is not a particularly important trait for technical-oriented engineers (in Chapter 6) as engineers' jobs do not typically involve close interactions with other people on a daily basis, but rather, tend to extensively focus on solving technical problems. In comparison, MBA students as a proxy managerial sample may engage more closely in social interactions, especially during their MBA program where group work is frequently required to complete an assignment. As a result, a stronger relationship between agreeableness and interpersonal performance may emerge. These explanations are in line with trait activation theory (Tett & Burnett, 2003; Tett & Guterman, 2000), which posits that personality traits are enacted only in trait-relevant situations. Given that this thesis did not generate conclusive findings about agreeableness – interpersonal relationship, I propose to keep this path open to further investigation. Future studies may need to focus especially on the moderators in this relationship, so as to find the contexts in which this relationship is promoted or inhibited.

8.3.2.2. Comparisons across personality instruments

Apart from the cross-validation of the above mentioned results in two different samples, this thesis employs the use of different personality instruments, providing some evidence as to the generalisability of the results. Although all three personality instruments being used, namely, Occupational Personality Questionnaire (OPQ), Hogan Personality Inventory (HPI), and Page Work Behaviour Inventory (PWBI), may be regarded as Big Five-based measures and all are primarily used for occupational purposes, there are slight differences across them, primarily in terms of theoretical underpinning, content and measurement.

In terms of the theoretical background and item content, PWBI is perhaps best aligned with the Big Five framework among all three instruments, as PWBI is specifically designed to measure workplace behavioural tendencies that are organised by the five dimensions (Page, 2009). OPQ32 addresses a broader spectrum of personality

than the Big Five tap, and uses three domains, *Relationship with people*, *Thinking styles*, and *Feeling and Emotions*, to organise the entire 32 scales (A. Brown & Bartram, 2009). The mapping of a selection of these scales to form the Big Five dimensions was conducted on a *post hoc* basis (Bartram & Brown, 2005). HPI is derived from the Big Five, yet its incorporation of the socioanalytical theory leads to the supply of finer-grained information beyond the Big Five (R. Hogan & Hogan, 1992).

In terms of measurement, PWBI uses a Likert scale on which test respondents are allowed to answer the degree to which they agree or do not disagree with a certain statement. The OPQ used in this study (OPQ32i) and HPI both employ ipsative scales, on which test respondents are presented with two or more desirable options and are forced to choose the most desirable one. Both types of scales are commonly employed by personality researchers, and the benefits and disadvantages of these two scale options have been well discussed (Baron, 1996; Bartram, 1996, 2007; M. W.-L. Cheung & Chan, 2002; Christiansen et al., 2005).

Table 8.2 shows that the strength of the personality – performance relationships tends to differ across the three sets of analysis in this thesis, such that the relationships appeared stronger by using PWBI than using OPQ and HPI. Given that the criterion measure in the three sets of analysis are virtually the same (i.e. four high-order performance factors as measured by the same 22 competencies), such a difference may be partially attributed to the different personality instrument being used. At the content level, PWBI focuses on tapping individuals' behavioural tendencies, and thus may be most in line with the behaviour-based content of performance measures. At the measurement level, PWBI uses the same scale format (Likert scale) as the performance measure (see Section 5.3.2 and 7.3.2.3 for description about the response scale of the performance measure), while OPQ and HPI use different scale format (ipsative scale). These considerations indicate that it is understandable that the strongest effect was obtained by using PWBI.

8.3.2.3. Using supervisor-rated performance

Chapter 6 also investigated the validity of this nomological net by using supervisor ratings in addition to self ratings of performance. No particularly strong and significant relationships were found. Only two of the hypothesised relationships achieved a magnitude that is comparable to those found in earlier meta-analyses (i.e., r = .12 between extraversion and supervisor-rated interpersonal performance, and r = .13 between openness to experience and supervisor-rated cognitive/proactive performance, both $n.s$). Chapter 6 has already discussed the implications of these findings (See Section 6.5.3 for more discussion); thus I will not repeat them here. However, it is useful to flag up some important points and discuss the findings in the broader context of researching and using personality assessment at workplace.

First, the discussion section of Chapter 6 has indicated that self-report personality has a very loose link with supervisor-rated performance. Even when self and supervisors rate on exactly the same construct (i.e. performance construct), correlations are frequently at about or below .30 (Harris & Schaubroeck, 1988; Warr & Bourne, 1999). Thus, it is reasonable to observe an even lower correlation, such as below .20 as typically found in meta-analysis (Barrick et al., 2001), between self-report personality and supervisor-report performance (i.e., two different constructs). This shows that the problem of the relatively low validity of personality tests as typically criticised by scholars (Guion & Gottier, 1965; Mischel, 1968; Morgeson et al., 2007) may not be due to personality assessment *per se*, but rather, to the self-other study design, such that the predictor and the criterion are collected from different sources. Although using self-other design is commonly used to avoid collecting data from the same source and thus to control common method effect (Podsakoff et al., 2003), this approach also creates unshared method bias which might attenuate the true relationships (Conway & Lance, 2010; Lance, Dawson, Birkelbach, & Hoffman, 2010).

In personality validation research, several scholars have already noticed these problems about self-other study design and the over-reliance on single-source performance ratings (such as supervisor ratings) (Barrick et al., 2001; Morgeson et al., 2007; Oh & Berry, 2009; Poropat, 2011), and some attempts have been made to overcome these problems. For instance, Oh and Berry (2009) showed that when

managerial performance is measured by inputs from supervisors, peers, subordinates, as well as the self (i.e., 360-degree assessment), the validity of Big Five personality traits can be increased to as high as .50. Taking a similar perspective, Poropat (2011) meta-analytically examined the relationship between conscientiousness and work performance such that both constructs are measured by both the self and peers. His results showed that this multitrait-multimethod approach helped raise the correlation between conscientiousness and overall performance to .35, and the correlation between conscientiousness and citizenship performance to .45. These are much higher than the commonly found validities in meta-analyses (e.g. as reviewed in Chapter 3). These empirical studies show a lot of promise to enhance the validity of personality assessment by refining and expanding our measurement of both the predictor and the criterion constructs.

Second, while this thesis does not directly consider the effect of contextual variables[12], it should be noted that contexts are of critical importance in organisational research, especially in personality research (Barrick & Mount, 1993; Christiansen & Tett, 2008; Day & Bedeian, 1991; Johns, 2006; Tett & Burnett, 2003; Tett & Guterman, 2000; Tett, Jackson, Rothstein, & Reddon, 1999). Researchers have consistently shown that personality – performance relationship frequently varies across job roles, work groups, and organisational culture, and sometimes even result in correlations with opposing signs (Tett et al., 1999). The trait activation theory proposed by Tett and colleagues (Tett & Burnett, 2003; Tett & Guterman, 2000) suggested that personality traits can only be expressed into relevant behaviour as activated by trait-relevant situational cues.

Based on the above discussions, especially the concept of trait activation theory, it is reasonable to expect that the strong effect of contexts may be even more important when performance is rated by others (such as supervisors) rather than the self. For a personality trait to be reflected into trait-relevant behaviours, we need to have, first, trait-relevant situations to activate the latent trait into behaviours, and second, appropriate situations to allow these expressed behaviours to be observed by others. This

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[12] This thesis indirectly addresses the effect of contexts by first, comparing the validity in different job contexts in the follow-up analysis section of Chapter 6, and second, including in Chapter 7 state-level personality which embodies the information from specific situations as being sampled.

logic implicitly suggests a two-stage process, with the first stage being more relevant for self-rated performance (i.e., an individual can observe his or her own trait-relevant behaviours when such behaviours are activated by trait-relevant situations), and the second stage being more important for other-rated performance, as the enacted behaviours need to be observed by other raters only when an opportunity to observe is permitted by appropriate situation. Such conceptualisation suggests that contextual factors play a part in both stages of this predictive path, and thus other-rated performance would be more subject to contextual influences than self-report performance. Therefore, it is important to consider the great dependency of other-rated performance on contextual variables in researching the predictive validity of personality.

8.3.3. Research Question 3: Implications from personality states

Chapter 7 investigates a new perspective in conceptualising and measuring personality, that is, to recognise that personality can be conceptualised as a state-level construct, in addition to the traditionally endorsed perspective that regards it as a fixed, trait-level construct. While the majority of earlier studies focus on the use of trait-level personality construct, it has been increasingly recognised by scholars that traits, as decontextualised measures, cannot provide sufficient information to predict an individual's behaviours, and it is necessary to look for additional approaches to decipher the myth about personality – performance relationships (Diener et al., 1984; Mischel, 1968; Morgeson et al., 2007; Pervin, 1994; Revelle, 1995).

Taking a density distribution theory in which personality is conceptualised as the aggregation of an entire distribution curve of momentary states (Fleeson, 2001; Fleeson & Gallagher, 2009; Fleeson & Leicht, 2006), Chapter 7 shows that personality traits can relate to the central tendency of daily personality states, supporting the arguments of density distribution theory that personality traits are the underlying determinants of the most frequently displayed personality states. Despite only a limited number of occasions being sampled, personality traits predicted the mean of daily states relatively satisfactorily. In particular, good predictions were obtained between neurotic trait and

the aggregated mean of neurotic states, with correlations at about .50 ($r = .58$ by using adjustment of HPI and $r = .48$ by using emotional stability of PWBI). This shows that those who are more neurotic in general tend to experience higher neuroticism on a daily basis.

Chapter 7 also shows that there are consistent individual differences in the degree people vary their behaviours on a momentary basis. Echoing earlier findings, some individuals are more consistent and some are more variable over time (Bem & Allen, 1974; Borkenau & Ostendorf, 1998; Epstein, 1979; Fiske & Maddi, 1961; Fleeson, 2001; Larsen, 1989; Mischel & Shoda, 1995, 1998). More importantly, this study finds that within-person variability tends to offer meaningful implication for work performance, especially for non-task performance factors. This finding indicates that if we are able to clearly understand and effectively capture this variability construct, we will have the potential to enhance the prediction of personality on performance. In Chapter 7, I showed that openness to experience may be partially responsible for the underlying determinants of intraindividual variability, such that open individuals may have a stronger internal forces to stabilise behaviours across situations and would thus display more consistency over time. Nevertheless, it is open to further investigation as to which individual characteristics precede this variability construct, and whether intraindividual variability on different Big Five dimensions is determined by the same underlying characteristic. If we know more about these underlying antecedents, we will be able to construct measures that can be used in selection and development settings.

A further important observation is that intraindividual variability on different Big Five dimensions has different implications for different aspects of performance. For instance, more variation on openness state was found to positively predict interpersonal performance, and that more variation on conscientiousness state was found to negatively predict adaptive performance and course grade. While some tentative explanations have been offered in the discussion of Chapter 7, it should be recognised that a meaningful theory building, between state variability and work performance aspects, is needed. It should also be acknowledged, however, that theory building between state-level constructs and performance are much more complex than that between trait-level

constructs and performance. This is because state-level constructs are jointly determined by traits and situations (Fleeson, 2001; Fleeson & Leicht, 2006; Mischel & Shoda, 1995, 1998; Nesselroade, 1991), and situation is an especially complex construct to be systematically and comprehensively captured (Sherman et al., 2010; M. A. Ten Berge & De Raad, 1999). Some experience sampling studies have included measures of situations so that the context of momentary behaviours taking place is captured; for instance, Church et al. (2008) asked participants to report their daily behaviours in different locations (work, home and recreation) and with different people (family, romantic partner, friend and acquaintance). Minbashian et al. (2010) manipulated the situation of task complexity in a laboratory setting and explored participants' momentary conscientiousness in response to these varying situations. Mischel, Shoda and colleagues' pioneering research (Mischel & Shoda, 1995, 1998; Mischel, Shoda, & Mendoza-Denton, 2002; Shoda et al., 1994) assessed interpersonal-related situations by using others' observations in a natural setting (i.e. children in a summer camp). These various attempts to capture situational specificity offer useful insights and can be more broadly applied in researching state-level constructs in work settings. Understanding the contexts of individuals' momentary expressions can help build a complete profile about each individual, and thus contribute to more effective predictions on behaviour and work performance.

8.4. Limitations and Future Directions

In this section I will describe some of the limitations of this thesis. I will also extend from these limitations and suggest some potential avenues for future research in the area of personality and performance.

8.4.1. Study design

8.4.1.1. Using subjective rating

First, the supported relationships between personality and performance were only found by using self-report on both constructs, but not when self-report personality and supervisor-report performance was concerned. Therefore, such findings may not have reflected the true, objective relationship between personality and performance, but merely people's implicit theories about how these two constructs relate. Implicit theories suggest that people spontaneously employ categories to describe a wide range of psychological and physical attributes that they perceive in themselves and others, and that people hold latent beliefs as to how these perceived characteristics go together (Dweck, Chiu, & Hong, 1995; Kelly, 1955). Since implicit theories guide the way about how the self concept is processed and understood, the discovered relationships between self ratings on personality and performance may thus merely reflect people's latent beliefs on how these two sets of construct relate to each other. For instance, a person who believes him/herself as an extravert would also believe him/herself as being good at the interpersonal aspect of performance. To what extent people's implicit theories affected the discovered nomological network remains to be investigated.

8.4.1.2. Rater source

While this thesis employs the use of different data collection methods, it is nonetheless heavily reliant on the use of self-reported data. In particular, the proposed nomological net between personality taxonomy and performance taxonomy was only found when performance was rated by individuals themselves, but not when performance was rated by their supervisors (in Chapter 6). This is of particular concern, as it suggests that the complex mechanism of how an individual self-report personality affects others' judgment of performance remains unsolved.

As has been mentioned before (Section 8.3.2.3), the common method bias associated with self-self design, and the underestimation of validity associated with self-other design indicates that a future avenue of research is to apply the multivariate approach (multitrait-multimethod, MTMM) more broadly in measuring both the predictor and the criterion. Since different raters tend to focus on different aspects of performance, weight the same performance aspect differently, and draw from different

behavioural samples (Borman, 1997; Scullen et al., 2000), it should be expected that differences in performance judgment across raters will occur, and these different ratings are not entirely method (rater source) errors but can be true-score-related variance (Lance et al., 2010). Therefore, by collecting information from multiple rater sources, we can maximally control for rater idiosyncrasies and partition the shared variance across ratings from different raters. Some examples have already been cited in Section 8.3.2.3 (Oh & Berry, 2009; Poropat, 2011), and this approach can be more broadly applied in personality – performance research.

8.4.1.3. Experience sampling technique

Due to the availability and resource constrains, only a small number (4 – 8 days) of daily experiences could be sampled from a small number of participants ($N = 60 – 64$ completed samples), which provides only limited coverage of individual participants' momentary states. To generate a complete distribution curve of states as required by the density distribution theory (Fleeson, 2001), it is necessary to sample a much greater number of an individual's momentary experiences on a more frequent basis (i.e. multiple times a day).

Nevertheless, the inclusion of experience sampling technique appears to be a useful approach that offers additional insight into the functioning and expression of personality traits. Over recent years, this technique is being increasingly applied in work settings such as exploring issues on work-family balance (Butler, Grzywacz, Bass, & Linney, 2005), emotion at work (Miner et al., 2005) and occupational health (Sonnentag et al., 2008; Totterdell, Wood, & Wall, 2006), among others, though it is still not extensively used in personality research in the workplace. Future studies will benefit from broader inclusion of this technique, such that both the personality and the performance measures are sampled at multiple times. This will help collect meaningful information at the within-person level, as the relationship among psychological constructs at the within-person level can sometimes show a contrasting pattern with the between-person level (Beckmann et al., 2010). The use of experience-sampling can also be combined into the above mentioned MTMM approach, such that data from multiple

time points can be collected both from the self and from other raters. Although a greater burden may be placed upon participants, this technique will help generate a rich database to look for consistency and discrepancy between self-other judgment on a momentary basis (rather than in more general sense). Further, it is also useful to investigate the psychological antecedents that determine within-person variability, as we do not have a good understanding about it to this date.

8.4.1.4. Quantitative and qualitative methods

A further limitation of the study design of this thesis is its sole reliance on quantitative methods, while qualitative methods such as in-depth interviews, focus group or observation studies can generate much richer information about the contexts of the study and thus greatly help interpret the discovered results. For instance, interviews with supervisors in Chapter 6 may help understand what performance aspects are most valued in their specific team, organisational and occupational contexts, and can thus potentially help explain the weak relationship between self-report personality and supervisor-rated performance. Future studies that primarily employ quantitative approach can benefit from combining a qualitative element either before or after quantitative data collection, as this information will help interpret the research findings and place the study into context.

8.4.2. Measurement issues

In this thesis, the performance construct is measured by a selection of competencies (22 competencies) from the entire Universal Competency Framework, thus only a small fraction of the entire performance constructs in the UCF database was tested. Therefore, the question remains as to whether the results of this study can be replicated when a different subset of UCF competencies are selected. Future studies are needed to investigate whether a selection of different competencies can replicate the high-order four-factor performance structure as found here and whether this structure can relate to personality trait constructs in a similar way.

In terms of the response scale format in measuring the predictor and the criterion in this thesis, personality was measured by ipsative and Likert scale types, yet the performance was measured solely by the use of a Likert scale type. It is thus not clear whether the results of this thesis can be generalised to other contexts when performance is measured by non-Likert scale format. Bartram (2007) showed that the scale format of the criterion measure does make a difference on validity, such that by replacing Likert scale with forced-choice scale in measuring line-manager ratings of competencies, operational validities can be greatly enhanced from .25 to .38. This is about 50% increase in validity when using the same predictor instrument. The scale format of measures (both for predictor and criterion) will have even greater implications in cross-cultural research, as it has been found that people in different cultures display different tendencies in using response scales, especially in using the Likert scale format (Bachman & O'Malley, 1984; Hui & Triandis, 1989; Van Herk, Poortinga, & Verhallen, 2004). For instance, people in East Asians tend to use the midpoint in a Likert scale to a greater extent than people in Western countries such as U.S., Canada and Australia (C. Chen, Lee, & Stevenson, 1995; Chun, Campbell, & Yoo, 1974; Dolnicar & Grun, 2007; Watkins & Cheung, 1995; Zax & Takahashi, 1967). Therefore, future research can further explore the use of an alternative response format in measuring performance in cross-cultural contexts, so as to examine whether changing the format, size, and content of scale can lead to changes in criterion-related validities, and whether such changes are moderated by cultural factors.

8.4.3. Cross-cultural issues

While this thesis is not a direct investigation of cross-cultural issues, it is necessary to recognise that the theoretical underpinning of the personality and performance measures being used here is mostly Western-based. Since all the data of this thesis were collected from China, it may be of concern as to whether Western-derived theories and related measures can be readily and directly applied to other cultural contexts.

In terms of personality, the Big Five structure emerged from a lexical approach by collating and sorting personality-related adjectives in the English dictionary (Allport & Odbert, 1936; Cattell, 1943; Fiske, 1949; Norman, 1963, 1967; Tupes & Christal, 1992). There thus remains the question of whether the words used to describe personality in the English language can identically represent the words people use to describe personality in other cultural contexts. Empirical studies show mixed findings on this issue. On the one hand, using the Western-developed instruments such as NEO-PI, scholars have found that the Big Five structure is not only present in the U.S. but also in dozens of other countries (McCrae & Antonio, 2005; McCrae & Costa Jr., 1997), including China (M. C. Chen & Piedmont, 1999; Yang et al., 1999), and that even the facet-level structure of Big Five can be replicable in different cultures (Saucier & Ostendorf, 1999). On the other hand, substantial indigenous research has found that different factor structures, ranging from three to seven factors, are present in different cultures (Caprara & Perugini, 1999; F. M. Cheung et al., 1996; Church, Katigbak, & Reyes, 1996; De Raad & Szirmák, 1994; Saucier, Georgiades, Tsaousis, & Goldberg, 2005; Wang & Cui, 2005). In the Chinese contexts specifically, F. M. Cheung et al. (1996) proposed a four-factor structure that consists of factors *social potency*, *dependability*, *accommodation*, and *interpersonal relatedness*. Wang and Cui (2005) used a lexical approach similar to the development of the Big Five, and found that seven factors are at the highest level of generality for Chinese personality. Therefore, it is still inconclusive as to what the most appropriate structure is that should be used to represent Chinese personality, and this thesis may potentially suffer from limitations by assuming that the Big Five structure and the personality measures developed out of this framework can be readily applied in China.

The same logic is applicable to the performance measure. While the development of the Great Eight performance framework and the associated measures as used in this thesis was based on collaboration across researchers worldwide, and was thus proposed to be generalisable across cultures, the majority of empirical data out of which this framework emerged are still Western-based, especially UK-based (Bartram, 2005; Bartram & Martin, 2003). Therefore, to what extent this performance structure can be

applied to Chinese and other cultural context needs to be further studied in well-designed cross-cultural comparative studies.

Besides, the strength and direction of relationship between personality and performance as found in this study may have been affected by culture-specific factors, as certain personality traits and certain performance factors may have been particularly valued and encouraged in the workplace embedded in a particular national and organisational culture context. For instance, in the Chinese culture where harmony seeking and relationship building is commonly expected (Tu, 1985), people may typically expect high level of agreeableness for their colleagues, and if their expectation is not met, they may rate the colleagues' interpersonal performance as particularly poor. The same may occur to other trait – performance relationships. For instance, as self-restraint is regarded as a virtue in China such that controlling own emotions is emphasised (D. Y. H. Wu & Tseng, 1985), the relationship between emotional stability and adaptive performance in China may have been different to the same relationship in a different culture. These arguments suggest that it is necessary to consider such a potential influence from culture on the personality – performance relationships, and this leaves room for future cross-cultural studies.

8.4.4. Other conceptualisations of personality

While this study uses the Big Five framework to conceptualise and measure personality, it is necessary to acknowledge the limitation of this framework and the existence of multiple other alternative approaches in understanding and measuring personality. For instance, some researchers, such as Tellegen and colleagues (Almagor, Tellegen, & Waller, 1995; Tellegen, 1993), have questioned the adequacy of the Big Five, arguing that the Big Five eliminated constructs such as temporary states, including mood and emotional activity. Therefore, Tellgen and colleagues' seven-factor model, which includes a positive valence and a negative valence in addition to the Big Five, may provide a more complete profiling of the personality domain, and may contain information as embodied in the state-level personality as measured in this thesis. Additionally, a typological approach rather than a taxonomic approach (e.g. the Big Five)

is also widely used in personality assessment. This approach posits the fact that people differ in their degree of membership in prototypical personality categories, rather than in the degree of some personality dimensions, thus providing a more person-centred rather than variable-centred approach to personality (Magnusson & Torestad, 1993). The Jung's (1923) psychological types remains a classic in the field and that instruments based on this theory, such as the Myers-Briggs Type Indicator (Myers, McCaulley, & Most, 1985) and Golden Personality Type Profiler (Deitz & Golden, 2004), are widely used in industry. Furthermore, there is a well-established circumplex model that better reflects the interdependent relationships of the Big Five traits (Hofstee & Goldberg, 1992). The Big Five are not orthogonal factors; rather, many individual characteristics tend to fall in the fuzzy areas between the factors (John & Srivastava, 1999; J. A. Johnson & Ostendorf, 1993). By pitting each pair of the Big Five traits to form a circle, these fuzzy, overlapping areas can be well captured and mapped out. Although this line of research is relatively less well explored, there has been evidence to show that the intersection between two traits, such as extraversion and emotional stability, can help predict performance outcomes over and above the two main traits (Judge & Erez, 2007). This suggests that broader utilisation of the circumplex model to capture the fuzzy areas of the Big Five factors may be a promising avenue to enhance predictive validity.

8.4.5. Domains and facets

This thesis focuses on the high-order level constructs in both the personality domain and the performance domain. However, many scholars have indicated that it is necessary to look into facet-level constructs, especially the facets of personality. This is due to that the Big Five may be too broad constructs that mask the important details at fine-grained level (Briggs, 1989; Costa & McCrae, 1995; Costa, McCrae, & Dye, 1991; Goldberg, 1993; Paunonen, 1998), such that real predictive validity is reduced by the use of broad traits (Ashton, 1998; Ashton, Jackson, Paunonen, Helmes, & Rothstein, 1995).

One of the three personality inventories used in this study, the Hogan Personality Inventory, is among those personality instruments that offer better differentiation of the Big Five dimensions at the domain level. In particular, HPI differentiates two facets each

from the broad extraversion domain and from the openness to experience domain. Chapter 7 where HPI was used shows that such differentiation is valuable, as the two facets of extraversion and the two facets of openness indeed showed different relationships with performance outcomes.

Although the main focus of this thesis is on mapping out the relationship between personality and performance at the high-order level, it is useful for future research to look into more specific facets of personality and performance, so as to investigate whether a nomological net at the finer-grained level can also be made. For instance, researchers can conceptually and empirically investigate the relationship between the Great Eight performance framework and the lower-order factor structure of the Big Five, such as the 10-dimension structure proposed by DeYoung, Quilty, and Peterson (2007).

8.5. Practical Implications

This thesis generates a unified performance framework and delineates the relationship between this framework and personality predictors both at trait level and at state level. These findings have several practical implications described as follows.

First, the framework can inform organisations and human resource personnel to develop measures that can comprehensively tap the most critical and fundamental aspects of the performance domain in contemporary work environment. At the moment, there lacks a commonly agreed high-order performance model for organisations to make reference to in developing their company-specific performance measures (e.g. competency models), thus great idiosyncrasies are in place across company-specific performance models. The theoretically and empirically validated performance structure, as proposed in this thesis, allows organisations to rely on a solid, commonly recognised performance benchmark while incorporating the flexibility to derive more specific, finer-grained performance facets according to their specific requirements.

Second, this research suggests that organisations should move beyond the reliance on global performance measures, such as overall job performance, and use more specific performance measures to evaluate their employees' work effectiveness. It is apparent that global performance is a rather insensitive performance measure and could obscure real individual differences in performing on the jobs. Also, global performance tends to greatly depend on job and organisational context, and is thus of limited value in providing generalisable understanding about each employee's ability and work effectiveness. By using specific performance such as the four factors proposed in here, organisations not only obtain more sophisticated knowledge about each employee's performance, but also convey the message of being person-centred, with their intention to understand individual characteristics rather than being merely concerned about employees' overall economic value.

Third, establishing a nomological net between performance and personality can help organisations select and develop talents by personality trait, based on their need for achieving specific performance outcomes. For instance, where organisations intend to recruit employees of whom cognitive and proactive performance is expected (e.g. jobs that require analytical thinking and creativity), they may want to focus on the openness to experience trait rather than other Big Five traits. When organisations intend to enlist people to engage in organisational change projects or to put people into highly stressful jobs, they may need to look for those with high openness to experience and high emotional stability. In this way, we can better match people to jobs through understanding the job requirement and identifying the corresponding personality trait(s). Sometimes more than one performance aspect may be important for a certain job role, in which case appropriate weights should be given to different performance factors to inform the selection process.

Finally, while personality assessment is generally a useful approach in personnel selection, supervisors and managers need to be aware of the limitation of personality traits in predicting their employees' work performance, and need to pay attention to individual employees' momentary behavioural expressions, because the same person can behave and perform rather differently in different contexts. To be able to more

effectively manage employees' performance, managers should not blindly rely on personality profiles as revealed in personality trait assessment; instead, they may need to adopt a more person-centred approach to better understand the specific situations that facilitate or hinder the performance of each subordinate. This requires a substantial amount of observation and interaction for the managers, but is an important pathway to better understand specific subordinates and more effectively manage them.

8.6. Conclusion

This thesis takes a criterion-centric approach that begins its journey from understanding and refining the individual performance domain. I found the existence of a four-factor high-order performance model that can potentially unify performance models developed from different approaches. The four factors discovered, namely, interpersonal, cognitive/proactive, task, and adaptive performance, can be conceptually and empirically related to factors in many other existing performance taxonomies. This suggests the generalisability of these factors, and indicates its potential to be broadly used for profiling the entire performance domain.

To explore the antecedents of this high-order performance model, I linked this model to an established personality model, the Big Five framework and mapped out a one-to-one nomological net. This nomological net can provide a conceptual foundation for future empirical studies investigating personality – performance linkages, such that conceptually related linkages can be targeted in framing research questions rather than simply correlating all personality traits with all performance outcomes. Furthermore, I demonstrated the potential to enhance personality – performance linkages by considering the dynamic perspective in understanding personality. Through a diary study, I disentangled the relationship between personality traits, the cross-time mean and variability of personality states and performance outcomes. The results confirm the merit of state-level constructs in predicting performance.

In conclusion, this thesis presents a criterion- and construct-oriented attempt to understand, measure and predict work performance. It is hoped that the revealed high-order, four-factor performance framework can represent the founding structure of the performance domain, and that future research and practice can rely on this framework to build collective, synthetic knowledge for the purposes of enhancing our prediction of work performance.

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APPENDIX

Appendix A. Sample items of 22 competencies in Universal Competency Framework (UCF)[13]

UCF Dimension	UCF Competencies	Sample item
UCF1 Leading & Deciding	UCF1.1 Making difficult decisions	I am not afraid of making controversial decisions 我不怕做出有争议的决策
	UCF1.2 Coordinating others	Usually I undertake the coordination of the team 我通常担负团队中的协调工作
	UCF1.3 Motivating others	I have trouble getting others to adopt a positive attitude towards their work(-) 我很难让别人以积极的态度对待工作
UCF2 Supporting & Cooperating	UCF2.1 Understanding others	I often observe people very closely in order to understand their behaviour 我常仔细观察他人以理解其行为
	UCF2.2 Acting Ethically	I adhere to ethical principles despite pressure from others 不管外界压力多大，我都恪守道德原则
	UCF2.3 Maintaining good relationship	I try to establish a more personal relationship with work colleagues 我设法与同事建立私人关系
UCF3 Interacting & Presenting	UCF3.1 Networking	People often rely on me to provide introductions to useful contacts 人们常常靠我来介绍对他们有帮助的关系网络
	UCF3.2 Resolving conflicts	I often mediate between colleagues to keep the team in harmony 我常在同事间调停以确保团队和谐
	UCF3.3 Persuading	I can persuade people to do something if I need to 如果需要，我能够说服他人做某事

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[13] Due to all items and the UCF framework being copyrighted by SHL Group Ltd., only one sample item from each scale rather than the entire questionnaire used in the study is provided.

	UCF3.4 Presenting to others	During my presentations, I always find unique ways to grab my audience's attention 演讲时我总能找到独特的方法来抓住听众的注意力
UCF4 Analysing & Interpreting	UCF4.1 Evaluating critically	I spot flaws in an argument 我能识别论点中的破绽
	UCF4.2 Making rational judgment	I attempt to assess matters logically 我力图运用逻辑型思维来评估分析事情
	UCF4.3 Updating specialist knowledge	I always keep abreast of what competitors have on offer 我总是密切关注竞争对手新推出的产品和服务
UCF5 Creating & Conceptualising	UCF5.1 Generating new ideas	I often come up with new approaches to tasks 我常提出新的工作方法
	UCF5.2 Thinking strategically	I always carry out my immediate tasks with a view to the long term 我总是带着长远的眼光来进行当前的工作
UCF6 Organising & Executing	UCF6.1 Planning ahead	I am most comfortable when I have a detailed plan or schedule to follow 我喜欢有详细的计划或时间表去遵循
	UCF6.2 Working systematically	I regularly take time to prioritise my upcoming tasks 我定期花时间安排下一步工作的优先次序
	UCF6.3 Monitoring quality	If a work outcome doesn't meet quality requirements, I clearly point it out to others 如果他人的工作质量达不到要求，我会明确向其指出
UCF7 Adapting & Coping	UCF7.1 Adapting to change	I find change exciting 我觉得改变是件令人兴奋的事情
	UCF7.2 Coping with pressure	Even under pressure I tackle difficult tasks calmly 即使有压力，我也能冷静地解决艰巨的任务
UCF8 Enterprising & Performing	UCF8.1 Striving to achieve	I take on demanding projects to challenge myself 我担负起高难度的任务来挑战自己
	UCF8.2 Develop business opportunities	I am good at identifying business leads 我善于发现商机线索

Note: In supervisor ratings, the items are rephrased in the third person form, i.e. 'I' is replaced by 'he/she'.

Appendix B. Items assessing Griffin et al. (2007)'s performance and global performance

Items in Griffin et al.'s (2007) performance model:

Proficiency	Carries out the core parts of his/her job well. （能出色完成其工作的核心部分）
	Completes his/her core tasks well using the standard procedures. （按照标准流程很好地完成其主要工作）
	Ensures his/her tasks were completed properly. （确保其工作任务能恰当完成）
Adaptivity	Adapts well to changes in core tasks. （能很好适应核心任务中的变动）
	Copes with changes to the way he/she has to do core tasks. （能应对惯用工作方式上的改变）
	Learns new skills to help him/herself adapt to changes in core tasks. （学习新技能以适应核心工作上的变动）
Proactivity	Initiates better ways of doing his/her core tasks. （主动寻求更好的方式来完成其核心工作任务)
	Comes up with ideas to improve the way in which his/her core tasks are done. （想出办法使完成工作的方式得到改进）
	Makes changes to the way his/her core tasks are done. （对完成核心工作的方式方法做出改变）

Items assessing global performance as selected from Robertson et al. (2000):

Overall job performance	Fulfils all the requirements of the job. （能完成工作上的所有要求）
	Competent in all areas of the job. （能胜任工作所涉及的所有领域）
	Performs well in the job overall. （工作的总体绩效很好）
	Accomplishes all that is required in the post. （能完成其职位所要求的一切工作）
Promotability	Meets the criterion for promotion. （具备升职所需的条件）
	Seems likely to rise higher in the organization. （有希望在公司里升到更高职位）

Appendix C. Occupational Personality Questionnaire (OPQ) scales mapped onto Big Five traits

Big Five	OPQ32 Scales
Extraversion	Outgoing
	Affiliative
	Socially confident
	Persuasive
	Controlling
	(-) Emotionally controlled
Openness to experience	(-) Conventional
	Conceptual
	Variety seeking
	Innovative
	Behavioural
Emotional stability	Relaxed
	(-) Worrying
	Tough minded
	Optimistic
	Socially confident
Agreeableness	Caring
	Trusting
	(-) Competitive
	Democratic
	(-) Independent minded
Conscientiousness	Conscientious
	Detail conscious
	Vigorous
	Forward thinking
	Achieving

Note:
a) This mapping is provided by Bartram & Brown (2005);
b) (-) indicates a reversed relationship between the facet and its Big Five domain;
c) Socially confident is a facet of both extraversion and emotional stability.

Appendix D. 22 UCF competencies mapped onto four high-order performance factors

High-order performance	UCF competencies
Interpersonal	UCF1.2 Coordinating others
	UCF1.3 Motivating others
	UCF2.1 Understanding others
	UCF2.3 Maintaining good relationship
	UCF3.1 Networking
	UCF3.2 Resolving conflicts
	UCF3.3 Persuading
	UCF3.4 Presenting to others
Cognitive/Proactive	UCF1.1 Making difficult decisions
	UCF4.1 Evaluating critically
	UCF4.3 Updating specialist knowledge
	UCF5.1 Generating new ideas
	UCF5.2 Thinking strategically
	UCF8.2 Developing business opportunities
Task	UCF2.2 Acting Ethically
	UCF4.2 Making rational judgment
	UCF6.1 Planning ahead
	UCF6.2 Working systematically
	UCF6.3 Monitoring quality
Adaptive	UCF7.1 Adapting to change
	UCF7.2 Coping with pressure

Note: This mapping is based on ESEM results in Table 5.7. The most consistent results across self- and supervisor-ratings were selected to derive this mapping.

Appendix E. Unstandardised estimates of indirect effects with bootstrapping results

	Unstandardised Estimate			Bootstrap (95% CI)	
	Point estimate	S.E.	Z	Lower	Upper
Model 2 – only indirect effects					
OJP					
Conscientiousness – Task – OJP	.075	.036	2.083*	.017	.158
Emotional stability – Adaptive – OJP	.042	.025	1.683[+]	.009	.111
Promotability					
Extraversion – Interpersonal – Promotability	.162	.064	2.548*	.047	.297
Agreeableness – Cognitive/Proactive – Promotability	-.066	.067	-.977	-.193	.074
Openness - Cognitive/Proactive – Promotability	.131	.045	2.888**	.045	.224
Revised model					
OJP					
Conscientiousness – Task – OJP	.099	.039	2.526*	.035	.195
Emotional stability – Adaptive – OJP	.061	.030	2.008*	.018	.135
Promotability					
Extraversion – Interpersonal – Promotability	.298	.117	2.545*	.082	.542
Agreeableness – Cognitive/Proactive – Promotability	-.063	.047	-1.346	-.176	.009
Openness - Cognitive/Proactive – Promotability	.106	.039	2.720**	.037	.189

Note:

a) 1,000 bootstrap samples;

b) ** $p < .01$, * $p < .05$, [+] $p < .10$;

c) A 95% Confidence Interval (CI) that does not contain 0 indicates significant indirect effect.

Appendix F. Items in Daily Behaviour Questionnaire (DBQ)

General instruction to participants: Please recall and reflect on your actions and behaviours yesterday. Did you experience or behave as described in the following statements? (Consider all contexts, e.g. school life, at work, family life etc).

Response Scale: YES / NO

Daily Neuroticism:

Felt anxious about things that needed to be done; Experienced a lot of stress; Acted moody; Complained about a problem I was having; Felt sad.

Daily Extraversion:

Talked a lot; Took the lead in organizing a project or activity; Expressed my own opinion; Felt cheerful and happy; Went out to socialize.

Daily Openness:

Thought about my emotional reactions to something; Listened to or read with interest a news story about another country; Listened with interest to someone whose values or beliefs differed from mine; Tried out a new activity/approach for the sake of doing something different; Discussed an issue from all points of view.

Daily Disagreeableness:

Criticized someone; Made a decision without consulting the others involved; Got into an argument; Had doubts about someone's honesty; Felt someone betrayed my trust.

Daily Conscientiousness:

Checked out every detail on a task I completed; Put my stuff neatly away; Did an important task well; Finished everything I planned to do; Reflected on the consequences of an action before going ahead with something.

Note: These 25 items were selected and adapted from the DBQ developed by Church et al. (2008). The selection and adaptation process is described in Section 7.3.2.2 of Chapter 7.