THE ROLE OF PERSONALITY COMPOSITION ON TEAM

CREATIVITY AND INNOVATION

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Dedicated to Refik and Şefik, my grandparents and role models

ABSTRACT

There is a growing interest in the literature on personality composition at work and its role in teamwork. The investigations undertaken, mainly focus on combinations of personality traits and their impact on general team performance. However, the influence of personality composition on creative and innovative performance of teams is not well covered within the literature. Thus, this research aims to investigate the role of personality composition on team creativity and innovation.

This thesis consists of two separate studies, both of which mainly examine the influence of personality composition – average levels and variability within teams – on team creativity and innovation. The first study focuses on the direct relationship between "big five" personality traits (openness to experience, conscientiousness, extraversion, agreeableness and neuroticism) and the creative performance of student teams in both short and longer period of time, addressing the research question, *how does student team personality composition relate to the creative performance of a student team*?

The second study, on the other hand, examines the interplay between personality traits (not only the Big Five, but also the Dark Triad that includes Machiavellianism, narcissism and psychopathy), team processes and team innovation in a knowledge intensive R&D context. Stated briefly, organizations operating in a knowledge intensive context are different in many ways from traditional firms and employ knowledge workers who are highly educated and well-qualified experts. These workers are responsible for innovative outcome through working in teams (Newell, Robertson, Scarbrough and Swan, 2009). The research questions of this study are*, how does knowledge worker team personality composition relate to the innovative performance of a knowledge worker team? and to what extent is the relationship between personality traits and innovative performance of a knowledge worker team explained (mediated) by innovation related group processes?*

An Input-Process-Output (IPO) model of team innovation is the main theoretical framework that is used to conceptualize the relationship between inputs (big five personality traits) and outputs (student team creative performance) in study 1. Additively, the same framework used to conceptualize inputs (Big Five and Dark Triad personality traits), processes (innovation related team processes) and output (knowledge worker team innovative performance) in the second study (Hulsheger, Anderson and Salgado, 2009). For instance, within the second study, if mean level conscientiousness is high in a particular knowledge worker team it can be expected that the team is task oriented and therefore innovative.

Data for the Study 1 was gathered from undergraduate students operating in teams while Study 2 was conducted with knowledge workers working in teams; both studies used quantitative methods, specifically questionnaires. Creative and innovative team performance were assessed by external judges (the module leader in study 1, and managers in study 2). The results do not indicate any significant relationship between team creativity and innovation in either study. However, there are considerable associations particularly between personality traits and innovation related team processes in the latter study, and the findings are discussed within the thesis.

It is believed that the theoretical findings of this study will help researchers to build further on understanding the relationship between team personality composition, creativity and innovation. In addition, the practical implications will help decision makers to select appropriate group members to foster creativity and innovation within teams.

ACKNOWLEDGEMENTS

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ACRONYMS

KWT	**Knowledge Worker Teams**
TWT	**Traditional Work Teams**
IPO	**Input-Process-Output Framework**
KIF	**Knowledge Intensive Firms**
EFA	**Exploratory Factor Analysis**
CFA	**Confirmatory Factor Analysis**
STF	**Short Time Frame**
LTF	**Long Time Frame**

CHAPTER.1: **INTRODUCTION**

In today`s new era, creativity and innovation are seen as particularly salient to society and its development. Globalisation brings its own opportunities and challenges together, and the environment in which the organisations operate, interact and compete is becoming more dynamic and fast moving. Therefore, governments, profit and non-profit organisations are searching for new ways in which to be adaptive and agile in such changeable and highly competitive environments.

Within the conditions of increasing complexity and transformation, effective teamwork is seen as one of the most crucial response and success factors for organisations. Agencies are also well aware of the benefits of collaborating with individuals in order to flourish through novel ideas, and to create value from those ideas. Therefore, organisations are increasingly designing team-based structures in order to be able to increase collaboration within, and even outside the organisation, and to respond to changes within the competing environment. Scholars estimate that four out of five organisations that have more than 100 employees utilise teamwork in their everyday operations (Osterman, 1994; Cohen and Bailey, 1997). For instance, studies within the UK have found that around 70% percent of organisations use teams (Waterson et al, 1997; Cully et al, 1999). Another key finding is revealed by Offerman and Spiros (2001) who found that managers spent 40% of their time on dealing with teams they are responsible for.

Indeed, organisations use teams to achieve different targets, such as productivity, completion of market research, product sales or innovation. In particular, in response to the increasing competition and complexity fostered by globalisation and technological developments, organisations need to introduce new means of operation to be able to survive and compete (Bessant and Tidd, 2011). In other words, innovation is increasingly becoming one of the top

priorities of organizations to compete in today's dynamic and fast-moving business environment. In this sense, teams are seen as a crucial structural and strategic solutions required in order to be innovative. In teams, instead of individuals responsible for separate tasks, groups of individuals come together and combine their efforts to tackle complex problems and devise creative ideas and innovative solutions. As a result, creativity and innovation within organisations could be achieved by teams (Henry, 2001; Caldwell and O'reilly, 2003, Nijstad and Levine, 2007; West, 2012).

As stated above, innovation is one of the most important effectiveness criteria for organisational teams operating in challenging and innovation-oriented context. In this regard, one effective way to conceptualize innovative effectiveness is to adopt the Input-Process-Output (IPO) framework. This framework was developed by McGrath in 1964, and then refined by Hackman and Morris in 1975; it was actually applied to team creativity and innovation field by West and Anderson in 1996. In fact, this theoretical framework has been used for conceptualising the relationship between input and process factors which are related through innovation.

Researchers, managers and employees determine various input factors (reseources, managerial suport, knowledge skill and abilities of members) which can assist teams in being innovative within organisations (West, 2002). Team composition is one such input factor, and it refers to mixture of members' attributes in a team setting). Team composition is seen as vital for teams to reach their goals and it attracts both researchers and practitioners' attention as a means of promoting effectiveness in teams (Kozlowski and Bell, 2003). There are certain member characteristics divided as surface and deep level attributes that are explained in detail within a related section 1.3. Relatedly, the focus of this thesis is on personality composition that is categorized under deep level constructs (Bell, 2007). In fact, recent research that combines

psychology and organisational studies, stresses the importance of the personality composition of teams and its effects on team outcomes. However, there has not been sufficient focus on this relationship between team personality composition and innovative performance and it is crucial to understand the effect of psychological factors like personality composition on complex tasks such as creativity and innovation (Bechtold, De Dreu and Nijstad, 2007). This thesis specifically focuses on the creative and innovative outcomes of teams, and will investigate the influence of personality composition on such outcomes. In other words, the main question for this research is "*how personality composition relates to team creativity and innovation*".

In this research project, the relationship between personality and team creativity, as well as innovation, is analysed through two distinct parallel studies, each of which will be conducted in a different context. The initial study probes the association between Big Five personality traits (inputs) and the creative performance of the student teams (outputs). By doing so, Study 1 adresses the question of whether the impact of personality on team creativity changes over time. Thus, the intention of this study is to extend existing knowledge as to the extent that personality composition influences team creativity over a longer period of time, as previous studies have mostly investigated the interplay between personality and team creativity over shorter time spans (e.g., in a single session). The latter study, on the other hand, goes well beyond the previous studies, and, indeed, beyond Study 1, by exploring the "Big Five" and "Dark Triad" personality traits (inputs) and their effects on team innovative performance (output) through innovation-related group processes. To this end, Study 2 aims to enhance our understanding of the role of personality traits on team innovation by extending the field to a previously unexplored area (to the best of our knowledge). Table 1.1 presents the research questions based on the relationship types amongst variables.

Table 1.1: Summary of Relationships and Research Questions Addressed in This Research

RELATIONSHIP TYPE	RESEARCH QUESTIONS
Direct Relationship	*Is there any relationship between the mean level of personality traits and both team creativity and innovation?*
Mediating Relationship	*How is the relationship between personality traits and both team creativity and innovation explained by team process variables?*
Moderating Relationship	*How does variability in personality traits affect the relationship between mean level personality traits and both creativity and innovation in teams?*

Based on the research questions above, this research has four subsidiary objectives:

1) *This thesis includes two distinct studies undertaken in different contexts in parallel. The first study is conducted in a module that is artificially designed by the module leader whereas the latter study is conducted in real knowledge intensive R&D organisations. To this end, this research will investigate the extent to which the context has an influence on team creativity and innovation.*

2) *As the title suggests, this thesis will aim to determine whether personality has an influence on team creativity and innovation. On this basis, the first study focuses on the direct relationship between the big five personality traits (input) and creative performance of student teams (output). For the second study, the main objective is to examine the impact of the Big Five and Dark Triad personality traits on innovative performance of knowledge worker teams.*

3) *With regards to mediating relationships, current research also investigates the mediating role of team process varaibles on the association between personality traits and creativity as well as innovation related outcomes. In this respect, whilst Study 1 investigates the intervening role of*

team trust, Study 2 examines the intervening role of innovation related team processes on the relationship.

4) *Present thesis not only aim to explore the impact of mean level personality on team creativity and innovation but also investigate the moderating influence of variability in personality on the association between mean level personality and team creativity and innovation.*

5) *The final motive of this thesis is to understand whether the existing findings in the literature on the relationship between personality composition and general performance informs as to the influence of personality on team creativity (study 1) and innovation (study 2).*

1.1 TEAMS

In today's world, with the effect of globalisation and technological developments, borders between countries (particularly in terms of business) are disappearing, markets are expanding such that they cover not only their local countries but also other countries and even continents. Thus, markets are becoming worldwide (Mead and Andrews, 2009). As a result of these changes, organisations are expected to adapt the new rules of the dynamic and global environments. Competition is fierce and innovation is one of the core strength factors for many organisations operating in complex environments (James, 1997). Hence, in many situations, organisations are encouraged to benefit from teams rather than individuals (Curral, Forrester, Dawson and West, 2001). It is also believed that in some situations teams as a group of people can accomplish better results than one individual can when working alone, and team-based working can meet the workers' needs while increasing productivity (George and Jones 2005;

Doorewaard, Hootegem, Huys, 2002; Richter, Dawson and West, 2011). As a result, there has been a considerable increase in teamwork usage throughout the recent decades (Richter et al, 2011).

1.1.1 What is a team?

There is no universally agreed definition of a "team"; instead, there are many different definitions in the literature. However, these definitions have some consistent characteristics of teams. These characteristics can be listed as shared common goals, shared responsibility and identity, working closely together in small numbers, mutual influence and interdependence (as shown in Table 1-2) (Proehl, 1997; Johnson and Johnson, 2000). On the other hand, there are also inconsistencies in the literature according to the skills, authority and temporal stability of the members within teams (Hollenback, Beersma and Schouten, 2012). For instance, in their recent paper, Hollenback et al. (2012) determined 42 different team types, which have different definitions and characteristics.

Table 1.2: Team Definitions That Have Certain Characteristics

Author(s)	Definition	Common Characteristics
Salas, Dickinson, Converse, Tannenbaum (1992)	A team is ''a distinguishable set of two or more people who interact, dynamically, interdependently, and adaptively toward a common and valued goal/objective/ mission, who have each been assigned specific roles or functions to perform, and who have a limited life-span of membership'' (p. 4).	1) Membership was stable over time 2) Mutual responsibility and interdependence
Richardson, West and Cuthbertson (2010)	A team is "a group of people working together in an organisation…who are committed to achieving team-level objectives upon which they agree; who have to work closely and interdependently".	3) Membership was assigned only or primarily to that team
Kozlowski and Bell (2003)	Teams as collectives ''who exist to perform organisationally relevant tasks, share one or more common goals, interact socially, exhibit task interdependencies, maintain and manage boundaries, and are embedded in an organisational context that sets boundaries, constrains the team, and influences exchanges with other units in the broader entity'' (p. 334).	4) Shared common goals and responsibilities 5) Defined roles and tasks

People in organisations, particularly managers, usually use the term "team" arbitrarirly and then it becomes more difficult to understand what the team really is. Groups or other collectives or the entire organisations can practice teamwork yet they are not equal to teams (Lyubovnikova, West, Dawson and Carter, 2015; Allen and Hecht, 2004). In their famous book *The Wisdom of Teams* Katzenbach and Smith (1993a, p.21) define "teamwork" as a *"Set of values that encourages behaviours such as listening and constructively responding to points of view expressed by others, giving others the benefit of the doubt, providing support to those who need*

it, and recognizing the interests and achievements of others." If organisations practise such attitudes, both individuals and the organisations as a whole can operate more effectively. Teamwork values do not only cover teams, they can work for any groups, department and whole organisation. However, these values are not enough to become a team and perform as a team (Katzenbach and Smith,1993a). Groups need to have several common characteristics (as aligned above) to be considered as a team.

Firstly, having shared common goals is one of these crucial characteristics of teams (Lyubovnikova et al, 2015). In teams, members often have difficulties in reaching to a consensus on the targets and purposes; therefore, someone (e.g. team leader, outside manager etc.) needs to set the direction for the teams. This direction should be clear enough for teams to determine their goal, and flexible enough to be adjustable by the team members (Hackman,1990). Teams often spend more time in determining their compelling mission and this will give energy and meaning to the job that the team members deal with. For effective teams the main purpose is vital to be successful. Hence, they don't just determine it they also discuss it as the process continues and, if necessary, revise and change it. To reach that main purpose, teams need to set related specific performance targets that assist teams to focus on results and help team members to be aware of the team`s position during the process. (Katzenbach and Smith, 1993a).

Secondly, team members need to develop a common approach and a mutual responsibility. Common approach indicates the ways in which team members act towards the main purpose of the team. Each member brings his/her own strengths and weaknesses to the team and through mutual understanding and adjustment a team can develop a common approach and distribute tasks effectively (Katzenbach and Smith,1993a). Mutual responsibility arises through

commitment and trust among members. It can be thought of as the result of proper team purpose and joint approach that are determined by members themselves. In other words, it can be said that if mutual responsibility, trust and commitment are high in groups, this means that they have an adequate common purpose and approach that make them a real team (Kozlowski and Bell,2003; Katzenbach and Smith, 1993a).

Thirdly, teams need to consist of people whose skills are complementary in order to work effectively. For instance, technical, communication and problem-solving ones are the prominent skills that teams generally need for effectivity (Larson and Lafasto, 1989). However, the required skills may change depending on the task, and the context in which the teams are operating (Curral et al, 2001). As the tasks change, the teams should adabt either by having the right members for the task or developing the right skills. Hackman (2009) states that good teams are the ones that learn and develop the missing skills, which could happen through high level of quality interaction and knowledge sharing within the team.

Fourthly, teams have boundaries and work in a larger social system (e.g., in a department or organisation), and its main components technology, structure, culture, strategy, and leadership has an impact on the teams` internal and external interactions. (Hackman,1990, Kozlowski and Bell, 2003). However, their interactions with the environment may depend on the teams' task and responsibilities. For instance, a team that operates in an assembly line may, at most, interact with the other people in the operations department in daily work time. However, a team that operates in a marketing department and deals with the marketing strategy of the organisation may need to communicate with various outsiders and shareholders (Ancona and Caldwell, 1992).

Figure 1.1: Main Characteristics of Teams Involved in This Research
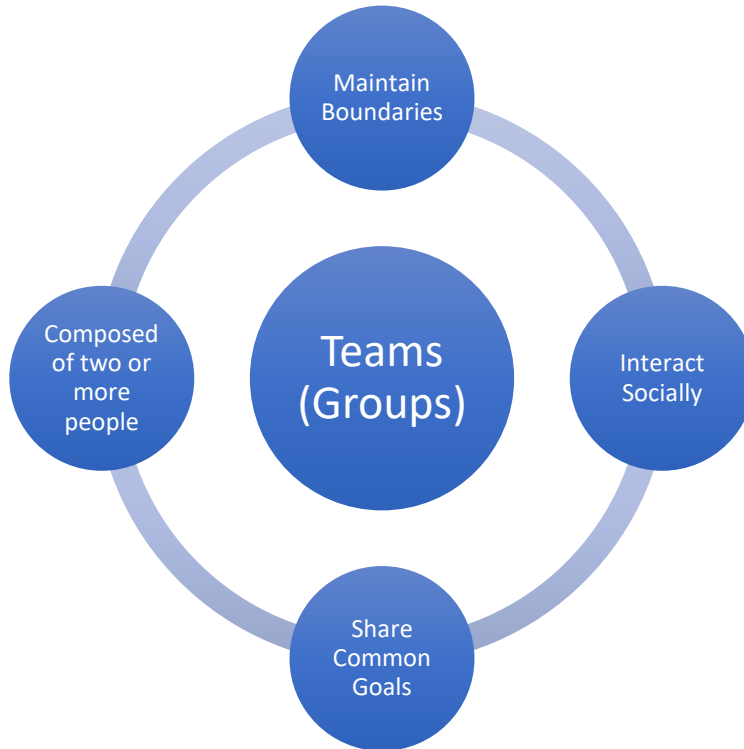
It is also crucial to add that, firms in Western countries tend to give more chance to individualistic structures rather than team-based ones because of the culture and its emphasis on individualism. However, organisations in some situations need to overcome these tendencies and use teams effectively to gain competitive advantage (Katzenbach and Smith, 1993a). In teams generally, the individuals` performance and tasks become a matter for the team rather than supervisors and managers since mutual responsibility of team members automatically generates a concertive control among team members (Barker, 1993). Management`s approach to the team is really critical and teams need to be considered and assessed as a complete unit rather than individuals working together. In other words, as Hackman (2009) argues, the focus needs to be on teamwork processes rather than the individuals.

Given the common characteristics above, some researchers have started to argue that it is time to reconsider the definitions of teams and there is a need to update the definitions according to changes in the organisations and their approaches to teamwork (Murase, Doty, Wax, Dechurch and Contractor, 2012). Particularly in the last two decades, competitive markets have become more innovation driven and organisations have redesigned their structures and strategies to become more creative and generate value from innovation (Tissen, Andriessen and Deprez; 1998). Innovation requires adaptability, knowledge-sharing and collaborative cognitive efforts. Therefore, shifting to team-based work and flourishing interaction among individuals has become a necessary movement. In fact, it is argued and supported by research that having creative and focused teams is essential for organisations to innovate and become successful (Caldwell and O'reily, 2003; Drach Zahavy and Somech, 2001; Fay, Shipton, West and Patterson, 2015). Thus, in today`s fast-moving sectors, owing to the competitive pressures and drive for creativity and innovation implementation, teams are used by many competitive companies to become more agile, responsive and leaner (Mathieu, Maynard, Rapp and Gilson, 2008; Somech and Drach, Zahavy, 2013). In some cases, teams are formed in a planned and systematic way, in other cases teams are composed in a more haphazard, informal and quick way. Teams are formed, redesigned and disbanded quicker than ever (Tannenbaum, Mathieu, Salas, Cohen, 2012; Edmondson, 2012). As this research aims to shed light on team creativity and innovation-related research it will be more useful to use definitions that are simple, flexible and easy to understand to present and embrace teams operating on complex tasks. Therefore, teams can be defined as "*groups of people who interact socially and perform tasks to achieve mutually shared goals*" (West, 2012). Notably, the terms "group" and "team" will be used interchangeably. Therefore, the main characteristics of teams in this research context are shown in the Figure 1.1 above (Kozlowski and Bell, 2003).

1.1.2 What are the benefits of teams?

The team literature suggests several benefits of turning to a team based approach. The most prevailing ones are flexibility and quick responses to changes in environment, helping organisational development processes, innovation and creative problem-solving, (Hackman 1987; Curral et al, 2001; Clegg, Pitsis and Cornberger, 2009). The team ideology receives enormous support from many researchers all around the world. Teams are represented as multiple satisfying tools of everything from individual needs to organisational needs (Sinclair, 1992).

What is more, teams can be a crucial weapon for organisations to gain competitive advantage, particularly for the ones that operate in really challenging sectors, because of their agility and speed. In effect, they rapidly get together, work together and disband (Kozlowski and Bell, 2003; Katzenbach and Smith, 1993a). They assist behavioural change and give way to individual learning. More to the point, teams can give quick responses to customers' reactions, industry moves and new trends and thus have a significant impact on organisational effectiveness and development (Hackman, 2009).

Moreover, there are positive psychological effects of teams on team members. Becoming a member of a team can sometimes be fun and therefore help to decrease the level of stress and work pressure (Katzenbach and Smith, 1993b). Besides, being a part of a social group can help individual members to socialise and increase their self-esteem, which may cause members to derive satisfaction from teamwork and adapt quickly (Allen and Hecht, 2004, Blair, 1991).

1.1.3 The Dark Side of Teams

While research suggests benefits of teams, some studies that have been carried out to assess effectiveness of teams in organisations do not seem to support teamwork and its wide range of benefits (Locke, Tirnauer, Roberson, Goldman, Latham, Weldon, 2001; Glassop, 2002). These researchers argue that, teams can also be counterproductive. Add to this, interpersonal psychological issues among team members can take significant time and resources of management (Clegg et al, 2009). Hence, in order to benefit from team work, organisations need to be managed carefully and effectively so that team-based structures can push organisations to productive and innovative ends (West, Brodback and Ritcher, 2004).

Lately, there has been a tendency to disguise the dark side of teams within the literature and this has been criticised by a number of scholars (Sinclair, 1992; Allen and Hatch, 2004; Naquin and Tynan, 2003). For instance, the critical review about organisational teamwork within the literature, scholars posited that, teams could also be counterproductive however both scholars and practioners seems to perceive teams as a lot more effective (Allen and Hatch, 2004). As a result, teams are presented as vital tools for organisations. Moreover, in many situations organising around teams or using teams to solve particular problems are seen as indispensable receipts for both individuals and orgnisations. On this matter, I agree with the argument that teams can indeed be beneficial but not all the time or in every situation (Hackman, 2009). Nevertheless, team framework has dominating effects on both scholars and practitioners (managers, decision-makers etc.) (Allen and Hecht, 2004). As a result, there is a significant focus on the benefits of teamwork.

However, managers or strategic decision-makers in organisations have to consider the other concealed sides of teams. According to Sinclair (1992), using teams in an organisation helps to hide coercion, conflicts, conformity, delayed actions, expedient arguments etc., and teams are also used due to lack of leadership. What is more, although many management and organisation scholars claimed that teams help to increase their members' motivation, the research showed the opposite (Nadler, Hackman and Lawler, 1979). In fact, it is argued that teams can increase the tension and stress between insiders of the group (Sinclair, 1992). Therefore, it is crucial for organisations to consider the negative sides of teams and think about the problems (discussed above) that can be created by team-based work types. Although, both in theory and practice teams are seen as indispensable tools for innovation, bringing various types of people together in teams may need conscientious consideration.

As a result, effective management and composition of teams is crucial for innovation and creative problem-solving (Larson and LeFasto, 1989). In this regard, heterogeneous groups that consist of members who have complementary skills and knowledge, can be particularly helpful units for creative problem-solving, and innovation. Since, teams increase interaction and knowledge-sharing and therefore cultivate new knowledge creation (Newell, Robertson, Scarbrough and Swan, 2009). To this end, organisations competing in innovation and new knowledge-creation oriented sectors need to consider composing teams in an effective way (West, 2012). Additively, considering the personality composition during the team formation process is argued and found to be important for the team performance (Mohammed and Angel, 2003; Bechtold et al, 2007). Accordingly, in this research the influence of personality on team creativity and innovation is in question.

1.2 PERSONALITY AND RELATED FRAMEWORKS

Pervin (1980) defines personality as *"individuals' unique and stable pattern of thinking, feeling, acting and reacting to his or her social environment"* (cited in Bechtoldt, Dreu and Nijstad; 2007). In addition, trait theories take these individual differences in behaviour, thought and emotions all of which can be explained and described by personality traits (Woods and West, 2010). For instance, some individuals value building trustable relationships with others in their social environment, while others prioritise self-enhancement and therefore seek for more status and power (Bechtoldt et al, 2007). As these traits have an impact on the individuals' interactions with others, trait approaches to understand and categorise individual characteristics have drawn the attention of many social scientists (Arnold and Silvester, 2004). Drawing from here, it is argued that the personality traits also have influence on the work-related attitudes and relationships of the individuals (Barrick and Mount, 1991). Accordingly, personality has been considered as a potential predictor of job performance since the early stages of research and it has been used principally for personal selection to firms, departments or teams (Muchinsky, 2006; Chmiel, 2008). In their study, Dunn and his associates (1995) also underlined the importance of personality traits in managerial issues (Dunn, Mount, Barrick and Ones, 1995).

Research related to personality composition and team performance has its roots back in 1950s. For example, in 1959 Mann's review on the impact of personality on team outcomes involved 7 personality traits that are; intelligence, emotional adjustment, masculinity, interpersonal sensitivity, dominance, extraversion and conventionalism (LePine, Buckman, Crawford, Methot, 2011). On the other hand, another review paper published by Richard Heslin in 1964 in which he identified 5 individual traits involving; extraversion, authoritarianism, adjustment, dominance, member ability and all other category (Heslin, 1964). In addition, in late seventies a creative

personality measurement was developed by Harrison Gough (Gough, 1979; Feist, 1998). Although this scale measures creativity potential of the team members it consists of only one item (trait) which is called as "creative personality" (McCrae, 1987). In fact, in early years the lack of a guiding typology to organize the personality measures particularly in group studies caused a considerable inconsistency among the research results (Driskell, Hogan and Salas, 1987 cited in Neuman, Wagner and Christiansen, 1999). However, when it comes to 1990s research has managed to generate a number of consistent frameworks that effectively conceptualise the dimensions of human personality (Arnold, Silvester, 2005). Starting from 1990s The Big Five personality traits framework has become the most accepted and well-used approach that has its roots in personality traits theory (McCrae and Costa, 1992). This typology has mostly undertaken the guidance and organization of multitude of personality traits in an inclusive way (Neumann et al, 1999). On the other hand, once again in 1990s the increase in the competition and necessity for the flexible and adaptable work force in oder to react effectively to the dynamic environment the use of teams has increased in organizations (Devine, Clayton, Philips, Dunfort and Melner, 1999; Curral et al, 2001). As a result, the interest on the factors that affect team performance started to increase (Hackman, 1990). As a result of the confluence of two trends the Big Five framework has started to dominated the team personality and performance related research (Lepine et al, 2011). As awidely used and widely accepted taxonomy this research uses "Big Five" framework in order to conceptualise personality in two distinct teamwork contexts in Study 1 and Study 2.

The "Big Five" taxonomy is based on a comprehensive review and arises through a compilation of a large number of personality traits revealed in previous research (Woods and Hampson, 2005). This approach involves five distinct personality factors namely; openness to experience, conscientiousness, extraversion, agreeableness and neuroticism, which can be representative

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in a research project (Costa, McCrae, 1988). Every individual's personality can be described with one of the Big Five personality factors and each dimension is a continium in itself such that there is an opposite end for each Big Five construct (Peeters, Van Tuijl, Rutte and Reymen; 2006).

1. Openness to experience, as a first dimension, refers to people who are intellectual, imaginative, broad-minded and curious. These kinds of people are tolerant of ambiguity and willing to experiment and try new things.

2. Conscientiousness refers to the extent to which a person is responsible, careful, hardworking and able to plan. Conscientious people are intrinsically motivated and willing to overcome obstacles that they encounter.

3. The third personality aspect is extraversion. Researchers define extroverts as talkative, assertive, adventurous and energetic. Confidence, in particular, is the dominant component of extraversion.

4. Agreeableness defines the people who are good-natured, flexible, cooperative and reliable. These people are good team players because they can easily work with other people and are open to different ideas.

5. The final dimension of personality is neuroticism. People who are high in neuroticism are defined as anxious, emotional, defensive and sometimes depressed (Mohammed and Angell,

2003; Peeters *et al*, 2006; Van Vianen and De Dreu; 2001; Phillips and Loyd, 2006; Taggar, 2002).

It has been claimed that personality plays an important role for individuals in terms of gaining social status, securing their place within the group, or increasing interactions with other people. For some people, being agreeable, conscientious or extrovert is the means by which to gain a place in society, while for others, arrogance, manipulation or aversive strategies help secure their statuses (O'Boyle *et al.*, 2012; Jonason, Li, Webster, Schmitt, 2009). This thesis will also explore the second type of personality trait including: "Machiavellianism, narcissism and psychopathy" which are combined under the roof of the so-called "Dark Triad" framework. In effect, these three Dark Triad personality traits have attracted the significant empirical attention and have the representative power of socially aversive personality characteristics (Furnham, Hardand, Paulhus, 2013). To put it differently, these characteristics are more-or-less related to self-promotion, emotional coldness, duplicity, and aggressiveness (Paulhus and Williams, 2002). Dark Triad personality traits are defined as the "Personality traits that fall between normal (ex: Big Five) and abnormal (borderline personality disorder) personality characteristics" (Harms and Spain, 2015; O'Boyle et al, 2012). Additionally, Paulhus and Williams (2002) used the "Dark Triad" term for these three characteristics, and indicated that the Dark Triad characteristics exemplify people who have a "*tendency to be callous, selfish, and malevolent in their interpersonal dealings*" (p. 100). At this point, it is worthwhile noting that in contrast to the Big Five, the Dark Triad personality traits have received little attention amongst workplace investigations. Hence, the present research also uses the Dark Triad taxonomy in order to better understand the personality related issues in organizational phenomena. More specifically It measures the influence of not only bright, but also dark, personalities on innovative performance to enrich the stream of team personality composition related research.

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1.3 TEAM PERSONALITY COMPOSITION AND DIVERSITY

As teams are essential to the adaptable and innovative capacity of organisations, composing teams with the appropriate configuration of attributes in order to achieve high performance has drawn the attention of both researchers and practicioners alike (Kozlowski and Bell, 2003). Additionally, its members are the most important source of any team, and events within teams can very often be related to the individuals composing the group. Therefore, scholars acknowledge team composition, and its influence on teams, as being one of the most important factors requiring investigation, particularly in terms of understanding its efffects on team effectiveness (Levine and Moreland, 1990; Bell, 2007). Recently, research on team composition and its influence on performance has been categorised into two types of team members attributes called the surface level and deep level compositions (Phillips and Loyd, 2006).

Surface level composition generally refers to any immediately apperent characteristics of the individual members of any team such as age, gender, ethnicity, etc. In contrast, deep level composition includes variables as knowledge, skills, experience, and the personality characteristics of the individuals (Harrison, Price and Bell, 1998; Phillips and Loyd, 2006). There have been many studies conducted in the area of diversity of surface level composition in teams and its impact on team performance. However, the results reported are, in general, inconsistent with each other. On the other hand, research on deep level composition and its effects on team performance suggests a comperatively stronger influence then surface level characteristics (Harrison, Price, Gavin and Florey, 2002; Hollenback, DeRue and Guzzo, 2004). Given this, however, the field of deep level composition variables and team outcomes is still developing, and consequently there are still significant gaps that need to be filled by further studies (Bell, 2007).

Given the importance of deep level composition variables on team-related outcomes, personality - as a deep level construct - and its impact on team outcomes has also drawn scholars' attention. The personality traits are in fact patterns of thinking, feeling and acting amongst team members, and the configuration of these characteristic features have been found to have a significant impact on team dynamics and performance (Bell, 2007). Composition of personality in a group setting describes the team level index of personality traits that reflects the mean or diversity level of a particular trait within a team (Prewett, Brown, Goswami and Christiansen, 2016). Scholars have investigated team personality configuration and team performance as multilevel constructs such that individual level traits are also agrregated at the team level in order to observe the influence of team level personality on group performance (Lepine, Buckman, Crawford and Methot, 2011). However, when it comes to team creativity and innovation the gaps exists in terms of the role of input factors on creative and innovative performance of teams. Although, we know the impact of some input variables (e.g. Knowledge, skill and abilities of members- team KSA, resources or managerial support) has found significant in prior research, to the best of my knowledge, far too little attention has been paid to the association between personality composition and the creative and innovative performance of teams (Bechtoldt, 2007; Litchfield et al, 2017). Therefore, this study aims to investigate the role of personality (as a deep level composition variable) on team level creativity in the first study and innovation in the second study.

1.3.1. Personality Diversity in Teams

Diversity is defined as the "*distribution of personal attributes among interdependent members of a work unit*" (Jackson, Joshi and Erhardt, 2003:802). It includes factors such as age, gender, ethnicity, knowledge, skills and personality differences. As mentioned, researchers tend to

divide these personal attributes into two groups, which are called surface level and deep level diversities (Phillips and Loyd, 2006).

As of the present day, the workforces in organisations have become more diverse owing to the increasing availability of workers with distinct cultural and educational backgrounds. Therefore, this heterogeneity within the workforce necessitates a better understanding of how surface level and deep level factors influence organisations and which organisational factors need to be more diverse in order to contribute to a greater extent to the achievement of targets.

Studies on organisational teams have revealed that diversity can be related to a wide range of outcomes such as general performance, creativity, innovation, satisfaction and commitment, as well as processes such as conflict, communication, cohesion, and decision making (Williams and O'Reilly, 1998; Van Knippenberg and Schippers, 2007; Guillaume, Dawson, Otaye-Edebe, Woods and West, 2017; Van Knippenberg and Mell, 2016). According to the research conducted to date, diversity may have both positive and negative influences on team outcomes, and heterogeneity in different dimensions may lead to different outcomes depending on such factors as work context and kinds of tasks that teams are required to accomplish (Williams and O'Reilly, 1998). In this regard, this research probes the role of personality diversity on accomplishing creative and innovation-related complex tasks at the team level in two different contexts.

It has been suggested that teams composed of individuals who come from different departments and have different knowledge bases, as well as viewpoints, depending on their demographic backgrounds may lead to creative and innovative outcomes (Erhardt, 2010; Sapsed, 2002). The thought behind these assumptions is that a diverse combination of

knowledge bases and viewpoints could facilitate new knowledge creation and foster innovation within teams. (Hobday,1998; Nonaka and Konno, 1998; Harrison and Klein, 2007). However, other factors may also have an impact on team performance such as contextual or personality diversity factors (Keck, 1997; Ancona and Caldwell; 1992; Mohammed and Angell, 2003).

In this regard, research on team composition suggests that personality diversity within teams may also influence their performance (Mohammed and Angell, 2003; Peeters et al., 2006). For instance, conscientiousness has been considered as a predictor of team performance (Barrick, Stewart, Neubert, and Mount, 1998; Neuman and Wright, 1999; Neuman, Wagner and Christiansen, 1999; Mount, Barrick and Stewart, 1998). Also, agreeableness (Neuman and Wright, 1999), extraversion (Barry and Stewart,1997) emotional stability - in other words low-level neuroticism (Mount, Barrick and Stewart, 1998) and openness to experience are associated with positive outcomes (Lepine, 2003; Taggar, 2002; Baer, Oldham, Jacopsohn and Hollingshead, 2008).

On the other hand, while research suggests a relationship between diverse personality composition and team performance, when the expected outcomes from teams are complex, such as creativity and innovation, the nature of the relationship between personality and composition and team performance might change (Neuman et al., 1999). In fact, some researchers have reported finding a negative correlation between conscientiousness and creativity-oriented tasks (Robert and Cheung, 2010). In addition, in some cases, a curvilinear relationship has been found or predicted between such traits as agreeableness, extraversion and group performance (Barry and Stewart, 1997; Bechtoldt et al., 2007). To this end, research on team composition is inconclusive and there is a need for more research whose principal aim is to examine the links between team creative performance, innovation and members'

personalities (Bechtoldt et al., 2007; Neuman et al., 1999; Litchfield, Shalley and Gilson, 2017). Additionally, further research is needed on team composition, performance and personality relationships in different contexts (Mohammed and Angell, 2003).

1.4. UNDERLYING THEORETICAL PERSPECTIVES FOR TEAM PERSONALITY COMPOSITION

There are variety of theoretical approaches that underpin personality composition and its impact on outcomes (Kramer, Bhave and Johnson, 2013). These approaches are grouped into two different categories, namely social categorisation and information/decision-making perspectives (William and O'Reilly, 1998).

The main argument to the social categorisation perspective is that similarities and differences in terms of such surface level factors as gender, age, religion, etc., are used by members of the group to categorise themselves and others into subgroups within the group (Tajfel and Turner, 1986, cited in Knippenberg, De Dreu, Homan, 2004). In other words, group members are inclined to be in groups composed of people who are similar to themselves. The social identity theory and the similarity and attraction paradigm confirm the self-categorisation approach. In this regard, according to social identity theory, individuals are motivated to maintain their membership within groups whose members are similar to the self (Lewis, 2011). Additionally, they are likely to favour and trust in-groups over out-groups, the latter being perceived as dissimilar to the self (Asforth and Mael, 1989). The similarity and attraction paradigm is also related to deep level constructs. Relatedly, it stresses the groups which are homogenous in terms of personality traits, backgrounds and values, where members of this type of group may experience high levels of wellbeing as they are attracted to the similarities in characteristics of

other members (Williams and O'Reilly, 1998). In this sense, the similarity and attraction paradigm is used as the underlying theoretical approach in studies related to team personality composition (Kramer, Bhave, Johnson, 2014). Taken together, research suggests that teams composed of members with homogeneous characteristics and attributes operate more effectively whilst at the same time providing a safe and satisfying environments for its members (Harrison, Price and Bell, 1998; van Knippenberg and Schippers, 2007; Kramer, Bhave, Johnson, 2014).

On the other hand, the information/decision-making approach favours a heterogeneous group composition and indicates that variance can, in fact, have a positive impact on team-related outcomes (Williams and O'Reilly, 1998). The information/decision-making theory is used as a basis for a variety of diversity-related research such as functional diversity (Ancona and Caldwell, 1992; Jehn, Northcraft, Neale, 1999; Somech and Zhavy, 2007), demographical diversity (Bantel and Jackson, 1989), and team personality diversity (Mohammed and Angell, 2003; Krammer et al., 2014). This theory is also supported by studies conducted in the field and found to have a positive association with higher team performance and effectiveness (Van Knippenberg, Dawson, West, Homan, 2011).

Functional diversity builds on the idea that complementation of a variety of skills, knowledge, and experience of members may help teams to generate creative outcomes through the team's richer knowledge and experience capital (Ancona and Caldwell, 1992; De Dreu and West, 2001; Halfhill, Nielson, Sundstrom and Weibaecher, 2005). The claim for demographic diversity is that teams that show surface level diversity with different cultural backgrounds and experience can generate more diverse perspectives and may be able to address problems through various alternative solutions (Bantel and Jackson, 1989). What is more important is that information and

decision-making theory can also be applied to studies related to team personality diversity and positive relationships found between performance and certain personality traits (Krammer et al., 2014). In particular, variance in extraversion traits was found to be positively related to team performance (Neuman, Wagner and Christiansen, 1999; Barry and Stewart, 1997; Mohammed and Angell, 2003). In addition, variance in openness to experience has been found to be positively related to team creativity in a study conducted by Schilpzand, Herold and Shalley in 2011).

The early team composition research relied heavily on the isomorphic composition that is predicated by the mean level (elevation) approach, and thus only calculated the mean level of personality in teams and its impact on the outcomes (Bechtoldt, De Dreu and Nijstad, 2007). However, this approach was later criticised regarding its overreliance on isomorphic based composition, and therefore falls short of the variety of other possibilities with a limited conceptualisation of team composition as "more versus less" of a factor (Mcgrath, 1998; Mohammed and Angell, 2003). Building on this, Kozlowski and Klein (2000) proposed several composition models ranging from isomorphism-based composition to discontinuous composition.

In consideration of the limitation of isomorphism-based composition approaches, this research uses personality diversity as an additional influencing factor. Diversity in personality refers to the variability of a particular trait within a team setting, and is calculated using the variance of members' scores (Prewett et al., 2016). Therefore, this inquiry not only probes the influence of mean level traits but also investigates the moderating role of variety in personality traits in terms of the relationship between average level traits and team creativity (in Study 1) as well as innovation (in Study 2). In fact, diversity in personality is given as an instance in the taxonomy

defined by Kozlowski and Klein (2000). Hence, it represents an additional way of conceptualising team composition (discontinuous composition) through focusing on variance in personality traits and its moderating role on the relationship.

The mean level (elevation) and diversity perspectives are the underpinned by the theory of person-environment fit. This approach indicates a degree of congruence between individuals and their operating context in order to generate positive or negative results (Muchisnky and Monahan, 1987). Two models for the person-environment fit were developed by Muchinsky and Monahan (1987), namely the supplementary and complementary models. These two models may conceptualise the relationship between homogeneity (low diversity) and heterogeneity (high diversity) of the teams and their performance (Mohammed and Angell, 2003).

A supplementary type of congruence refers to the fit of the individuals who supplement and own traits that are congruent with the other people in the environment (Neuman et al., 1999). A conscientious individual might fancy joining a team that is composed of conscientious and responsible members. For instance, in this case the individual may feel that he fits in because he has similar characteristics to the other members of the team. What is of note here is that in this model the environment is represented by the individuals within it. That is, an individual or a decision maker evaluates the other people within the environment and decides whether the member is in congruence with it (Muchinsky and Monahan, 1987).

The second model is that of the complementary fit. The word 'complementary' implies that the personality trait of each individual complements the requirements of the environment (Muchinsky and Monahan, 1987). The main assumption of this model is that teams become more effective when the characteristic attributes of the team members are diverse. The reason

behind this assumption is that each members' personalities are essential for the team to operate smoothly (Neumann et al., 1999). For instance, a heterogenous team in extraversion may be expected to function smoothly as some of the extraverted members will fill the role of being outgoing and ensuring communication flow, while other more introverted members follow and participate in decision making. On the other hand, a team that is composed entirely of extravert members (homogenous) may be ineffective because extravert members with dominant and assertive characteristics may conflict with each other and the team may lose its focus on the task at hand (Barry and Stewart, 1997).

The main difference between the supplementary and complementary models of the person-environment fit perspective is rooted in the environment. That is, the environment in the supplementary fit approach is characterised by its inhabitants, whilst in the complementary model the environment is described by its demands (Muchinsky and Monahan, 1987). Moreover, whilst the supplementary fit model underpins the mean level (elevation) perspective, the complementary model supports the diversity approach within teams. In this manner, the present study also not only investigates elevation but also variance in personality traits and predictions of both supplementary and complementary models of person-environment fit theory. This research probes the role of personality diversity on the relationship between mean level traits and team creative and innovative performance.

As a matter of fact, the scholars in the field of personality composition emphasise the importance of examining variety as well as average level of personality traits when undertaking any study (Neumann et al., 1999; Peeters et al., 2007; Bechtoldt et al., 2007). Additionally, Neuman and co-workers (1999) stressed probing variance in personality in order to understand the role of personality differences between members in terms of team-related outcomes.

Moreover, in 2001, Moynihan and Peterson developed a typology that conceptualises the relationship between personality traits and team performance. Their typology consists of three theoretical perspectives including the universal, contingent and configuration approaches. Firstly, the assumption of the universal approach is that certain personality traits have an impact on team performance, disregarding the task or contextual influence. Operationalisation of this view is to simply compute the team's mean score for the particular personality variable. The main assumption of this type of operationalisation is that the total contribution of the team members defines the outcome of the group (Steiner, 1972). Therefore, this assumption incorporates both positivity and additivity, which are both representative characteristics of the supplementary fit model (Kramer et al., 2014). However, this approach is irrespective of the influence of the task in hand. In other words, when the task is conjunctive this means the effectiveness of the team depends on the performance of the weakest group member. For example, when it comes to the creative performance of a particular team that has a member with the lowest score in openness to experience, this may significantly influence the creative performance of the team (Baer, Oldham, Jacobsohn, Holligshead, 2008). On the other hand, in the instance of a disjunctive assignment, the outcome of the team may depend on the member who has the highest scores. For instance, when the required output is creativity, the performance of the group may depend on the individual who has the highest openness to experience score.

The second perspective is the contingent approach, which relates personality and team performance depending on the task and organisational culture. Therefore, the basic assumption is that the outcome of the team relies on the interaction between personality traits and task- and culture-related situational variables (Moynihan and Peterson, 2001).

The third perspective is the configuration approach, and this is the most complex perspective among the three. It actually examines the dynamics within the group with regards to cooperation between members (Mohammed and Angell, 2003). As opposed to the operationalisation of previous approaches (through calculating the mean score of the group), the configuration approach also includes the variance of a particular trait and probes the influence of the level of diversity on the team outcome (Moynihan and Peterson, 2001). This operationalisation assesses the variability of the personality trait, and this method is also the indicator of a complementary fit model (Halfill, Nielson, Sundstrom, Weilbaecher, 2005). This thesis is underpinned by this perspective, and investigates the role of diversity as a moderation variable on the relationship between mean level personality variables and team creativity, as well as innovation. Considering all three perspectives, a comprehensive study might be considered the one that incorporates at least two approaches (Bechtoldt et al., 2007). In this sense, this study includes both the means (universal perspective) and variance of personality variables (contingent perspective), though it does have the limitation of disregarding contingent perspective on personality and team performance relationship.

1.5. INTRODUCING CREATIVITY AND INNOVATION. WHAT IS THE DIFFERENCE?

Innovation has been acknowledged as a critical success factor for most organisations operating in challenging and competitive environments (Choi and Chang, 2009). Despite the well-known importance of innovation, the roles that teams play in fostering or hindering such innovation, and the factors that stimulate work groups to generate and implement novel ideas, has received less attention (Anderson and West, 1996; Somech and Zahavy, 2001; Caldwell and O'Reilly, 2003; Hulsheger, Anderson and Salgado, 2009; Maier, Gunter, Hulsheger and Anderson, 2015).

According to West (2002), one reason for the scant attention on innovation at the team level is the misunderstanding as to the difference between the core concepts of innovation, those of "creativity" and 'innovation". Scholars argue that clear differentiation may decrease the confusion regarding the phenomenon of innovation (Anderson and West, 1998; Drach-Zahavy and Somech, 2001; West, 2002; Caldwell and O'Reilly, 2003; Eisenbiss, Boerner and van Knippenberg, 2008; Hulsheger et al., 2009). In this regard, in their well-known paper West and Farr (1990) defined innovation as the introduction, and application, of novel ideas, procedures, processes or products that are new to a job, team or organisation. As indicated in this definition, innovation results from the effective combination of two component processes. The first process is that of creativity, and which refers to the generation of novel ideas (Eisenbiss et al., 2008; Amabile, 1996). Relatedly, Shalley and co-workers (2004) claim that in order to be categorised as creative, ideas need to be novel and related to other ideas available within the organisation (Shalley, Zhou and Oldham, 2004). The second process is innovation implementation, which is defined as the successful implementation of the generated novel ideas (Somech and Zahavy, 2001). In this sense, innovation is perceived as a process in which creativity is the first step and includes thinking about new things (West and Rickards, 1999; George, 2007). Innovation also subsumes a second step, innovation implementation, which is about doing new things (Hulsheger et al., 2009).

What is noteworthy is that innovation is not a linear process (West and Anderson, 1996) but it is process of generation of novel ideas and creating value through those ideas. Therefore, creativity (new idea generation) occurs mostly in the early stages of innovation when an organisation's members are required to, or gathered for the purpose of, proposing ideas in response to any attempt at innovation (Caldwell and O'Reilly, 2003). However, this does not mean that later implementation stages do not involve creativity. In fact, the innovation

implementation strategies may also involve idea generation regarding the implementation strategies; however, it is nevertheless true that the need for creative ideas is greater during the initial stages of innovation (West, 2002). As a result, creative ideas can be related to organisational procedures, structures, and products as well as services, and is expected to have the potential to bring additional value to the organisation (Drach-Zahavy and Somech, 2001).

When it comes to innovation implementation, although studies show a significant link between the two sub-processes of innovation (creativity and innovation), scholars argue that the generation of creative ideas is far more frequent than actual innovation (West, 2002). In this regard, it can be inferred that while creativity focuses on the creation of novel ideas, innovation emphasises the implementation of the ideas so generated (Anderson, Potocnik and Zhou, 2014). One reason for these ideas may be rooted in the novelty dimension of creativity. In other words, the newly generated ideas often necessitate changes in behaviour, procedures and practices, and these issues may cause scepticism or seem contradictory to others within the organisation. Hence the novelty aspect of creativity can potentially cause the failure or cancellation of the implementation process. Additionally, innovation attempts nurtured by novel ideas involve considerable complexity, and therefore team members need to be good at solving complex problems and exploit the developed novel ideas within the innovation implementation process phase (Baer, 2012). In short, although creativity and innovation are related to each other, they are not identical processes. Anderson, Potocnik and Zhou explain the difference between two concepts in a very clear way:

> *Creativity and innovation at work are the process, outcomes, and products of attempts to develop and introduce new and improved ways of doing things. The creativity stage of this process refers to idea generation, and innovation refers to the subsequent stage of implementing ideas toward better procedures, practices, or products. Creativity and innovation can occur at the level of the individual, work team, organization, or at more than one of these levels combined but will invariably result in identifiable benefits at one or more of these levels of analysis. (p.1298).*

1.6. CHAPTER SUMMARY

In this beginning chapter, the core motive and the research questions of this thesis were covered. Moreover, underlying theories of team personality composition and the main concepts that are included in this thesis were introduced. In particular, the notions related to personality, teams, creativity and innovation were essential. The fundamental aim of this research is to understand the function of personality composition and on creativity and innovation through using team process variables. Therefore, after the establishment of main objectives and concepts of this research, the overarching conceptual framework and the review of the related literature will be covered next.

CHAPTER.2:   LITERATURE REVIEW AND HYPOTHESES DEVELOPMENT

2.1. INTRODUCTION

In this chapter, the literature that is related to personality and team creativity and innovation are reviewed. This chapter is composed of four sections. The first section introduces the input-process-output model of team performance as a conceptual model of this research. In this regard, the personality traits, team processes and output variables (creativity/innovation) will be elaborated. Following this, the previous investigations that examined the personality and creativity relationships are reviewed. Finally, the direct, mediated and moderated hypotheses regarding the relationships between personality, team processes and outcomes including creativity and innovation are developed.

2.2. AN INPUT - PROCESS - OUTPUT (IPO) MODEL AS A CONCEPTUAL FRAMEWORK FOR THIS STUDY

The Input-Process-Output (IPO) model originally rooted from general systems theory and created by social Psychologist Joseph McGrath in 1964 (Hackman; 1987). The main argument of the IPO model is that input factors have an impact on the group process factors, through which the output of the group is influenced (Hackman and Morris, 1975). This model is found to be the most appropriate for the conceptualisation of team effectiveness (Guzzo and Shea, 1992). The IPO model is a well-used conceptualisation framework, and it was used to understand determinant factors of team performance. In this sense, this model is crucials as it

stresses the role of mediating and moderating factors in order to explain the relationship between inputs and ouput factors (Kozlowski and Ilgen, 2006; Suifan, 2010). However, IPO model of team performance is not a universal model for conceptualizing effectiveness of teams. In fact, there are more than 130 models for measuring team effectiveness (Salas, Stagl, Burke, Goodwin, 2007).

McGrath's input-process-ouput model determines input and output factors in three dimensions. In this model these factors grouped as individual level, team level and environmental factors. In this sense, input factors can be knowledge, skills and abilities of members, personality charactersitics, team size, task type etc. Output factors on the other hand considered variables related to performance or satisfaction of group members (McGrath 1964, cited in Hackman, 1987). This first IPO model of team performance is underpinned by functional or task oriented perspective whose focal point is on team roles, functioning and task related issues Paris, Salas and Cannon- Bowers (2000). According to Hackman (1987) the main assumption of the IPO model of team performance is about the role of interaction and activities among members of the team. Since, these process factors explains the associations between input and output variables. For instance, in order to explain personality and team performance relationship, Van Vianen and De Dreu conducted a study in 2001 investigating the associations between the Big Five personality compositions (input), social and task cohesion (processess), and team performance. Having 3 dimesions in hand in a study published in 1984 Gladstein brought 4th organizational level dimension that includes organizational inputs like structure, resources and rewards.

Later on another input-process and output model of team effectiveness is created by Tannenbaum, Beard and Salas in 1992. However this model is built on integrative perspective

that emphasizes the combination of variables used in multiple models (Paris et al, 2000). The scholars underlined the importance of considering all variables in a particular context. Additionally, having an integrative nature the number of IPO variables were increased. In this integrated IPO model there are four main areas are brought together from prior studies and classified under input dimension. Nature of the task, structure, members attributes, charactersics of the groups. Addtionally six factors are considered as team processes including, conflict resolution, boundary spanning, member interaction, decsion making, coordination and problem solving and it is assumed that these factors lead to smooth functioning of teams.

In 1993 Campion, Medsker and Higgs develped a distinct framework named as meta framwork through synthesizing previous models of team performance. In this regard, this framework is also underpinned by integrative perspective and it mainly focuses on the input and output variables. In other words, it disregards the mediating and moderating influence of process variables (Suifan, 2010). In this regard, this model reveals 5 dimensions that may have a direct influence on the performance of teams: Interdependence (goal and task related interdependence), composition (diversity, flexibility), context (organizational support, training, communication), task design (self management, meaningfulness and identity of jobs), processes (potency, communication, cooperation, social support) (Salas et al, 2007). Furthermore, another salient team performance framwork promoted by Salas, Sims and Burke in 2005. This model is in congruence with the meta framework developed by Campion and his associates (1993). However it adopts socio psychological theory whose focus is on relationships and interactions among team members and social and psychological indications of those factors (Paris et al, 2000). This Big Five model focuses on the important team processes and their influence on the performance of teams. In this sense, team orientation, adaptation and back up, control, leadership, and mutual performance are considered as crucial team processess that triggers high performance in groups. Salas and his colleques consider additional 3 processes

that are team share mental models, communication and mutual trust as additive determinant factors for effectivity.

Moving on to the last and most recent framework that is also fits in to the meta framework however it not only adopts socio psychological approach but also sociotehchnical perspective that concerns the technical issues in at team based work (Baninajaraian and Bin Abdullah, 2009). In this framework there are two main dimensions and a number of variables that are classified under these dimensions. The first dimnesion is incorporates the facilitating input and process variables including: knowledge, skill and abilities and personal characteristics as well as interdepence and composition of the team. The secon dimension is involves variables that are related to group structure including: team context, synergy and design (Roosmalen, 2012).

The models considered above contributed to the literature in their own ways however they can be classified under two main aprroaches to team performance which are IPO model and meta framework of team effectiveness. The models have differences in terms of the variables, mediators and moderators they have used and the theoretical perspectives that they are built upon (Salas, 2007; Paris et al, 2000). All in all, the main inference is that there is no standart measure and framework exist for scholars investigating the team effectiveness, however it is clear that the IPO framework of team approach is the one which most commonly used and useful for conceptualizing relationships between dependent and independent variables (Guzzo and Shea 1992, Suifan, 2010). In fact this model is also the one that is mostly used framework in team creativity and innovation related research. It is used for conceptualization of the relationships between team input - process – output variables (creativity and innovation) (Hulsheger, Salgado and Anderson, 2009). In this sense, present research will also adobt this

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model in order to explain and conceive the relationships between personality traits, team processes and team creativity as well as innovation.

2.2.1. INPUT: TEAM PERSONALITY VARIABLES

This research will focus on the effects of personality factors on creative and innovative performance of teams. Thus, personality becomes a determinant independent input whose impact on the performance of teams is in question. Pervin (1980) defines personality as "individuals' unique and stable pattern of thinking, feeling, acting and reacting to his or her social environment" (cited in Bechtoldt, Dreu and Nijstad; 2007) and personality factors can be categorised in many ways. However, as is widely accepted, utilised and researched, Costa and McCrae's the "Big Five" model of personality factors, namely openness to experience, conscientiousness, extraversion, agreeableness and neuroticism can be representative in this research project (Costa, McCrae, 1988).

The first personality trait of the Big Five personality approach is extraversion. Researchers define extroverts as talkative, assertive, adventurous and energetic. Confidence, particularly, is the dominant component of extraversion (Phillips and Loyd, 2006). These types of individuals are well known for with their communication skills and dominant characteristics, as they can easily engage in conversations with others, as well as being self-confident and assertive (Costa and Mcrae 1988). Having positive (communicative tendency) and negative (dominance and assertiveness) together, researchers expected curvilinear relationships between extraversion and team performance, and favoured variability in extraversion (Barry and Stewart, 1997, Peeters, Van Tuijl, Rutte and Reymen 2006).

The second Big Five personality trait is agreeableness. Agreeableness defines people who are good-natured, flexible, cooperative and reliable. These people are good team players because they can easily work with other people (Peeters *et al.*, 2006). Therefore, there are a considerable number of studies that indicate the positive and contributive role of agreeable individuals within teams (Schippers, 2014). Although agreeableness is perceived as a constructive characteristic in a team context, their crucial role may depend on the type of the task that team has. In other words, the agreeable and conflict-solving nature of these individuals may not have a powerful influence on a particular creative outcome because creativity is nurtured by task-related conflicts and the generation of alternative ideas (Baer *et al.*, 2008).

Thirdly, conscientiousness refers to the extent to which a person is responsible, careful, hardworking and adept at planning. Conscientious people are intrinsically motivated and willing to overcome obstacles that they encounter (Taggar, 2002). In fact, this characteristic is similar to agreeableness in terms of its impact on general performance within teamwork-related literature. That is to say, conscientiousness is another trait whose positive influences are mostly supported by research findings, particularly when general team performance is of concern. However, these individuals generally take responsibility for accomplishing the task in hand, rather than generating alternative and innovative ways of doing things (Robert and Cheung, 2010).

The fourth trait is neuroticism. Neurotic individuals are defined as anxious, emotional, defensive and sometimes depressed (Mohammed and Angell, 2003). Drawing on these definitions, neurotic individuals are generally conducive to negative outcomes within the contexts of both organisation and team work (Van Vianen and De Dreu; 2001), since, in a team context, cooperation and inter-relationships among individuals are seen as crucial factors (Hackman,

2009). As a result, these individuals are generally unfavourable in terms of positive creative outcomes in team levels (Bolin and Neuman, 2006).

The final and most creativity-oriented trait is openness to experience. This trait refers to people who are intellectual, imaginative, broad-minded and curious. This kind of individual is tolerant of ambiguity and willing to experiment and try new things (Schilpzand, Herold and Shalley, 2011). Creativity-oriented teams need to be composed of members who are not only creative themselves, but must also be open to alternative ideas and have the ability to build upon other members' contributions so that novel and useful ideas can flourish (Baer *et al.*, 2006). In fact, individuals who are highly open to new experiences are considered to have both skills mentioned above, and therefore some scholars argue that they can play an active role in the overall performance of creative teams (Reilly, Lynn, Aranson, 2002; Taggar, 2002).

Personality research, particularly in a work context, has made excellent progress; a considerable amount of research in this regard has, to date, already been completed. As mentioned before, the Big Five personality traits model is the most accepted model in personality research. There is also some research in the literature that looks at the Big Five personality traits in organisational teams (Barrick *et al.*, 1998; Halfhill *et al.*, 2005; Peeters *et al.*, 2006; Lepine *et al.*, 2011). However, the 5 personality characteristics included in the taxonomy are categorized as normal or bright personalities that refer to generally socially desirable traits that are perceived positively by most of the members of the society (Judge and Lepine, 2007). However, studies show that particularly in real business world the assumptions about all workforce consist of bright personalities may lead to a misleading or significantly limited inferecences about a particular work context (O'Neill and Hastings, 2011). Additively, the scholars argue and underline the empirical findings that indicates the limited encapsulation of

"Big Five" framework and necessity of the additional measures that particularly measures dark personalities along with the bright ones (Jakobwitz and Egan, 2006; Jonason, Slomski & Partyka, 2012). In this regard, the Big Five framework and Dark Triad taxonomy are the acknowledged and well known measures for measuring bright and dark personality characteristics respectively (Lee and Ashton, 2004; Jakobwitz and Egan, 2006; Hodson, Hogg and MacIlnis, 2009).

The most well-known characteristics of Dark Triad personality types are Machiavellianism, Narcissism and Psychopathy (Paulhus and Williams, 2002). In the literature, the general focus has been on the negative effects of Dark Triad personalities (O'Boyle, Donaldson, Banks and McDaniel, 2011). Nathanson's research (2008) indicates that Machiavellians are prone to take revenge against others, and are more likely to tell lies to the people in their environment (Kashy and DePaulo, 1996). Narcissists, on the other hand, can be mean and aggressive when their egos are threatened (Miller, Widiger and Campbell, 2010). Psychopathy is associated with unethical and inconsiderate behaviour (Nahanson, Paulhus and Williams, 2006). However, there are some studies that show some null or positive relationships with impression management (Vohs, Baumeister and Ciarocco, 2005), self-promotion (De Vries and Miller, 1986) and even leadership (Ames, 2009). Studies that have been carried out on this subject show that the Dark Triad approach has the potential to help researchers to better understand personality issues in organisational phenomena. Furthermore, recent research conducted on the subject of the "Dark Triad in organisations" emphasised the need for future investigation regarding the effects of dark triad personality traits on team dynamics and performance (Wu and Lebreton, 2011; O'Boyle et al., 2012). Therefore, this research investigates the influence of the Big Five and Dark Triad personalities together in order to encapsulate the personality composition in a more comprehensive way through considering both bright and dark personality

traits and so corresponding with real business and work team contexts (Judge and Lepine, 2007; O'Neill and Hastings, 2011). These personality studies aim to help understand how the Dark Triad affects innovation-related group processes, which in turn leads to the innovative performance of teams.

2.2.2. PROCESS: GROUP PROCESSES

In this section, the main focus will be the processes part of the Input-Process-Output model of team performance. Here, "process" refers to mutual transactions between team members such as knowledge-sharing, participation and support levels within the group (Hulsheger *et al.*, 2009). In other words, team processes represent the team activities that team members engage in order to achieve targets (Marks, Mathieu and Zacarro, 2001). That is, the main role of team processes is to explain the association between team level inputs and outputs (Suifan, 2010).

The relationship between team process and team inputs, as well as outputs, has been widely discussed within the literature (Hackman, 1987; Salas, Stagl and Burke, 2004; Ilgen, Hollenback Johnson, and Jundt, 2005; Hulsheger *et al.*, 2009). The focal point of such studies has been to understand and determine process variables through the lens of the relationship between personality composition and team creativity, as well as innovation. As this thesis examines the impact of personality traits on two distinct team outputs in particular, team processes predicting creativity and innovation will be elaborated on in this section.

Firstly, team trust, as an important predictor of creativity in teams, will be examined (Barczak, Lassk and Mulki, 2010). In other words, the team trust variable will be used as a mediating factor between personality traits (agreeableness and extraversion) and team creativity. Since

both traits are considered as intrinsically interpersonal, scholars argue that they are the particular traits that should be associated with trust (Barrick, Stewart, Neubert and Mount, 1998; McCrae and Costa, 1989). Add to this, the conditions of the module allowed the examination of only one process variable in order not to distract the learning environment. Given that, team trust is chosen as a mediating variable as the question whether team trust explain the associations between personality traits and team creativity is new and has potential add to the existing knowledge within the team personality literature.

Secondly, in this thesis, eight innovation-related processes will be introduced as mediators of the relationship between personality composition and team innovation. These processes were based on a meta-analysis conducted by Hulsheger and co-workers in 2009. In their study, eight innovation-related processes and their relationship with team innovation were investigated and confirmed. Building on this specific study and its findings, such processes were adopted in Study 2 and the mediating association of each of these innovation-related processes with team innovation and personality traits have been investigated in this thesis (West and Anderson, 1996; Woodman, Sawyer, Griffin, 1993; De Dreu, 2006). The first four innovation-related process factors are those of shared vision, participative safety, support for innovation and task focus were determined by the early study of West in 1990, and were later validated by West and Anderson's (1998) research. Collectively, they were named Team Climate Inventory (TCI) factors, which have subsequently gained recognition from other researchers (Brodbeck and Maier, 2001; Bain, Mann and Merlo, 2001; Mathisen, Einarsen, Jørstad and Brønnick, 2004). In addition to these first four TCI team processes, four other innovation-related process factors were also shown by the same researchers to be predictors of team innovation. These four process variables are team social cohesion, team communication, and task and relationship conflict (Hulsheger *et al.*, 2009). Drawing from these findings, as distinct from previous

innovation-related Input-Process-Output studies, this research examines the mediating role of various team process variables on the relationship between personality traits and team creativity and innovation.

Team Trust:

Trust is a personal expectation that others will act as expected and not engage in deceptive behaviour. Trust is a fundamental element that forms the basis for effective interactions among people. Trust in a team context, on the other hand, is about acting confidently and willingly on the basis of the words, decisions and actions of other members (Kanawattanachi and Yoo, 2002). Whitener and co-workers (1998) stated that, in having high levels of interdependence in the completion of tasks, teams need more trust than individuals (Whitener, Brodt, Korsgaard, Werner, 1998). It is also argued that the absence of trust may lead to failures in communication, empowerment, quality (Hakanen and Soudunsaari, 2012) and cause relationship conflicts among team members (Peterson and Behfar, 2003; Curseu and Schruijer, 2010). As can thus be understood, team trust is one of the key accelerators of cooperative behaviour (Erdem, Ozen and Atsan, 2003; Costa, Roe and Taillieu, 2001). Regarding the creative performance of teams, one of the dominant argument is that team trust is a necessary antecedent for team creativity (Barczak, Lassk and Mulki, 2010).

Research shows that early and effective communication and interpersonal interaction are key drivers for the formation of trust within teams (Jarvenpaa and Leidner, 1999; Pillis and Furumo 2007). In this research, it is argued that extraverted and agreeable people are more likely to stimulate, and be involved in, social and task-related interactions, thereby facilitating the development of trust among members. İn fact, the association between both personality

variables and trust has also been proposed by others, as each of these traits are the ones that, for the most part, incorporate interpersonally (McCrae and Costa, 1989; Barrick *et al.*, 1998; Furumo, Pillis and Green, 2009) Thus, this research investigates the mediating role of team trust between mean levels of extraversion, agreeableness and creative performance.

On the other hand, the mediating role of team trust on the association between conscientiousness, neuroticism, openness and team creativity have not been hypothesised in this thesis as these variables were not associated with interpersonal relations (Barrick *et al.*, 1998). Conscientious members are well-known influencers of performance; however, in a creativity-oriented team context, focusing on tasks in a rigid and inflexible manner brings the accelerator role of conscientious members into question. Given this, the extent to which team trust mediates associations between conscientiousness and team creativity remains unclear. Furthermore, considering the absence of any interpersonal nature in conscientiousness, this research has not investigated such mediating relationships. Neurotic members, on the other hand, are the ones who are defensive, anxious and depressed. Although these negative attitudes may influence creative performance negatively, they are not considered as the direct determinant of trust amongst the members of a team. The final remaining trait, openness to experience, encompasses characteristic features such as imagination, curiosity and openness to new ideas. Although these characteristics have been found as being essential to creativity, they are not directly related to the interpersonal interactions and dependencies that trigger team trust (Furumo, Pillis and Green, 2009). To this end, considering the argument and proposals within the literature, I do not expect any mediating influence, in terms of team trust, on the association of each of the three traits (conscientiousness, neuroticism and openness to experience) with team creativity.

Taken together, a considerable number of researchers have been signalling the importance of trust among team members and its impact on team performance (Newell et al, 2009, Edmondson, 2012). In fact, the relationships between personality composition, team trust and creative performance is a new avenue of research, and one where there has not been any significant degree of investigation. Hence, understanding the influence of extraversion and agreeableness on creativity through team levels of trust is one of the major motivations behind this research.

Team Social Cohesion:

Social cohesion of the group refers to members' attraction to the group itself, and their desire to be a part of the team (Van Vianen and De Dreu, 2001; Hulseger *et al*, 2009). A considerable amount of research has been conducted into team cohesion, and it is one of the most widely studied group process factors (Kozlowski and Bell, 2003). In this regard, it should be noted that this process variable is also examined as an intervening process variable between personality composition and team performance by several scholars (Barrick et al, 1998; Van Vianen and De Dreu, 2001).

Researchers studying innovation contexts tend to argue that interpersonal (social) cohesiveness is positively related to team innovative performance (Keller, 1986; Woodman *et al.*, 1993; Huang, 2009). Increased attraction among group members may facilitate knowledge-sharing and building shared cognition among members (Hulseger *et al.*, 2009). Of note here however, a number of researchers have pointed out that a high level of team cohesion may reduce task-related discussions and alternative proposals that do not harm the cohesive climate of the team (Sethi, Smith and Park, 2002). Therefore, it can be argued that team social cohesion is essential for innovation only so long as it does not develop conformity in the team. Taken together,

investigation of mediating role of team social cohesion on the relationship between personality and team innovation is likely to enrich the existing discussions within the team personality composition literature.

Team Communication:

Teams need to have an adequate level of communication and interaction to perform their tasks effectively. Research also shows that, in complex projects, intensive levels of formal or informal communication are crucial to the sharing of knowledge and development of new approaches for particular tasks and problems (Edwards, 2007; Keller, 2001). Moreover, besides internal communication, external communication is also crucial for the team to be innovative (Ancona and Caldwell, 1992). Communication is particularly important for that teams often deal with ambiguity and new kinds of complex problems that they have never experienced before. Since, somewhere along the line, these types of innovation-oriented teams may need different sources of expertise that their current members do not have (Ancona and Bresman, 2007). At that time, team members have to network and communicate with external actors to receive any support for the issue encountered (Newell, 2009). Furthermore, information flows and interaction with other teams and projects may also help the team to gain new knowledge and discover alternative ways of dealing with tasks (Newell and Swan, 2000; Keller, 2001; Ancona, Bresman, and Kaeufer 2002). As a result, given the importance of team communication, it is also included as an intervening variable in order to explain the personality and innovative performance relationship at team level. What is of note here is that, in their study Barrick and his colleques (1998) chose team communication as a team process variable to mediate the associations between personality and general team performance and found considerable relationships. Relatedly, this study aims to enrich the existing research and investigate the similar association between personality and team innovation.

Task and Relationship Conflict:

Conflict is in the nature of human interactions, and broadly refers to misalignment of the interests and ideas of related actors (Martin and Fellenz, 2010). At face value, conflict could be perceived as a factor that have a negative influence on teamwork. However, researchers argue that conflict can actually increase the innovative performance of teams. It is claimed that when conflict is related to group tasks, it may foster discussion and knowledge-sharing and help team members to discover new approaches and alternative ways of looking at things (Shaley and Gilson, 2004; West 2002). However, it is also important to note that this conflict should not be related to the relationships between team members. In other words, team members should accept task-related conflict as long as it does not harm the personal relationships among team members (De Dreu, 2006).

In the literature, conflict is divided into two different sub-concepts, which are task-related conflict and relationship conflict. Task-related conflict in groups refers to dissensus and clashes among team members regarding thre task in hand. On the other hand, relationship conflict is defined as social and emotional debates and controversies among team members (Jehn, 1995; De Dreu and West, 2002). It has been argued that while task-related conflict is appropriate for team innovation, relationship conflict is generally seen as a diminishing factor for innovativeness (Nemeth and Kwan, 1987; Jehn, 1995; De Dreu, 2006; Hulsheger *et al.*, 2009). In fact, the prior research includes studies that probes the association between personality traits, team processes and team outcomes. In this regard, Bradley and colleques (2013) investigated the moderating role of certain team member characteristcs (openness and emotional stability) between task conflict and team performance and found positive linear interactions between the variables. (Bradley, Klotz, Postlethwaite, Brown, 2012). However, this research approach such relationships in a distinct way. It investigates the mediating role of task conflict between

personality traits and team innovation and by doing so it aims to increase the understanding of how conflict function in teams. On the other hand, in terms of relationship conflict, once again Murray Barrick and co-workers (1998) probed the mediating role of team conflict between personality traits and general team performance and found significant negative associations between personality and team performance. Accordingly, this study investigates the similar association but this time with team innovation output in order to bring additional discussions to the literature and thus contribute to the existing knowledge in team personality literature.

Following these processes there are four more team process variables which are mentioned above and included in well-known Team Climate Inventory (TCI) framework that is developed by West and Anderson in 1996. These four factors are also acknowledged as predictors of team innovation (Curral et al, 2001).

Shared Vision (TCI):

Team vision can be created through the determination of a clear set of goals, priorities and true comprehension of the objectives of the organisation and the project itself (Revilla and Rodrigez, 2010). Team vision has a considerable influence on teams. In effect, the importance of having shared goals within a team and its impact on performance was discovered by the preeminent scholars of team effectiveness long time ago (Hackman, 1987). Add to this, investigations also supported the positive effect of having shared and clear goals on team performance (Antoni, 2005; Al - Rawi, 2008).

It has also been argued that if a team has a clearly-stated vision that has been acknowledged and internalised by the team members, it can play a significant role in the innovative performance of the team (West and Anderson, 1996). Clearly stated team objectives may

develop focused idea generation within the team, and team members will actualise these ideas with enthusiasm. In this regard, Pinto and Prescott (1987) revealed the positive impact of clearly stated mission on all stages of innovation process. Therefore, building a shared understanding is not only crucial for generating novel ideas but also for the application of those ideas (Curral et al, 2001; Gilson and Shalley, 2004). On the other hand, if members of the group fail to develop a shared vision, their efforts may not be channelled towards innovative ends, and conflict and decomposition may occur.

Participative Safety (TCI):

Building a safe and participative climate in a team is crucial to the belief that any member of the team can share his/her thoughts with the rest of the group (West and Farr, 1990; Edmondson, 1999). This may lead to a high level of participation in the team, which is important for developing creative ideas and increased commitment to the exploitation of these ideas (Amabile, 1997). In other words, if the atmosphere in a group is open, friendly and supportive, as well as intellectually intensive, then innovation is more likely to occur (West, 2003). Claxton (1997,1998) and Jehn's (1995) research supports this idea, and states that when there is no pressure, and people feel safe and work in a positive environment, they can easily share information, interact and discuss with each other, and creativity will occur and innovation will follow (Keller *et al.*, 1996, Edmondson, 2012).

Support for Innovation (TCI):

Safety and a high level of participation in a group is important to create the appropriate conditions for innovation. However, mutual support and encouragement are also vital factors that allow teams to be innovative. As mentioned before, innovation is divided into two major processes, which are idea generation and implementation. Adequate levels of support in a

group will assist the transition from the development of ideas to the actualization of these ideas (West, 2012; West and Hirst, 2003). Michael West defines support for innovation as "*expectation, approval and practical support of attempts to introduce new and improved ways of doing things in the work environment*" (West, 1990, p. 315). In supportive climates, false attempts at innovation are often tolerated and members are encouraged to take the initiative, risks, and come up with new ideas.

West (1990) argues that the groups in which proposals about new ways of doing things are ignored will be desperate for innovation. Therefore, practical and verbal support given by team leaders, members and managers is crucial to developing creative ideas and putting them into action. As a result, it can be argued that verbal support is particularly important for the development of creative ideas. In addition, practical support is essential for the development of ideas and subsequent implementation activities, since it may stimulate cooperation and action for innovation (Tushman and O'Reilly, 1997; West, 2012).

Task Focus (TCI):

As mentioned before, teams may also create various disadvantages for themselves and the organisations they work for. Groupthink, conformity, high levels of cohesiveness may inhibit the innovative performance of teams (Newell *et al.*, 2009). Thus, it is crucial that team members have a common concern about their teams' tasks, targets and quality of their performance (Hulseger, Salgado and Anderson, 2009). West (2002) argued that a climate of excellence and task focus motivates teams to build or adapt systems for evaluation, modification and control. Moreover, task focus may also lead teams to be reflexive about their tasks. Team reflexivity can be defined as a critical appraisal process; in this process, objectives, strategies and procedures are reflected upon and the performance of the team is evaluated by its members (West, 2012).

The reflexivity process, therefore, enables a team atmosphere in which diverse ideas are equally discussed and alternative ways of approaching problems are generated, and hence the innovative performance of the team may increase (Tjosvold, Tang and West, 2004).

In summary, the team process factors are acknowledged as important mediators of the relationships between inputs and outputs. Because the focus of this research is probe the interplay between personality composition and team creativity as well as innovation, the literature signals the 9 prominent factors that may be related to creativity or innovation. In the context of this research team trust is associated with creative performance (Bidault and Castello, 2009). On the other hand, the other eight team processes including TCI variables and team cohesion, team communication, task and relationship conflict are expected to be related to innovation (Hulsheger et al, 2009).

2.2.3. OUTPUT: CREATIVITY AND INNOVATION

Outputs for teams can include various factors such as productivity, wellbeing, satisfaction, innovation, etc. For the purposes of this study, the focus will be on team creative and innovative performance as outputs of the IPO framework. In addition, the reasons why these variables are chosen as output variables for this research will be discussed.

Creativity and innovation is becoming really important and argued as drivers of the competitive advantage within many sectors (Amabile, 1996; Dougherty, 2004). Add to that, teams are acknowledged as one of the most important units of organization that cultivate creativity and innovation (West, 2012). In this regard, the decision about how to compose teams is crucial and

considering personality configuration during team formation has been found and suggested to be vital for team effectiveness (Bell, 2007). As a matter of fact, there has been considerable research into the understanding of team dynamics and the importance of personality composition on work team performance. However, the effects of personality factors on creative performance and innovativeness have received little attention (Reilly, Lynn and Aronson, 2002; Bechtoldt et al, 2007). To my knowledge, while there are four main studies that probed the relationship between personality and creativity, the association between personality compostion and team innovation has not been investigated yet. For this reason, in this thesis these output variables are chosen for investigation so that this research enhances the existing knowledge about team personality composition and bring new discussions to the field.

2.2.3. a) Team Creativity as an Output

Creativity, in this context, refers to the generation of new, useful ideas and is considered a starting activity of innovation (Hulseger *et al.*, 2009). There has been considerable research into the understanding of team dynamics and the importance of diversity on work team performance, as stated by Bechtoldt and co-workers (2007). As discussed previously, the effective composition of a team has a considerable impact on the team's ability to perform well, and in this respect the determination of the team members' personalities is one of the most essential steps (Bell, 2007). More to the point, the tendency of an individual to act in a particular way and interact with others in an effective way is a function of his/her personality (Kichuk and Weisner, 1997). Hence, personality is likely to play a role on the effectiveness of teams and thus its impact on team creativitty can also be researched. Relatedly, there is only four studies that are conducted the interplay between personality and team creativity. To this end, there are still gaps

within the literature in terms of the role of personality composition on the creative performance of teams over time. In this regard, within the section below I review the exisiting studies on the relationships between personality composition and creativity and show the remaining gaps that lead me to conduct this research.

Review of the Previous Studies:

Recent research shows that group work can be extremely beneficial in producing creative outcomes in the right conditions (Sutton, Hargadon; 1996; Hoeghl and Gemuenden, 2001; Rietzschel, De Dreu and Nistad, 2009;). The aim of this thesis is to understand the association between team personality composition and team creativity as well as innovation. Therefore, before moving on to the hypothesis development, in this section the previous investigations that probed the impact of personality composition on the team outcomes will be reviewed.

There are a considerable number of studies that investigate the relationship between personality and general team performance (Mount, Barrick and Stewart, 1998; Van Vianen, De Dreu, 2001, Quigley and Gardner, 2007). However, the association between personality traits and the creative as well as innovative performance needs more attention (Bechtoldt *et al.*, 2007). There are only a few studies that analyse the relationship between personality and the creativity and interestingly no studies found that probed the innovative performance and personality composition relationship. In their review, Robert Litchfield and his colloquies addressed 4 previous studies and build discussion and future research directions based on the findings of these studies (Litchfield *et al.*, 2017). Relatedly, this thesis considers the findings and the arguments written in both in previous studies and the review paper as they examine and review the relationship between personality and creative performance in teams.

First, the study conducted by Bolin and Neuman (2006) involved 309 undergraduate psychology students who were randomly placed in 78 brainstorming groups. This study is conducted in an artificial context and the total time for brainstorming tasks was only 20 minutes. The aim of the research was to investigate the impact of all Big Five personality characteristics on the creative performance of groups through mediating processes social loafing, production blocking and evaluation apprehension. This was assessed by a simple brainstorming task with no end product beyond the number of ideas generated by the student teams. The results generated significant relationships between openness and creative performance, and insignificant relationships between extraversion, conscientiousness and agreeableness.

The second study, performed by Baer and co-workers in 2008, illustrated some particularly interesting findings. They also conducted their research on 507 undergraduate management students composed of 147 three-person teams. This study comprised two distinct idea generation tasks during two one hour sessions: the first involved five human resources-related problems, whilst the second task included three new product development problems. Researchers aimed to probe both the influence of mean level personality traits (including all Big Five traits) and creative confidence gained after the completion of the first task. This study could not find a direct relationship between personality and team creativity. However, it revealed the importance of creative confidence, as the only significant results related to this. Openness and extraversion and low mean levels of conscientiousness were associated with creative performance only when the creative confidence was high within the participating student groups.

Robert and Cheung conducted the next study in 2010. This study focused solely on team-level conscientiousness and its role in the creative performance of 229 student teams. The task used for assessment of the student teams was slightly more complex in comparison to the other tasks

discussed here, as it required the development of basic marketing plans for novel products in 50 minutes' time span. The findings of this study showed a negative relationship between conscientiousness and team creative performance. Additionally, it is worth noting that mean-levels of extraversion and openness to experience were included as control variables; however, no significant relationship was found between these characteristics and the creative performance of the student teams. In this study, the researchers also aimed to find the explanatory mechanisms for the relationship between conscientiousness and creative performance. They developed hypotheses that involved intervening associations regarding the mediating role of information sharing and systematic task on the relationship. The research, however, did not reveal any significant findings regarding these mediators.

The final, and most recently published, study was that of Schilpzand, Herold, and Shalley (2011), who examined the association between openness to experience and the creative performance of 31 student teams. Only in this research the task was a semester long project and included a creative product/service development proposal to meet a market problem and opportunity. This research involved both mean and variability effects of openness on creative performance, and it revealed that although mean-level openness does not significantly relate to creative performance, variability in openness does. Therefore, the finding about insignificant association between mean level personality traits and team creativity is supportive of the previously mentioned studies of Baer *et al.*, (2008) and Robert and Cheung (2010). On the other hand, the positive impact of variation in openness was an unexpected finding for this study. However, the scholars concluded that teams needed at least one individual with low levels of openness in order to help the team evaluate the feasibility of the ideas generated by others (including open ones), and also reach a consensus on the best idea to follow (Schilpzand *et al.*, 2011; Litchfield *et al.*, 2017).

Overall, it seems that when it comes to creative performance, the role of personality is more complex and weaker than general team performance. While the findings related to openness to experience were mixed, there is a fair amount of support for the negative impact of conscientiousness and strong support for no influence of agreeableness, extraversion and neuroticism. It is of note here however, the impact of personality composition on creativity over time has been mostly neglected coupled with the effect of variability of personality traits on creative performance at team level. Therefore, the present study aims to investigate the personality composition and team creative performance relationship through testing both mean and variation effects in both short and longer time span through the lens of an input-process-output model. In doing so it differentiates itself from the previous studies in three aspects. Firstly, the thesis incorporates the investigation of the role of all Big Five variables on team creativity within both short and considerably longer time period in order to examine to what extent the impact of personality on creativity varies in comparison with short time influence. Secondly, it also investigates the moderating role of variability in all personality traits on the relationship between mean level personality traits and creative performance of student teams. Relatedly to my knowledge there is no study in the literature that addresses this moderating relationship gap. Add to this, as a determinant factor of team performance, understanding how personality diversity interplay in the associations between mean level personality and team creativity remain unprecented. Thus, exploring these moderating relationships enhance our understanding of the role of personality composition on team creative performance. Finally, distinct from earlier research, this study probes the mediating role of team trust on the association between mean level personality traits and creative performance. In so doing, current research introduces a new intervening team process variable to explain the association and thus it gives way to additional contribution to the existing knowledge about the mediating role of team processes between personality and performance relationship at team level.

2.2.3. b) Team Innovation as an Output:

The word 'innovation' is derived from the Latin verb "*innovare"* or "*innovus*", which means "to make something new in modern English (Tidd, Bessant and Pavitt, 1997). In general, it refers to the development, creation and application of new ideas, processes, procedures or products that serve the purpose of individuals, groups and/or organisations (Maier, Hulsheger, Anderson, 2015; West and Farr, 1990). Once again It is important to note here that, innovation and creativity is different outputs and when innovation is the focus, creating new ideas alone is not enough; these ideas need to be applied to generate any value from them (Magadley and Birdi, 2012). In this sense, I chose innovation as a second distinct output and aim understanding the role of personality composition on innovation at team level. Notably, to my knowledge there is no prominent research that probes the relationship between personality composition and team level innovation. Hence, considering the importance of team innovation, investigating the role of personality configuration on team innovation can make an important contibution to the existing literature (Bechtoldt et al, 2007). To this end, in the following parts I embrace innovation as a second output variable and explain why innovation is associated with the variables included in the IPO model in the context of this study.

Innovation in organizations:

Indeed, innovation is a complex phenomenon and can be scrutinised at various levels (individual, team, organisation, industry, consumer group, region and nation). However, within the organisational system, there are three levels of innovation. These are the individual, team and organisational levels of innovation (Woodman, Sawyer and Griffin, 1993; Crossan and Apaydin, 2010; West and Altink, 1996). All levels of analysis involve new ideas, processes, procedures or product development, or creation and application processes. Individual level

innovation implies a set of individual behaviours that are related to the idea generation and implementation (Scott and Bruce, 1994, McAdam and McClelland, 2002; Janssen, 2003). Team-level innovation is generally defined as the intentional introduction and application of new and useful ideas, processes, products and procedures within an organisational team (West and Farr, 1990; Caldwell and O'reilly, 2003; Hulsheger, Anderson and Salgado, 2009; Somech and Zahavy, 2001). Lastly, the macro-level analysis includes organisational innovation and it refers to the adaptation of an internally generated or purchased value added idea, procedure, process or product which is new to the organisation (Damanpour, 1991; Crossan and Apaydin, 2010).

Figure 2.1:Three Levels of Innovation
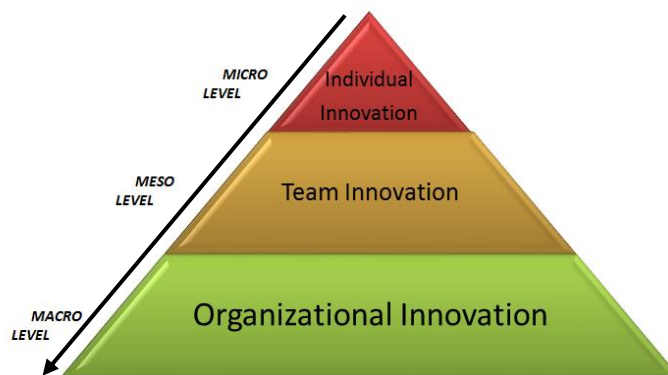
Determinants of Team Level Innovation:

In the present research, the unit of analysis and the scope is on team level innovation within the organisational phenomena. Although recent research has revealed various aspects influencing innovation in this meso-level, considerable attention has been given to particular antecedents of

team innovation that were assembled in a study conducted by Hulsheger and co-workers (2009). These influencing factors are separated into two main predicting factors named input and innovation related team processes and these determinants are placed within the input-process-output model of team innovation. This type of classification is also consistent with the aims of the present research as it also uses the IPO model to conceptualise the relationship between personality, team processes and innovative performance. To this end, potential input and process determinants of innovation output at team level is elaborated below.

Firstly, when it comes to input variables and their relationships to team level innovation, there are various aspects that have attracted the attention of researchers. Previous investigations mostly focus on the knowledge skill and ability of team members, resources, organizational and managerial support (Curral *et al.*, 2001; West, 2002; Hulsheger *et al.*, 2009; Suifan, 2010). In this regard, composing a team with a broad array of members with adequate knowledge, skill and expertise may help teams to solve complex problems and accomplish innovation related tasks (West and Anderson, 1996). As such, this argument is underpinned by the information/decision making approach to task related diversity which claims that teams composed of members who have different knowledge, skill and experiences may provide alternative solutions to the group problems and therefore cultivate creativity and innovation within the team. In addition, it is argued that combination diverse perspectives are likely to generate the task related conflict which also cultivates innovation (De Dreu, 1997). Accordingly, prior research also supports such arguments and revealed that task-related diversity brings various perspectives, skills and networks together, and creates a synergy that promotes team innovation (Jehn *et al.*, 1999; Hulsheger *et al.*, 2009).

Along with the right composition of knowledge, skill and expertise, teams also need wide array of resources deal with ambiguity of complex tasks (Newell et al, 2009). In this context of research team resources includes financial, technical and material sources that teams have in order to accomplish innovation oriented tasks. As such, team resources are considered as an important input fact for team innovation (Rogers, 1995; West and Anderson, 1996) and found as a predicting factor for team effectiveness (Guzzo and Shea, 1992). Relatedly, in their well-known article about team climate for innovation, Anderson and West (1998) argued that climate that is suitable for innovation is more likely to be created in the organizations that are eligible to provide necessary resources to their teams. As a result, adequacy of resources is likely to be an important determiner of innovation within teams and thus it is considered as crucial input factor for innovation oriented teams (Suifan, 2010).

Another key predictor of innovation that most scholar stress is the managerial support for team innovation. Innovation includes novelty and thus requires considerable level of change in attitudes and procedures within organizations (West, Hirst, Richter, Shipton, 2004). Therefore, managerial support is seen as crucial factor to enable teams to innovate (Ancona and Bresman, 2007; Edmondson, 2012). As such, a well-known scholar of team innovation Michael West (1999) found significant correlation with managerial support and team innovation. Taken together teams with right composition of knowledge, skill and abilities, resources and support are close to innovate (West, 2004)

However, in addition to these 3 key resources research in team innovation continue to investigate the determining factors for teams to clearly understand the nature of innovation enable innovation in a more effective way. In this regard, beside the factors mentioned above team size and team longevity are also considered significant input factors within team

innovation-related investigations (Curral *et al.*, 2001; Stewart, 2006). Findings related to the first input factor, team size, shows that there is a positive correlation between team size and innovative performance. Larger teams have the potential to be more innovative than small ones due to the wider range of skills, knowledge, network and abilities that the larger teams will naturally possess (Stewart, 2006; Hulsheger *et al.*, 2009). Turning to the second aspect, the arguments and findings on team tenure indicate a negative relationship with innovative efforts of teams. In their well-known study on team innovation. West and Anderson (1996) argued, and found, that in due course, teams become less innovative and unable to develop alternative means to challenge the status quo. In fact, this factor was also tested on knowledge workers in an R&D context by Katz in 1982, and the results were in line with West and Anderson's study.

In addition, effective functioning of the team processes and team innovation may in turn depend on personality composition as an input variable. Although the variables above are well studied, there has been scant attention paid to the role of personality traits on team innovation (Mohammed and Angell, 2003; Bechtold *et al.*, 2007). In fact, it is widely acknowledged that personality composition is likely to influence the team outcomes (Costa and McCrae, 1988; Bell, 2007; Bradeley et al, 2013) Add to that there are solid arguments regarding the poteantial influence of personality composition on team based innovation (Reilly et *al*, 2002; Bechtoldt et a*l*., 2007). For this reason, the current study concentrates on the direct or indirect influence of personality composition as an input factor on the team level innovative output.

Turning to the innovation-related processes as a second determinant factor, the four innovation-related team climate factors are considered to be solid factors for team innovation (West and Anderson, 1996). Team climate is defined as "*shared perceptions among group members with respect to their relationships, their tasks and their work environment" (*Maier *et al.,*2015, p.215*)*.

In a well-known study of team innovation, West and Farr (1990) identified four distinct climate-related antecedents of team innovation for the first time. These four determinant factors are shared objectives, participative safety, task focus and support for innovation.

Moreover, in a following notable meta-analysis undertaken by Hulsheger, Anderson and Salgado (2009), these four team climate dimensions and other influencing process-related factors (team cohesion, team communication, task and relationship conflict) were assembled under the same roof as innovation-related team process variables. As a point of fact, in this study, additional team processes were carefully examined and found to be strongly correlated with team innovation (Hulsheger *et al.*, 2009; Maier *et al.*, 2015). Drawing on this, these team processes have been adopted in the present study and their mediating role between personality composition and the innovative performance of teams is examined.

In summary, In the current research, the output measurements are team level creativity and innovation. Add to this, it is now clear that there is a difference between creativity and innovation related outputs. Considering this, this research is conducted to investigate the interplay between personality traits, team based processes and such distinct outputs. To this end, the next section involves the developed hypotheses regarding the relationships among these variables.

2.3. DEVELOPMENT OF RESEARCH HYPOTHESES

In this part of the thesis the relationships between inputs (personality traits), processes and outputs (team creativity/innovation) included in the thesis will be introduced, and based on these

relationships the hypotheses will be developed. In other words, the hypotheses related to creativity and innovation will be presented together under this section of the thesis in order to avoid duplication by having two separate hypothesis development chapters for each study. It is also worth noting that most of the hypotheses developed regarding creativity and innovation are identical. The reason behind this is that the innovation process incorporates creativity and implementation stages and thus teams cannot be innovative without being creative (West and Anderson, 1996). That is to say, both novel idea generation and the implementation stages of team innovation are highly correlated, and thus it is difficult to separate their individual influences (Somech and Zahavy, 2013; Rogers, 1995). In fact, creativity covers considerable level of variance in innovation and thus anything influences creativity also influences innovation (West, 2002; Magadley and Birdi, 2012). To this end, in most cases (apart from the moderating influence of variability in conscientiousness on the association between mean level conscientiousness and team creativity/innovation) I expect similar influences of personality variables on both the creative and innovative performance of teams.

In this part of the thesis, there will be three main hypotheses development subsections divided based on the nature of relationship between variables. In this sense, the first part is related to personality traits (including Big Five and Dark Triad) and their direct association with creative and innovative team outcomes. This section is thus, incorporates hypotheses related to isomorphic composition that is incongruence with Moynihan and Peterson's (2001) universal perspective and investigates the association between mean level personality traits and team creativity and innovation. The second part, on the other hand, will include mediating relationships among personality traits, team processes and creative as well as innovative outputs. Again, in this section the hypothetical predictions are based upon isomorphic composition and operationalization of universal approach through calculating mean level

personality in teams. Then, in the final subsection the moderated relationships among mean level personality traits, variability in personality traits and team creativity and innovation, will be hypothesized. In this last section, the third and most complex configuration approach, which incorporates both mean and variability type of operationalisations, underpins development of moderated hypotheses.

Figure 2.2: Structure of Hypotheses Development Section
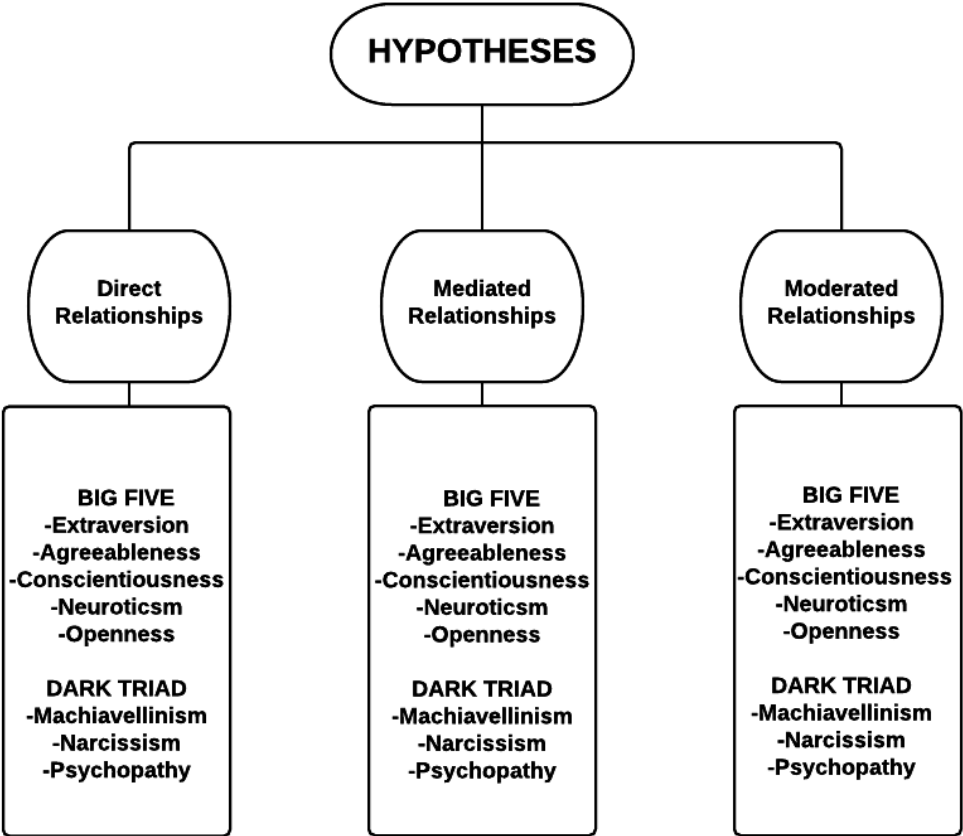
2.3.1. Direct Relationships Between Personality Composition and Creativity/Innovation

In this first subsection, hypotheses are built in terms of the direct relationships between personality traits and both creativity as well as innovation. Present research aims to investigate the relationship between high and low levels of each personality traits and creative as well as innovative performance of teams.

As mentioned within the introduction chapter this study uses "Big Five" personality traits as personality input factors to test the role of personality on team creativity and innovation. Additively, it also investigates the impact of "Dark Triad" variables on team innovation. Given this information, the section below starts hypotheses related to the Big Five and then followed by the Dark Triad personality traits and their direct relationships with the creativity and innovation outputs.

2.3.1.a) Extraversion:

People who are highly extraverted can be described as sociable, energetic, assertive and talkative (Costa and McCrae, 1992; Becholdth *et al.*, 2007). Some researchers believe that these characteristic features may indeed have a positive impact on teamwork (Barry and Stewart, 1997). As can be understood from the defining characteristics of extraverts, these individuals can actually be helpful in terms of facilitating knowledge flow both inside and outside the team (Taggar, 2002; Bradley and Hebert, 1997). However, the results of the investigations illustrate the damaging impact of too much elevation of the level of extraversion within the groups. It has been claimed that the high level of communication comes with a considerable

level of 'chat' that may distract the members' focus on the tasks actually at hand (Neuman *et al.*, 1999). Conversely, too low a level of extraversion may result in weak idea exchange and communication, and is therefore not favoured (Baer *et al.*, 2008). Of note here however, investigations on the relationship between personality traits and team creative performance have revealed no significant results in short time period (Bolin and Neuman, 2006; Baer *et al.*, 2008; Robert and Cheung, 2010). However, in the longer run extravert members may exceed their characteristics more effectively which may lead significant influence on outcomes (Epstein, 1980). What is more, there is strong support, both from a theoretical and research point of view, that extroverts facilitate idea-sharing processes, and having a reasonable level of extraversion within teams is likely to create positive results (Costa and McCrae, 1992; Barry and Stewart, 1997; Barrick *et al.*, 1998; Van Vianen and De Dreu, 2001). To this end the expectation is towards a positive influence of moderate level of extraversion on both creativity and innovation. Since, not only creativity stage but also idea implementation phase necessitates discussion stimulation and idea circulation so that team members may be able to generate novel ideas and bring additional value through these approaches (Reilly, Lynn and Aronson, 2002). Bringing both findings and theoretical arguments together curvilinear-level relationship between extraversion and both creativity as well as innovation is predicted. In other words, I expect positive relations between moderate levels of extraversion and both creative and innovative performance, and negative relationships between low- and high-level extraversion and the creative as well as innovative performance of teams.

Thus, the first hypotheses for creativity and innovation respectively:

H1A: The mean level of extraversion has a curvilinear (∩-shaped) relationship with creative performance, such that the highest performance will be at a moderate level of extraversion.

H1B: *The mean level of extraversion has a curvilinear (∩-shaped) relationship with innovative performance, such that the highest performance will be at a moderate level of extraversion.*

Figure 2.3: Expected Curvilinear Relationship Between Mean Level of Extraversion and Both Team Creativity and Innovation
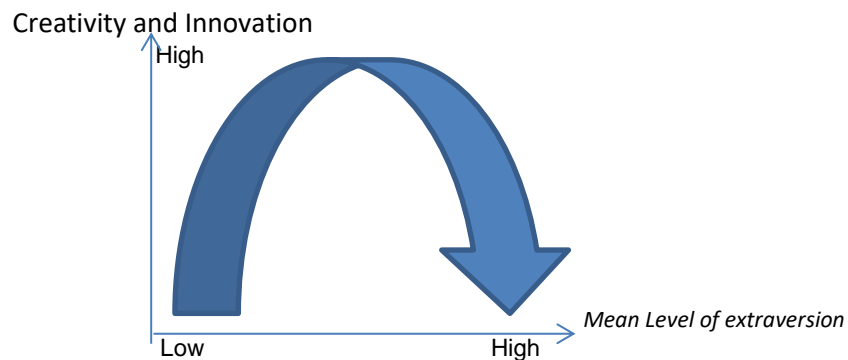
2.3.1.b) Agreeableness:

Agreeable people are decent, reliable and cooperative people (Stewart, Fulmer and Barrick, 2005). These individuals are good team players because they can easily work with other people and are open to different ideas (Mohammed and Angell, 2003; Peeters *et al.*, 2006; Van Vianen and De Dreu, 2001; Phillips and Loyd, 2006; Taggar, 2002). Findings endorse this theory, and further show that agreeable members have a positive impact on teams and their performance (Barrick *et al.*, 1998; Graziano, Hair and Finch, 1997; Neuman *et al.*, 1999; Neuman and Wright, 1999; Van Vianen and De Dreu, 2001). They are also good at solving conflicts smoothly (Barrick *et al.*, 1998; Neuman and Wright, 1999; Taggar, 2002).

However, when it comes to creative and innovative performance of teams, research often shows that novel ideas tend to be created by having task-related conflicts within the team, yet the confirmatory nature of agreeable people is contrary to these findings (De Dreu and West, 2001; De Dreu, 2006; Jehn, 1995). Thus, high levels of agreeableness may not be beneficial for teams that aim for creativity and innovation as challenging ideas may be replaced with cohesive consensus among members with agreeing nature and critical evaluation of the decisions probably decreases (De Dreu and West, 2001). At the other extreme, teams with a high disagreeability rate are unlikely to create psychologically safe environments, which are known as one of the key triggers for idea sharing in teams (Edmondson, 1999; West ,2012). Having these results in hand, neither high nor low levels of agreeableness can be expected to be positively related to both creative and innovative performance. Instead, the prediction favours a curvilinear relationship between agreeableness and team creativity as well as innovation. Therefore, the hypotheses for team creativity and innovation are:

H1C: The mean level of agreeableness has a curvilinear (∩-shaped) relationship with creative performance, such that the highest performance will be at moderate levels of agreeableness.

H1D: The mean level of agreeableness has a curvilinear (∩-shaped) relationship with team innovative performance, such that the highest performance will be at moderate levels of agreeableness.

Figure 2.4: Expected Curvilinear Relationship Between Mean Level of Agreeableness and Both Team Creativity and Innovation
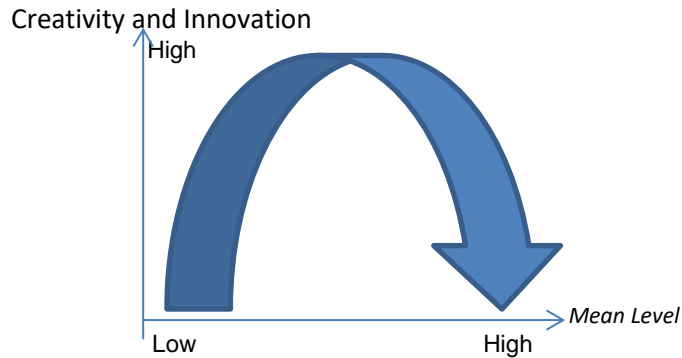
2.3.1.c) Conscientiousness:

Conscientious individuals are responsible, careful, hardworking and self-disciplined people. Therefore, these people are considered to be highly important for teams to accomplish their tasks (Taggar, 2002; Lepine, 2003; Molleman, Nauta & Jehn, 2004). However, because these members are highly task-oriented people, they tend to hold to the established ways of doing things (Lepine, 2003), and abstract parts of team working (like idea generation) may not attract these individuals. Therefore, teams with high levels of conscientiousness may not perform well in terms of creativity. In fact, some researchers have found that a low level of conscientiousness is positively related to creative performance (Robert and Cheung, 2010). However, as mentioned above, these individuals are highly important for teams to achieve their targets. Therefore, given the critical role of conscientious members in teamwork and achievement of targets, even in novel idea generation phase it would be immature to completely neglect and significantly reduce mean levels of conscientiousness in teams (Litchfield et al, 2017).

When it comes to innovation, conscientious members may also be critical for the application of generated ideas. In other words, they can be more effective within the implementation phases of innovation process as these individuals good at focusing on and accomplishing the task at hand (Bechtoldt, 2007). However, it should be noted that, high elevation in conscientiousness may also stifle innovation as it also involves tasks related to idea generation. Based on these arguements, in this research I do not expect high creative and innovative performance from teams that have either high or low levels of conscientiousness. The prediction is a positive effect due to moderate mean levels of conscientiousness on team creativity as well as innovation. Stated briefly, a curvilinear relationship is expected between conscientiousness and both creative and innovative performance of teams in both studies. Thus, the first expected hypothesis is:

H1E: *The mean level of conscientiousness has a curvilinear (∩-shaped) relationship team creative performance, such that the highest performance will be achieved at a moderate level of conscientiousness.*

H1F: *The mean level of conscientiousness has a curvilinear (∩-shaped) relationship with team innovative performance, such that the highest performance will be at moderate level of conscientiousness.*

Figure 2.5 Expected Curvilinear Relationship Between Mean Level of Conscientiousness and Both Team Creativity and Innovation
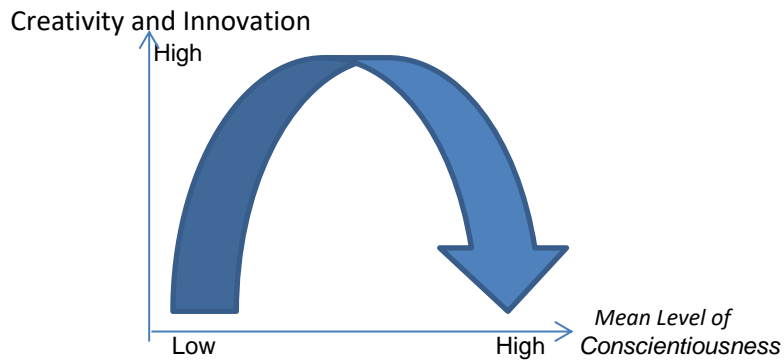
2.3.1.d) Neuroticism:

The fourth dimension of personality is neuroticism. People who are high in neuroticism are defined as anxious, emotional, defensive and sometimes depressed (Mohammed and Angell, 2003; Peeters *et al.*, 2006; Vianen and De Dreu; 2001; Phillips and Loyd, 2006; Taggar, 2002). Hence these individuals are likely to disrupt any cohesion among team members and cause conflict (Peeters *et al.*, 2006). Findings related to general performance favours the negative influence of neuroticsm (Kramer, Bhave and Johnson, 2014). Based on these strong negative-sided arguments and findings, scholars predict negative relationships between creativity and neuroticism; despite this, some researchers have found no significant relationship between the two (Bolin and Neuman, 2006). In light of prior theory and related findings, the expectation is a positive linear relationship between low levels of neuroticism and performance related to creativity as well as innovation.

The hypotheses for both study are:

H1G: *The mean level of neuroticism has a negative relationship with team creative performance, such that the highest performance will be at low mean levels of neuroticism.*

H1H: *The mean level of neuroticism has a negative relationship with team innovative performance, such that the highest performance will be at low mean level of neuroticsm.*

2.3.1.e) Openness to Experience:

People who are open to experience are intellectual, imaginative, broad-minded and curious. These kinds of people are tolerant of ambiguity and willing to experiment and try new things (Mohammed and Angell, 2003; Peeters *et al.*, 2006; Vianen and De Dreu; 2001; Phillips and Loyd, 2006; Taggar, 2002). Adapting easily to new conditions, and searching for and finding alternative ways to solve problems, can be expected from team members who are open to experience (LePine, 2003). Thus, these members may assist their teams in the task-related conflicts that have been found to be crucial for group innovation (De Dreu, 2006). Homan and her associates (2008) claimed that members who are open to new experiences also foster knowledge-sharing through becoming more receptive. Moreover, they can encourage group members to form a creative atmosphere to learn new things, and give support to new ideas that may again lead the team to greater originality (West, 2012). In terms of creativity, these arguments show that teams that have open individuals are more likely to be more creative and idea-generative because these individuals support knowledge sharing and encourage other members to share their ideas through being open. When it comes to research findings one

research has found significant relationships between mean level openness and team creativity (Bolin and Neuman, 2006). One other study found correlations between variability in openness and creative performance (Schilpzand, Herold, Shalley, 2011), and two others could not find any direct association (Bolin and Neuman, 2006; Baer *et al.*, 2008; Robert and Cheung, 2010). However most of the studies above conducted the personality and team creativity association in short time period and the influence of open individuals may be exerted in longer time periods as in this research.

Regarding innovation, openness to experience is argued as the most prominent trait with regards to its relationship with innovative outcomes (Hammond, Farr, Neff, Schwall & Zhao, 2011; Shalley *et al*, 2004). Additively, creative and adaptable nature of these individuals are expected to assist accomplishment of innovative tasks. Considering the strong theoretical support and findings, in this research mean level openness to experience is expected to have a positive linear influence on both novel idea development and innovation related performances. To this end, the expected hypotheses are:

H1I: The mean level of openness to experience has a positive relationship with team creative performance, such that the highest performance will be at high mean levels of openness to experience.

H1J: The mean level of openness to experience has a positive relationship with team innovative performance such that, the highest performance will be at the high mean level of openness to experience.

2.3.1.f) Machiavellianism:

The term 'Machiavellianism' is generally used for people who have a manipulative characteristic. This characteristic was found by Christie and Geis (1970) after investigation of Machiavelli's own books (Furnham, Richards and Paulhus; 2013). Individuals who have this type of personality have a tendency to behave in a self-centred manner, and use deception and manipulation in their interactions with others (Jacobowitz and Egan, 2006; Jonason; Slomski and Partyka, 2012). It has been found that Machiavellians often have a negative view of others, and a tendency to take ethically dubious decisions (Kish-Gephart, Harrison, and Trevino, 2010). According to O'Boyle and co-workers (2011), Machiavellians have three main values. The first is the belief in effectiveness of manipulative strategies in their interpersonal relationships (e.g., you do not need to share the reasons for your actions if it doesn't suit you). The second value is related to cynicism (e.g., everyone has a motive to break the rules at some point if they find the right opportunity). Thirdly, Machiavellians can sometimes behave in an immoral manner (it is good to find a shortcut even it does not match with the rules). It can be inferred that the emotional intelligence of these people is low (Dahling, Whitaker and Levy; 2009). Jones and Paulhus (2009) also argue that although they have some tendency to behave in a manipulative or unethical way, Machiavellians do not behave in an extremely negative way.

In fact, these people should not be considered as loser actors in their social context, at least in the short run. Research shows some interesting findings about Machiavellians. Their peers perceive Machiavellians as smart and charming (Cherulnik, Way, Amesand and Hutto, 1981). Hurley (2005) argued that Machiavellians can conform with others' behaviour, whilst at the same time manipulate any given situation to their own benefit. Additionally, Kessler and co-workers (2010) claimed that Machiavellians behave generously in public to manifest themselves in the best way possible. These skills may help Machiavellians to have social networks and

increase job performance (O'Boyle *et al.*, 2012). However, it is not guaranteed that Machiavellians can always manipulate the situation. This may result in risky situations for them because other co-workers and teammates ultimately figure out the real intent, and the self-centred aims, of Machiavellians. This may harm the interpersonal dynamics in the workplace and be noted by others. Furthermore, the trust level that Machiavellians gained from others can decrease dramatically (Molm, 2010; O'Boyle *et al.*, 2012). Research findings are in furtherance of these arguments. In their study in 1989, Jaffe, Nebenzahl and Gotesdyner found negative relationships between Machiavellianism and team success. Bringing all these arguements and findings together, the prediction about mean levels of Machiavellianism and team innovative performance is given below.

H1K: The mean level of Machiavellianism has a negative association with innovative performance, such that the lowest performance will be at high mean level of Machiavellianism.

2.3.1.g) Narcissism:

Narcissists are the people who love self-praise and growth (Jonason *et al.*, 2011). These people see themselves as extraordinary, and more capable than others. They are good at overestimating their creativity, intelligence, success and capabilities (e.g., performance, leadership, academic, etc.) even though others do not agree with them (Nevicka, Ten velden, De Hoogh and Van Vianen. 2011). The main characteristics of Narcissists are being arrogant, autocratic, egocentric, dominant and exploitative in their interpersonal interactions (Paulhus, 1998; Jacobowitz and Egan, 2006). Therefore, they tend to seek attention and respect from others, and like to perform better than others (O'boyle *et al.*, 2012). They also do not like being

criticised by others, and carry on good relationships with people who seem to admire them (Campbell, 1999).

On the other hand, these negative characteristics do not necessarily generate unwanted results. Indeed, research shows that others generally perceive narcissistic individuals as leaders in specific contexts (Judge, Ilies, Bono and Gerhardt, 2002), and the outcome of having a narcissist leader can sometimes be positive. For instance, it is found that narcissistic leaders are good for chaotic and complex situations; therefore, this type is encountered more in modern organisations. Conversely, they are not effective in more stable environments (Campbell, Hofmann, Campbell and Marchisio, 2010).

However, within the team context, with these unfavourable characteristics, the benefit of narcissist members is likely to be outweighed by their potential for harm. In fact, scholars have found that narcissistic individuals tend to take credit from other individuals close to them, and this can create harmful results for both relationship development and job performance. Therefore, they may not perform well in tasks that require high levels of interpersonal relationships (Campbell, Reeder, Sedikides and Elliot, 2000). Moreover, in terms of job performance, research shows individuals with low narcissistic tendencies often perform better than narcissistic ones (Gabriel *et al.*, 1994; John and Robbins; 1994).

H1L: *The mean level of narcissism has a negative association with team innovative performance, such that the lowest performance will be at high mean level of narcissism.*

2.3.1.h) Psychopathy:

The last characteristic of the "Dark Triad" model is psychopathy, which refers to an individual who is selfish, careless in interpersonal relationships, and has a charming and impulsive personality (Jacobowitz and Egan, 2006). Hare and Neumann (2009) argued that these people tend to be charismatic and glib, as well as poor in terms of establishing empathy. They further argued that people high in psychopathy tend to engage in criminal actions to fulfil their needs or aims.

Scholars have argued that at least three million employees and employers could score high in psychopathy (Babiak, Neumann and Hare, 2010). These types of workers can perform in rational, less emotional situations. However, as mentioned above, they are likely to cause harmful work behaviour and, as with narcissism, relationship-oriented tasks are not for these individuals. The expected respect level from these individuals is low, and these people are likely to engage in illegal activities and aggressive behaviour (Hare and Neumann, 2009; O`boyle *et al.*, 2012). Therefore, in group situations, it is difficult to expect productive results from these individuals (Ali, Amorim, Chamorro-Premuzic, 2009).

H1M: The mean level of psychopathy has a negative association with team innovative performance such that the lowest performance will be at high mean level of psychopathy.

2.3.2. Mediating Relationships Between Personality Composition, Team Processes and Creativity/Innovation

In this second subsection, the hypotheses that predicts the mediating role of team processes on the association between personality traits and team creativity as well as innovation are included. It is also worthwhile noting that specific team processes are chosen to mediate the relationship between specific personality traits and creativity as well as innovation. In this sense, these mediation hypotheses are built through considering the nature of the direct relationships between inputs and outputs included in the thesis and theoretical perspectives of previous research that exists in the literature. For instance, considering the nature of the relationship between input and output variables, I did not investigate the mediating impact of team cohesion on the relationship between Machiavellianism and team innovation. Since the predictable negative association between Machiavellianism and team cohesion and the curvilinear association between team cohesion and innovative performance contradicts the expected direct negative relationship between Machiavellianism and innovative performance. In a similar vein, the prediction of a positive association between agreeableness and participative safety and team innovation would collide with the expectation of a direct curvilinear relationship between agreeableness and team innovation. As a result, the developed direct and indirect hypotheses correspond to each other in order to effectively test the relationships between personality traits, team processes and innovation.

With regards to the theoretical considerations, for instance, conscientious members are associated with the task focus process as these individuals are considered as highly responsible and intrinsically motivated to accomplish the task in hand (Costa and McCrae,

1992). In fact, prior studies predicted the mediating impact of same variables on general team performance (Van Vianen and De Dreu, 2001).

2.3.2.a) Extraversion:

In this thesis the association between extraversion and team creativity is expected to be mediated by team trust. Additionally, when the matter is team innovative performance team communication is expected to explain the relationship between extraversion and team innovation. To this end, the mediated relationship with creativity will be examined first and then the latter mediated association between extraversion, team communication and innovative performance will be eloborated.

First of all, this research investigates the indirect relationship between extraversion and creative performance, as mediated by team trust. Extraverts are key individuals who nurture communication and idea sharing within teams, hence these individuals can play a vital role in the development of trust within their teams. Relatedly, research shows that idea sharing is positively related to the formation of trust within teams (Kessel, Kratzer and Hultz, 2012; Ferrin and Dirks, 2003). Researchers argue that extraverts are people with a high propensity towards initial trust in order to engage in relationships with others and satisfy their need to interact with people, and that such an attitude may facilitate the formation of trust within a team (Jacques, Garger, Brown and Deale, 2009; Spector and Jones, 2004). Moreover, Furumo and co-workers (2009) signalled that extraversion has a role on the relationship between trust and satisfaction within teams. Based on the findings and arguments of the previous literature, a linear relationship is predicted between mean levels of extraversion and trust.

On the other hand, in this research a curvilinear relationship is expected between trust and team creativity. In effect, it is argued that whilst low levels of trust lead to dysfunctional conflict, high levels of trust is likely to inhibit creativity. Since members of teams with high levels of trust may have little motive to critically observe other member's behaviours and engage in task-related discussions, this may lead to a decrease in minority dissent and creativity within the team. Indeed, in their research Bideault and Castello (2009) revealed supportive findings to the expectation above, and found a curvilinear relationship between creativity and trust. Thus, it is predicted that there is a positive relationship between extraversion and trust, and therefore a moderate level of extraversion will lead to moderate levels of trust, and moderate levels of trust are positively related to creative performance owing to its curvilinear relationship with creativity. In other words, neither high or low levels of extraversion, nor high or low levels of team trust are favoured, mainly because of the expected curvilinear relationship between team trust and creativity. The predicted hypothesis is:

H2A: *The curvilinear relationship between mean levels of extraversion and creative performance is explained by team trust, such that mean level of extraversion has a positive linear relationship with team trust and in turn team trust has a curvilinear relationship with teams' creative performance.*

Turning to the second relationship, the present study also examines the interplay between mean levels of extraversion and team innovative performance, which is mediated by team communication. As argued above, extroverts are perceived as, and found to be, facilitators of communication within teams (Taggar, 2002; Barrick et al., 1998). Drawing from a theoretical basis and research findings, a linear relationship between extraversion and team

communication might be predicted. However, in the present study, a curvilinear relationship is expected between team communication and team innovative performance, as too much talk and a tendency to seek enjoyable social interactions at the expense of the task at hand may inhibit the teams' efficiency and task focus, particularly during complex tasks (Barry and Stewart, 1997; Mohammed and Angell, 2003). Hence, the main expectation is moderate propensity towards team extraversion, which will also lead to moderate mean levels of team communication and innovative performance.

H2B: The curvilinear relationship between mean-level extraversion and team innovative performance is mediated by team communication, such that, the mean level of extraversion has a positive linear relationship with team communication, and team communication has a curvilinear (∩-shaped) relationship with team innovative performance.

2.3.2.b) Agreeableness:

In present study, when the matter is the association between agreeableness and team creativity, once again team trust variable is expected to mediate this relationship. On the other hand, when it comes to the association between agreeableness and team innovation this relationship is predicted to be mediated by both team cohesion and task related conflict variables. In this sense, the mediated relationships between agreeableness and creativity wil come first and then the second expected mediated relationship will be examined.

This research predicts a mediated relationship between mean levels of agreeableness and team creativity through team trust. Individuals high in agreeableness are reliable, helpful, cooperative and good-natured people. With these characteristics in hand, agreeable people are also seen both as trusting and trustworthy (McCrae and Costa, 2008). Moreover, they are generally the

ones who are seen as key members in facilitating cooperation, inter-member relations and interactions. Thereby, scholars who investigate the relationship between personality and trust within the teams consider agreeableness as one of the key traits having an impact on trust formation (Coglisier, Gardner, Gavin and Broberg, 2012; Furumo, Pillis and Green, 2009). Therefore, positive linear relationship is predicted in the first link of the mediated association. When it comes to the latter link between team trust and creative performance, a curvilinear relationship is expected. As mentioned previously, neither low nor high level of trust is found to be related to creativity (Bideault and Castello, 2009). As a result, instead of high or low levels of agreeableness, a moderate mean level of agreeableness can be associated with the most creative outcomes because this leads to moderate level of trust, which in turn maximises creative performance.

The second hypothesis is,

H2C: The relationship between mean level agreeableness and creative performance is explained by team trust, such that mean level of agreeableness has a positive linear relationship with team trust and in turn team trust has a curvilinear relationship with team creative performance.

What is more, the findings in the literature show that having agreeable members in a team is good for the team's cohesion, wellbeing and safety (Barrick *et al.*, 1998). Thus, it can be predicted that agreeable members facilitate cohesion within work groups and, with a high level of agreeableness, may lead to high cohesion within teams. In other words, a linear relationship is likely to occur between mean level of agreeableness and team cohesion. Yet, high cohesion is often questioned when innovation is the matter at hand. (Sethi, Smith and Park, 2002). Highly cohesive groups often tend to overlook processing external developments. Furthermore,

conformity among members can reach a point where decisions become irrational and painful in this type of group. This situation is called 'groupthink' in the literature (Turner and Pratkanis, 1998). In their study, Bechtoldt and his associates (2007) stressed this issue and stated that to be innovative, work groups should avoid being significantly cohesive and high levels of agreeableness within teams might cause groupthink. In agreement with this arguement, the expectation is that a moderate level of cohesion within the team will be most helpful towards innovative outcomes. Hence, the hypothetical prediction is a moderate level of agreeableness will result in a moderate level of team cohesion, and this will lead to team innovation.

H2D: The curvilinear relationship between mean levels of agreeableness and team innovative performance is mediated by team cohesion, such that mean level of agreeableness has a positive linear relationship with team cohesion and team cohesion has a curvilinear relationship with team innovative performance.

Moreover, to be innovative, members need to develop constructive debates. Although agreeable members elicit and appreciate others' contributions, they fall short in contributing to work-related conflicts. They are, in fact, known as conflict solvers (Barrick *et al.*, 1998; Neuman and Wright, 1999; Taggar, 2002). Teams with high mean levels of agreeableness will have a supportive environment, yet innovation teams also need to have an atmosphere where there is some level of divergence in ideas and task conflict (De Dreu and West, 2001). On the other hand, teams with low mean levels of agreeableness may need to deal with disagreeableness and excessive amounts of conflict (Mohammed and Angell, 2003). Accordingly, too much task conflict can also be harmful towards team innovation because it may result in too much communication and information overload, as well as reducing the synergy and focus among team members. In fact, in a study conducted in 2006, it was found that task-related conflicts are,

to some degree, beneficial for team innovation. In other words, too little or too much task conflict is detrimental to team innovation, and moderate levels of task conflict results in best performance (De Dreu, 2006). To this end, having a moderate mean level of agreeableness may relate to moderate task conflict, and this will result in team innovation.

H2E: The curvilinear relationship between mean levels of agreeableness and team innovative performance is mediated by task-related conflicts, such that mean levels of agreeableness has a negative linear relationship with task-related conflicts, and task-related conflicts, in turn, has a curvilinear relationship with team innovative performance.

2.3.2.c) Conscientiousness:

The relationship between conscientiousness and team innovative performance can be explained through task focus. Taggar (2002) argues that teams can benefit from conscientious members as they can keep the team focused on the task, inspire group members and provide organisation. Researchers also expect effective cooperation from these members (Molleman *et al.*, 2004). Having these types of characteristics, conscientious members help teams to stay focused on team tasks and targets (Van Vianen and De Dreu, 2001). To this end, linear relationships can be predicted between task focus process and mean-level conscientiousness. However, having too high a conscientiousness level - so as to have too much focus on tasks - may lead to rigid thinking and tunnel vision within the team, such that members may disregard external developments or creative alternative views to innovative solutions (Davilla, Epstein, Shelton, 2006). In fact, research also shows that high mean levels of conscientiousness might result in a myopic outlook and reduced creativity (Robert and Cheung, 2010). Bringing arguments and findings together, moderate mean levels of conscientiousness can be expected

to create the most positive innovative outcome, as low levels of conscientiousness may lead to a degree of social 'loafing' among members (Schippers, 2013), whilst high mean levels of conscientiousness might end up with rigid thinking and reduced creativity (Baer *et al.*, 2008). Taken together, the prediction is that the association between moderate mean level conscientiousness and team innovative performance will be mediated by moderate levels of task focus within the team.

H2F: The curvilinear relationship between mean level of conscientiousness and team innovative performance is mediated by team task focus, such that a mean-level of conscientiousness has a positive linear relationship with task focus, and, in turn, task focus has a curvilinear relationship with innovative performance of teams.

2.3.2.d) Neuroticsm:

Turning to the mediating relationships, the relationship between mean-level neuroticism and team innovative performance is expected to be mediated by participative safety in a negative way. In other words, an increase in neuroticism within the team is predicted to negatively influence participative safety, which leads to lower innovative performance as the members of an innovation oriented team need to be emotionally stable, focused and self-motivated to deal with complex and uncertain tasks. Having unstable and pessimistic members may inhibit creativity and safety within the team (Mohammed and Angell, 2003; Stewart *et al.*, 2005; Thoms, Moore and Scott, 1996). Accordingly, neurotic members are prone to question the decisions made since they are anxious about actions taken and tend to feel unsure about the ideas created within the team (Van Vianen, De Dreu, 2001). Based on this reasoning the following hypothesis was proposed:

H2G: The relationship between mean level of neuroticism and team innovative performance is mediated by participative safety, such that a mean level of neuroticism has a negative linear relationship with participative safety, and, in turn, participative safety has a positive linear relationship with team innovative performance.

2.3.2.e) Openness to experience:

When it comes to openness trait, participative safety and support for innovation, team process variables are expected to mediate the relationship between mean levels of openness and innovative performance. People who are open to new experiences can encourage group members to forge a creative atmosphere, to learn new things, and to give support to new ideas (Taggar, 2002). Thus, one can argue that teams composed of open and receptive people are likely to have participative climate and ready to endorse innovation (Edmondson, 1999; West, 2012). In other words, the level of openness is potentially a leading factor for teams to be open to new and creative ideas, as well as supporting the novel paths leading to innovation.

The hypothesis is:

H2H: The positive linear relationship between mean level of openness to experience and team innovative performance is mediated by participative safety and support for innovation such that,

- mean level of openness to experience has a positive linear relationship with participative safety, and, in turn, participative safety has a positive linear relationship with innovative performance of teams

- mean levels of openness to experience has a positive linear relationship with support for innovation and, in turn, support for innovation has a positive linear relationship with innovative performance

2.3.2.f) Machivellinism

When it comes to the mediated associations between Machiavellianism and team innovative performance, relationship conflict is predicted as a intervening variable on the relationship. The political and manipulative tendencies of Machiavellians may cause a decline in their attention towards responsibilities of their job. In fact, Zetler and co-workers (2011) found a negative association between Machiavellianism and team commitment. In addition, other scholars have found that, coupled with unproductive work attitudes (Dahling *et al.*, 2009), Machiavellians are less likely to share their knowledge (Liu, 2008). Based on the arguments and findings above, considerable mean levels of Machiavellianism, including manipulative and deceptive attributes, may harm the connections among members and cause relationship conflicts, which may possibly lead to team member dissatisfaction (Wisse and Sleebos, 2016). Moreover, in light of the findings and theoretical underpinnings, it can be argued that, particularly in team situations where innovation is the focus, trust and intensive interactions among members are prerequisites for effective innovative performance; high-level Machiavellianism may lead to a potential decrease in innovative job performance. Drawing on the arguments and findings presented, the hypothesis will be:

H2I: The negative linear relationship between mean level of Machiavellianism and team innovative performance is mediated by relationship conflict, such that mean level of

Machiavellianism has a positive linear association with relationship conflict and in turn relationship conflict has a negative linear association with team innovative performance.

2.3.2.g) Narcissism

Moving on to the mediated associations between narcissism and innovative performance, participative safety and relationship conflict are expected to mediate such association. Particularly within the team context, it has been found that if there is no high self-enhancement opportunity, narcissistic individuals are prone to social loafing. What is more, with their self-absorptive and egocentric characteristics, it has been revealed that they are exploitative in their relationships (Milon and Davis, 1996, cited in Jakopwitz and Egan, 2005), reluctant to share information and keep critical knowledge to themselves (Nevicka *et al.*, 2011). Therefore, the presence of these members may harm the participative safety climate within teams and thus lowers the innovative efforts (Kayes, 2004). Having high levels of self-approbation, hyper-competitiveness and elitism may result in some counteractive behaviour from others, and clashes within the team. For instance, in teams, narcissistic members may be excluded by other members in terms of both formal and informal interactions (O'Boyle et al., 2012). Building on this, this type of worker may cause team member dissatisfaction and unsatisfactory group work (Soyer, Rovenpor, Kopelman, Mullins, and Watson, 2001). In light of foregoing findings and discussions, another prediction might be made about the positive association between narcissism and relationship conflict within teams, which may lead to low innovative performance. Given the predictions about the influence of narcissism on related team processes so far, it can be hypothesised that:

H2K: *The negative linear relationship between mean level of narcissism and innovative performance is mediated by participative safety and relationship conflict.* *Such that;*

-mean level of narcissism has a negative linear association with participative safety and, in turn, participative safety has a positive linear association with team innovative performance.

-mean level of narcissism has a positive association with relationship conflict and, in turn, relationship conflict has a negative linear association with team innovative performance.

2.3.2.h) Psychopathy

Moving on to the association of mean level psychopathy with mediating team processes and innovative performance, the expectation is towards a negative influence on participative safety, and a positive influence on relationship conflict. Since being inclined to be arrogant, deceitful and impulsive, one cannot maintain healthy relationships with other members of the team in normal circumstances. In effect, in a study that investigates interpersonal perceptions, it was revealed that psychopathic individuals were perceived negatively and less well liked (Rauthmann, 2012), and thus development of a participative and healthy climate in a team with such negative perceptions is not predicted to take place. Moreover, Scherer, Baysinger, Lebreton and Zolynsky (2013) found that groups with high levels of psychopathy are prone to engage in malfunctioned interactions. As a result, individuals with psychopathic characteristics can potentially have a negative impact on participative safety within the group, as other group members may find it difficult to talk freely and engage in constructive discussions with people showing an arrogant and irresponsible nature. Pushing this argument further, another prediction concerns relationship conflicts within teams that have psychopathic members. Behaving irresponsibly and deceitfully are expected to cause personal clashes amongst members that

may also have a negative influence on the innovative performance of teams. Thus, the hypotheses related to mediating variables will be:

H2L: *The negative linear relationship between mean level of psychopathy and team innovative performance is mediated by participative safety and relationship conflict.* Such that;

    - mean level of psychopathy has a negative linear association with participative safety and, in turn, participative safety has a positive linear association with team innovative performance

    - mean level of psychopathy has a positive linear associtation with relationship conflict and, in turn relationship conflict has a negative linear association with team innovative performance.

2.3.3. Moderating Relationships Between Personality Traits and Team Creativity/Innovation

In this third and last subsection predictions were developed based on the configuration approach of personality and team performance relationship including both mean and variability level associations. Therefore, hypotheses related to the moderating role of variability in personality on the association between mean level traits and outcomes related to creativity and innovation are developed under each Big Five and Dark Triad personality traits. To put it differently, in light of person - environment fit approach; the moderating impact of high (complementary) and low (supplementary) variability in personality traits on the association between high, moderate or low mean levels of personality and innovative performance is under examination.

2.3.3.a) Extraversion:

The moderating role of variability in extraversion on the relationship between mean level extraversion and team creativity as well as innovation, is investigated in this thesis. The main argument is that low and high mean levels of extraversion may not positively benefit team performance. As explained before, teams with low levels of extraversion are expected to suffer from reduced information exchange, whereas teams with high extraversion may result in too much talk with less task focus, as well as having excessive dominance within the team (Mohammed and Angell, 2003; Kichuk and Wiesner,1998; Mazur, 1973). Thus, in theory, having both low and high mean level of extraversion within a team is not favourable. In fact, scholars argue that teams definitely need formal and informal communication and idea exchange for creativity to flourish, and extroverts are seen as key to facilitating conversation within groups (Taggar, 2002). Drawing on these arguments, a moderate mean level of extraversion within the team is predicted to be positively related to team creativity and innovation because, at this level, the expectation is a safe environment for participation with no harmful conflict and easy interaction among team members. Taking the argument further, low or high levels of variability in extrovert members is not expected to result in a considerable change in the relationship. Since the total extraversion level is low, so the communication and interaction is low within the team, no matter how variable the team is. On the other hand, the opposite situation, which is having a high level of extraversion within the team, is also not supported. Researchers pointed out that, besides being talkative, extroverts tend to be assertive as well as dominant. Therefore, inclusion of too many extrovert members may cause harmful conflicts within teams (Mohammed and Angell, 2003; Kichuk and Wiesner, 1998; Mazur, 1973). Having too much assertiveness and dominance in hand once again bears out claims that the level of variability (low or high) within the team is not expected to have a significant influence on the expected negative

relationship between a high level of extraversion and creative and innovative performance of teams.

Figure 2.6: Variability in extraversion is moderating the relationship between mean level extraversion and creative/innovative performance of teams
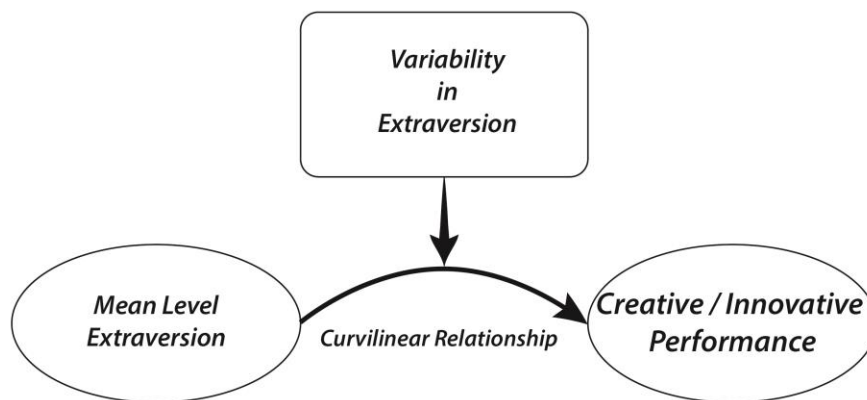
Considering the arguments above, a moderate level of extraversion within the team is expected to be positively related to team creativity and innovation because in these types of teams there is no expectation of a significant level of harmful conflict or weak communication arising. Additionally, if a moderate level of extraversion interacts with high variability in extraversion, this moderated interaction is predicted to have the most positive effect on the outcomes. Since, high variability in extraversion is also expected to be positively associated with creativity and innovation related outputs. On the basis of complementary fit approach, It is argued that

successful teams will be those that include a variety of extroverts with different levels. In other words, there should be some introverted members, as well as extroverts, within the teams (Neuman *et al.*, 1999). In fact, it is claimed that, introverts are adept at having holistic views about their teams - reflecting and assessing the teamwork they are involved in, and these features can indeed be beneficial for teams in terms of solving complex problems and making decisions (Bradley and Hebert, 1997). Considering the arguments above, in present research, a high level of variability in extraversion is favoured, whilst low-level variability (summplemntary fit) is not supported as there won't be any influencing extroverts who foster interaction. In fact, findings also support these arguments. In their research, Barry and Stewart (1997) found a curvilinear relationship between the proportion of extrovert group members and group performance. Another investigation by Neuman and co-workers (1999) also reveals a positive relationship between heterogeneity in extraversion and group performance. Therefore, having an average level of extraversion and high variety of members from almost all levels of extraversion is expected to be positively related to creative and innovative performance of teams. In this regard, *Team B (shown in red in the figure 2.7 below)* represents an ideal example of a team type that has a moderate mean level and high variability in extraversion.

The third predicted hypotheses for both creativity and innovation are:

H3A: *The curvilinear relationship between mean level of extraversion and team creative performance is moderated by variability in extraversion, such that the association between a moderate mean level of extraversion and creative performance is most positive when the variability in extraversion is high.*

H3B: *The curvilinear relationship between mean levels of extraversion and innovative performance is moderated by variability in extraversion, such that the association between*

moderate mean level of extraversion and innovative performance is most positive when the variability in extraversion is high.

Figure 2.7: Team Types Based on Their Mean Levels and Variabilities in Extraversion

X : Indicates a team member

Table 2.1: Explanations of performance expectations of team types based on the mean and variability levels of extraversion

TEAMS	LEVEL	VARIABILITY	CREATIVITY	REASON
A	*Low*	*High*	*Low*	Low level of extraversion within the team jeopardises the information flow among members since there is no extrovert member who will be the facilitator of formal and informal transaction. Strong variance among members is considered as beneficial. However, the average level of extraversion is low so the expectation is weak impact on the relationship between mean level of extraversion and the outcomes.
B	*Moderate*	*High*	***High***	This team is expected to be the best performer in terms of both creativity and innovation. Because there will be adequate level of communication and low dominance so no dysfunctional conflicts. Having high level of variability within team in terms of extraversion is also considered as good for the team to be able to reach the right harmony for creativity and innovation.
C	*High*	*High*	*Low*	High level of extraversion is also not favoured within the teams because extraversion comes with the dominant characteristics and these cause dysfunctional conflicts within teams. Additionally, in high level of extraversion situations too much talk is expected and this may inhibit the team`s focus on accomplishing creativity and innovation related tasks.  As mentioned above high variability is seen as positive yet the average level of extraversion is high within the team thus there won`t be a strong influence on the relationship between variability and the investigated outputs.
D	*Low*	*Low*	*Low*	The mean level of extraversion is low and also variability is low which is not seen as promising situation for both creativity and innovative performance.
E	*Moderate*	*Low*	*Low*	Although the mean level is moderate, the team is highly homogeneous in terms of extraversion that is not a favourable situation for creativity and innovation.
F	*High*	*Low*	*Low*	In this team, once again the mean level is high and variability is low hence creative as well as innovative performance is expected to be low.

2.3.3.b) Agreeableness:

In this part of research, the moderating impact of variability in agreeableness on the association between mean level of agreeableness and team creativity and innovation is under investigation. Firstly, the prediction related to the impact of mean level of agreeableness on the outcomes is that a moderate mean level of agreeableness is positively associated with team creativity and innovation. Since, with a low mean level of agreeableness may have a lot of disagreeable members, and thus suffer conflicts and weak cooperation; on the other hand, highly agreeable teams may confront with high cohesion, less task-related conflict and groupthink, which are also seen as detrimental to group creativity and innovation (Jehn, 1995; Bechtoldt, De dreu, Nijstad, 2007). When it comes to variability, in average agreeable teams, having members from all levels of agreeableness within the team, is expected to result in the best outcome in terms of creativity and innovation. In other words, when it comes to novel idea generation and innovation implementation, complementary approach of having both agreeable and disagreeable members is treated as being beneficial, instead of supplementary design with one type dominating the team. The reason for this is that agreeable members are good at facilitating team functioning and triggering cooperation and a safe climate (Stewart *et al.*, 2005). Per contra, less agreeable members can challenge ideas and are less likely to conform easily, so that teams can have constructive conflicts. Indeed, this type of conflict is seen as essential for idea generation and elaboration, which leads to creative synergies within teams (Baer *et al.*, 2008). In other words, high variability in agreeableness, is predicted to be positively associated with both creative and innovative performance.

Figure 2.8: Variability in agreeableness is moderating the relationship between mean level openness and creative and innovative performance of teams
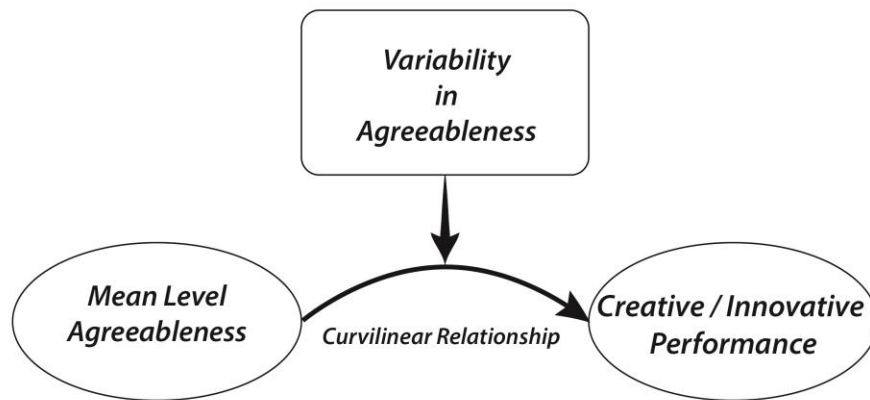
In fact, some researchers support this argument and predict heterogeneity in agreeableness when the creative performance is the matter at hand, because whereas some members who are high in agreeableness foster a safe and friendly climate, those who are low in agreeableness dare to engage in task-related conflicts and voice their concerns regarding problematic issues (Bechtoldt *et al.*, 2007). Considering the theory and the arguments above, the prediction is that high variability in agreeableness will have the most positive influence on the relationship between moderate mean level of agreeableness and performance related to creativity and innovation. *Team B* (shown in red in the figure 2.9 below) matches the expectations with regards to mean and variability in agreeableness.

The second hypothesis:

H3C: *The curvilinear relationship between mean level of agreeableness and team creative performance is moderated by variability in agreeableness, such that the association between moderate mean level of agreeableness and creative performance is most positive when the variability in agreeableness is high.*

H3D: *The curvilinear relationship between mean levels of agreeableness and team innovative performance is moderated by variability in agreeableness, such that the association between moderate mean levels of agreeableness and innovative performance is most positive when the variability in agreeableness is high.*

Figure 2.9: Team Types Based on Their Mean Levels and Variabilities in Agreeableness

X : Indicates a team member
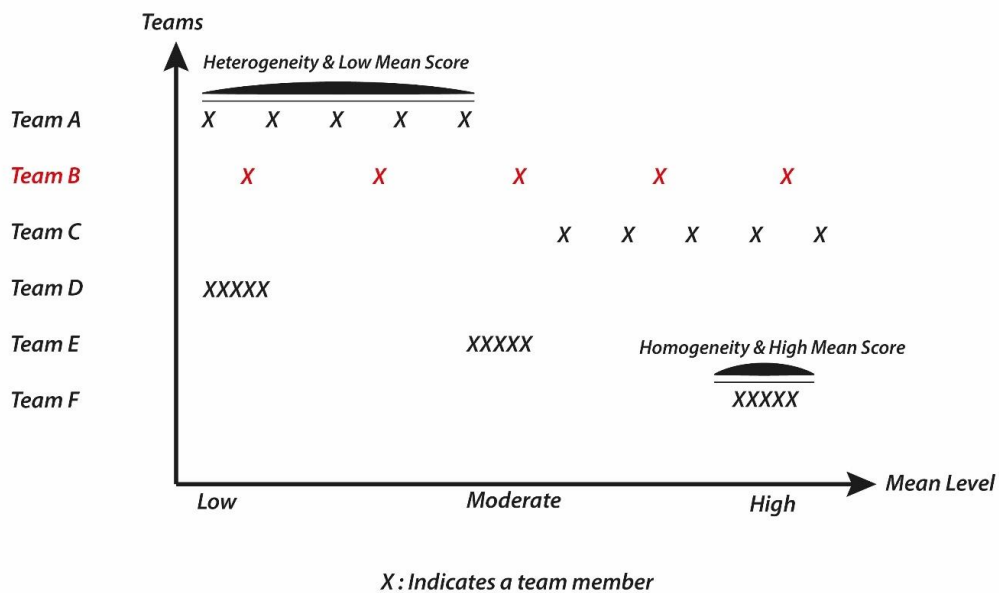
Table 2.2: Explanations of performance expectations of team types based on the mean and variability levels of agreeableness

TEAMS	MEAN LEVEL	VARIABILITY	CREATIVITY	REASON
A	Low (-)	High (+)	Low	A low level of agreeableness within the team jeopardizes the cooperation and knowledge sharing among members. Since there will be no agreeable member who facilitates formation of trust among members, as well as increasing the psychological safety in the team Strong variance among members is considered as beneficial. However, the average level of agreeableness is low so the expectation is weak impact on the relationship between mean level of agreeableness and team creativity and innovation.
B	*Moderate (+)*	*High (+)*	*High*	This team is predicted to be the best performer in terms of creativity and innovation. Because the mean level is moderate and therefore the expectation is adequate level of cooperation trust and constructive task related conflicts within the team. A high level of variability within the team in terms of agreeableness is also considered as positive for the team to be able to reach the right harmony through having adequate level disagreeable agreeable members for creative and innovative performance.
C	High (-)	High (+)	Low	A high level of agreeableness is also not favoured within the teams because agreeableness comes with the confirmative and less conflict-oriented nature and these characteristics can cause dysfunctional level of cohesion, groupthink and weak minority dissent in the team. High variability in agreeableness is seen as positive yet the average level of agreeableness is high within the team thus there won't be strong impact on team creativity and innovation.
D	Low (-)	Low (-)	Low	The mean level of agreeableness is low and also variability is low which is not seen as promising situation for the creative and innovative performance.
E	Moderate (+)	Low (-)	Low	Although the mean level is moderate, the team is highly homogeneous in terms of agreeableness that is not a favourable situation for creativity and innovation related performance.
F	High (-)	Low (-)	Low	In this team once again, the mean level is high and variability is low hence team creativity and innovation is expected to be low.

2.3.3.c) Conscientiousness:

This time variability in conscientiousness is expected to moderate the team level relationship between mean level conscientiousness and creativity as well as innovation in teams. When the examination is about the role of conscientiousness on team creativity and innovation, theory and research do not significantly favour conscientiousness in teams particularly for task related to creativity. (Baer *et al.*, 2008; Robert and Cheung, 2010). It is in fact, claimed that the importance of having heterogeneity in conscientiousness, may be essential (Litchfield, Gilson and Shalley, 2017). In addition, Buchanan (1998) revealed the positive impact of conscientiousness members on a team's creative performance as long as there is a moderate level of extraversion and high levels of openness within the team. Considering the theoretical background and arguments of previous researchers, moderate level of conscientiousness is expected to positively related to both creative and innovation related outcomes as high level of conscientiousness can inhibit creative performance, whilst conversely a low mean level of conscientiousness may lead to low task cohesion and motivation problems.

On the other hand, when it comes to moderating impact of variability in conscientiousness the expectation is different for creativity and innovation. In addition, there has been no significant investigation into the variability aspect of the relationship between conscientiousness and the related outcomes. When it comes to creativity, homogeneous teams are likely to fall behind in terms of the novel idea generation, while teams without conscientious members will be lack responsibility in terms of reaching the core mission. Therefore, having a variety of members from almost all mean levels (high, moderate, low) of conscientiousness may generate the correct harmony and composition for creativity. On the other hand, when the matter is innovation a low level of diversity in conscientiousness is expected to create the most positive outcome, because high variability in conscientiousness may involve members with high social

loafing tendencies and low task focus (Schippers, 2014). Having the complex task in hand, these features are likely to harm the teams' innovative performance; therefore, particularly in the implementation stage, teams may not tolerate low conscientiousness (Latené, Williams and Harkins, 1979). *Team B* (shown in red in the figure 2.11 below) is representative of the ideal type of team in terms of both mean levels and variability in conscientiousness.

Based on the prior literature and arguments, the prediction is in line with complementary fit approach and high variability in conscientiousness is expected to have the most positive impact on the relationship between moderate mean level of conscientiousness and creativity. On the other hand, when the matter is innovative performance of teams the expectation is in congruence with the supplementary fit perspective, such that low variability in conscientiousness is predicted to have the most promising influence on the relationship between average level of conscientiousness and innovative performance. Team E (shown in the figure 2.11 below) is representative of the team that has ideal composition regarding conscientiousness for team innovation

The second hypothesis is:

H3E: *The curvilinear relationship between mean levels of conscientiousness and team creative performance is moderated by variability in conscientiousness, such that the association between moderate mean levels of conscientiousness and creative performance is most positive when the variability in conscientiousness is high.*

H3F: *The curvilinear relationship between mean level of conscientiousness and team innovative performance is moderated by variability in conscientiousness, such that the association between moderate mean level of conscientiousness and innovative performance Is most positive when the variability in conscientiousness is low.*

Figure 2.10: Variability in conscientiousness is moderating the relationship between mean level conscientiousness and creative / innovative performance of teams

Figure 2.11: Team Types Based on Their Mean Levels and Variabilities in Conscientiousness
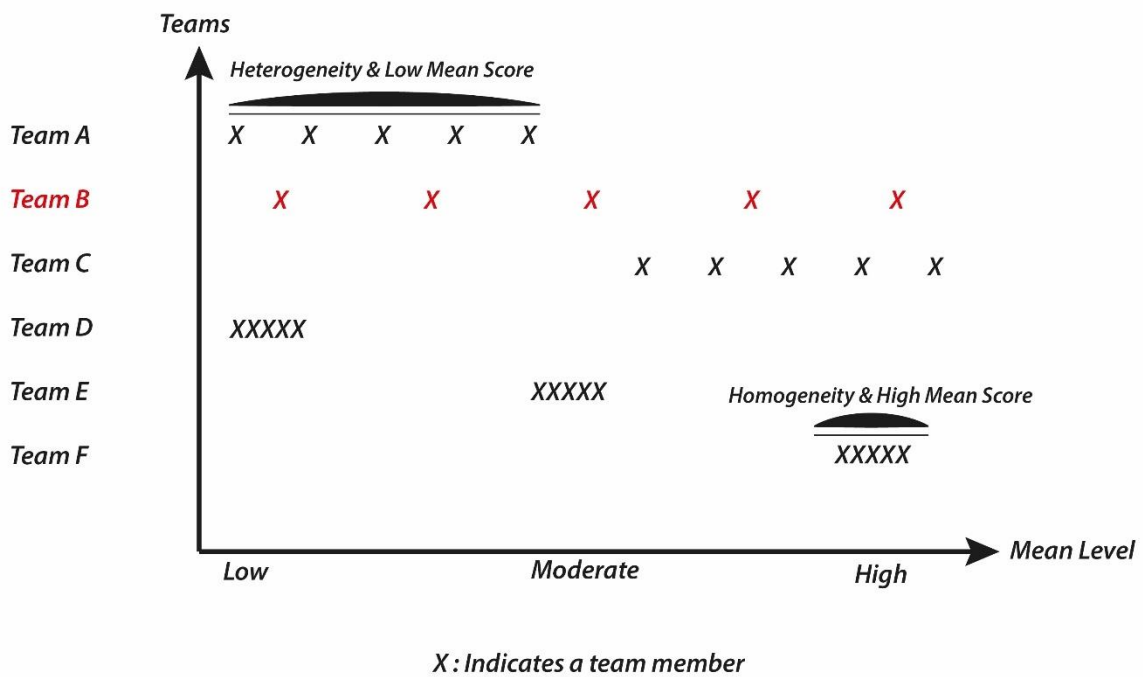

X : Indicates a team member

Table 2.3: Explanations of Performance Expectations of Team Types Based On the Mean and Variability Levels of Conscientiousness

TEAMS	LEVEL	VARIABILITY	CREATIVITY	REASON
A	Low (-)	High (+)	Low	Low level of conscientiousness within the team may cause reduction on the task cohesion, responsibility rates of the team which is expected to have a negative impact on creativity and innovation since conscientious members are famous for achieving the targets and being responsible for the task in hand teams need moderate level of conscientiousness. Strong variance in conscientiousness is considered as beneficial. However, in team A average level of conscientiousness is low, so no matter how varied the team, the creative as well as innovative performance will be low.
B	Moderate (+)	High (+)	High	This team is expected to be the best performer in terms of creativity and innovation because there will be adequate levels of focus on the creative task and low level of rigid thinking and adherence to established ways of thinking and doing things. Having high level of diversity in conscientiousness within teams is also considered as good for the team to be able to reach the right harmony for team creativity and innovation. By way of saying, heterogeneity among members from all levels (high, medium and low) of conscientiousness is predicted to be the most creative composition.
C	High (-)	High (+)	Low	High level of conscientiousness is also not favoured within the teams because conscientiousness comes with the rigid thinking and tendency to act towards established ways of doing things and these types of features are not favoured when it comes to creativity and innovation. As mentioned above, high variability is seen as positive for creative performance yet the average level of conscientiousness is high within the team thus there won't be strong influence on creativity and innovation.
D	Low (-)	Low (-)	Low	The mean level of conscientiousness is low and, as aforementioned, this situation is not seen as a promising one for both creative and innovation related performance. In addition, when the average level of conscientiousness is low within the team, the level of variability is not expected to have strong influence on the outcomes.
E	Moderate (+)	Low (-)	Low	This time team E is expected to have the best composition type for the innovative output. Since, the mean level is moderate, Team E is highly homogeneous in conscientiousness and although that is not a favourable situation for creative performance it is a preferred one for innovation as both concepts are distinct and when the matter

				is innovation members with low level conscientiousness are not preferred.
F	*High (-)*	*Low (-)*	*Low*	In this team, once again, the mean level is high and variability is low hence both creativity as well as innovation related performance of teams is expected to be low.

2.3.3.d) Neuroticsm:

The fourth moderating association is between mean levels of neuroticism and team creativity that is moderated by the variability in neuroticism. In fact, when the matter is neuroticsm, the expectations and research findings are mostly dominated by results with negative associations (Barrick *et al.*, 1998; Van Vianen and De Dreu, 2001). In this regard, low levels of neuroticism are expected to generate the most positive impact on both team creativity and innovation when there is a low level of variability within the team. In fact, research and theory signify the benefits of emotional stability, which is the effective opposite of neuroticism, within teams. It is argued that the presence of neurotic members in work groups may have an unfavourable influence on performance through impeding cooperation, the climate and cohesion (Van Vianen and De Dreu, 2001). Pushing this argument further, other researchers have claimed that effective teams are those that are composed of emotionally stable members, rather than neurotic ones (Barrick *et al.*, 1994; Neumann *et al.*, 1999). Thus, this time, instead of heterogeneity, supplementary type of congruence underpins the prediction and thus homogeneity in neuroticism with low mean levels is favoured for both creativity and innovation related outcomes. As a result, the expectation is that low levels of variability in neuroticism should make the most promising positive change on the relationship between low mean levels of neuroticism and team creativity

as well as innovation. *Team D* (shown in red in the figure 2.13 below) represents the ideal team, which is homogenous and has a low mean level score for neuroticism.

The second proposed hypothesis is:

H3G: *The relationship between mean level of neuroticism and creative performance of teams is moderated by variability in neuroticism, such that the association between low mean level of neuroticism and creative performance of team is most positive when the variability in neuroticism is low.*

H3H: *The relationship between mean level of neuroticism and team innovative performance is moderated by variability in neuroticism, such that the association between low mean level of neuroticism and team innovative performance is most positive when the variability in neuroticism is low.*

Figure 2.12: Variability in neuroticism is moderating the relationship between mean level neuroticsm and creative / innovative performance of teams

Figure 2.13: Team Types Based on Their Mean Levels and Variabilities in Neuroticsm
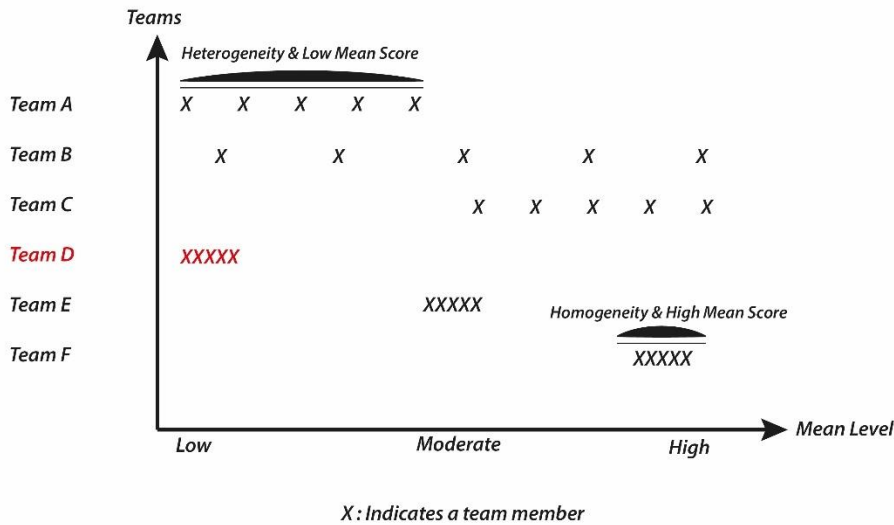
Table 2.4: Explanations of Performance Expectations of Team Types Based on the Mean and Variability Levels of Agreeableness

TEAMS	LEVEL	VARIABILITY	CREATIVITY	REASON
A	Low (+)	High (-)	Low	A low level of neuroticism within the team is considered beneficial for team cooperation, effective knowledge sharing and creativity as well as innovation. However, Team A loses the best performance due to having high level of variability. Considering the negative influences of the neurotic members on team climate, interpersonal facilitation and the outcomes, low variety in neuroticism is expected to create more promising results in terms of both creativity and innovation.
B	Moderate (-)	High (-)	Low	As mentioned above, high variability in neuroticism is not favoured for both creativity and innovation associated performance of teams. Moving on to the moderate mean-level of neuroticism which refers to allowance of some level of neuroticism within teams. Considering the theory and research findings, even moderate mean level of neuroticism is not favoured for team creative as well as innovative performance.
C	High (-)	High (-)	Low	Based on the previous arguments, the interaction of high mean levels and high variety of neuroticism is predicted to generate negative results. Since groups like Team C are composed of members who have high tendency of neurotic behaviours which may result in dysfunctional reactions to the situations and neurotic atmosphere within the teams.
D	Low (+)	Low (+)	High	Team D is expected to be the best performer team type in terms of both creativity and innovation. Because it has both low level of neuroticism and high level of homogeneity in neuroticism and each of these situations are most positively related to the investigated outomes.
E	Moderate (-)	Low (+)	Low	Although, Team E has low level of variability in neuroticism, it has average mean level of neuroticism all across the team which is likely to inhibit the creative as well as innovative potential of the teams.
F	High (-)	Low (+)	Low	In this team, once again, the mean level of neuroticism is high and the impact of low heterogeneity in the team is expected to be low hence both novel idea generation and implementation performance is expected to be low.

<u>Openness to Experience:</u>

The fifth expectation is that the relationship between mean level of openness and team creative performance is moderated by variability in openness to experience. The theory states that members that have open characteristics are curious, broad minded (Baer et al, 2008). In this sense, having members who are enthusiastic to try new things will increase the motivation and the courage to follow complex routes of creativity and innovation. In this regard, teams aiming for creativity should have members who are open to new experiences and have a tendency to develop and support new idea generation (Bechtoldt *el al.*, 2007). Research, on the other hand, has mixed findings regarding the relationship between openness to experience and creative performance; while some researchers could not find any strong associations between the variables (Baer *et al.*, 2008), others have found positive relationships between variability in openness and creative performance (Schilpzand, Herold and Shalley, 2011). Nevertheless, based on the strong theoretical underpinnings there is a tendency to expect strong relationship between openness to experience and divergent thinking at team levels (Bolin and Neuman, 2006; Litchfield *et al.*, 2017). Hence, I argue that when the target is novel idea generation and innovation implementation, homogeneous teams with high mean-level openness are likely to be more effective because teams with low and moderate levels of openness to experience are not expected to produce the most positive outcomes. Additionally, based on the strong association between openness to experience and both individual and group creativity and innovation, variability in openness is not favoured hence the prediction is in line with person environment model of supplementary fit where homogeneity is supported. As a result, homogeneity in openness to experience within teams that also have a high mean-level openness score is favoured. These types of team (as for *Team F*, shown in red in the figure 2.15 below) is expected to reach the most positive outcomes that are related to both creativity and innovation in teamwork.

The second hypothesis is:

H3I: *The relationship between mean level of openness to experience and creative performance of teams is moderated by variability in openness to experience, such that the association between high mean level of openness to experience and creative performance of teams is most positive when the variability in openness to experience is low.*

H3K: *The relationship between mean level of openness to experience and team innovative performance is moderated by variability in openness to experience, such that the association between high mean level of openness to experience and team innovative performance is most positive when the variability in openness to experience is low.*

Figure 2.14: Variability in openness to experience is moderating the relationship between mean level openness to experience and creative/innovative performance of teams
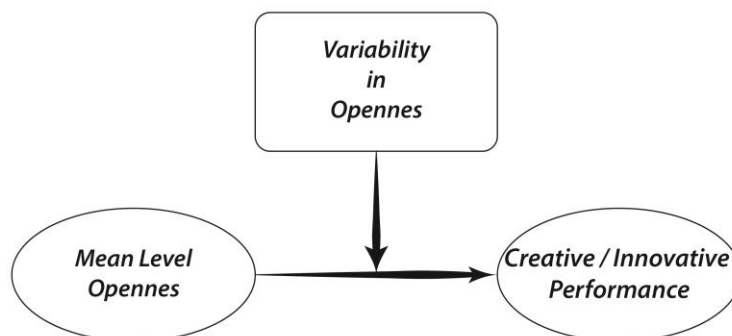
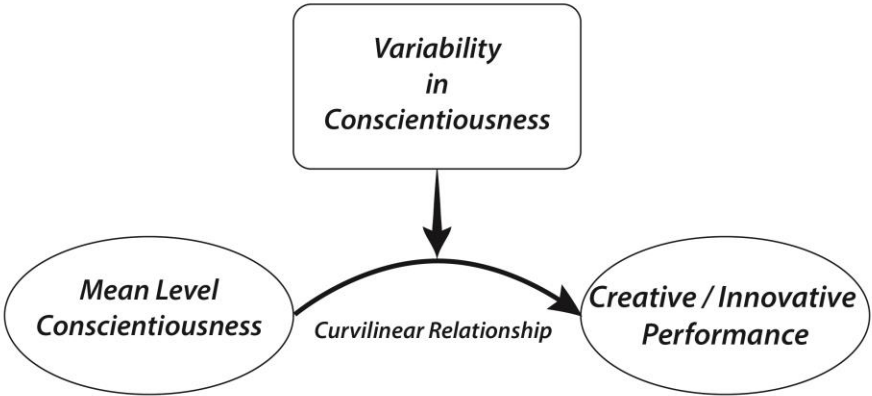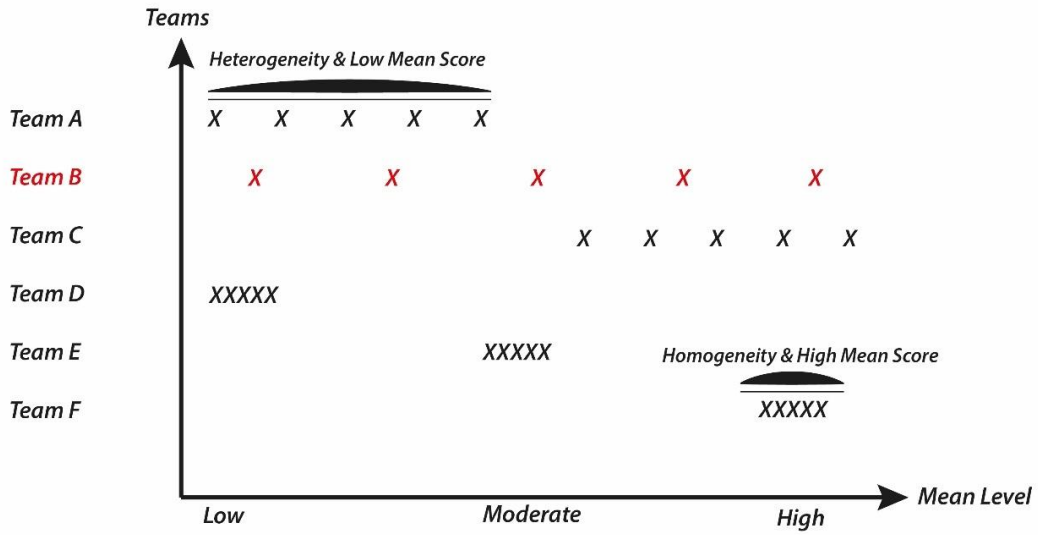**Figure 2.15: Team Types Based on Their Mean Levels and Variabilities in Openness**

X : Indicates a team member
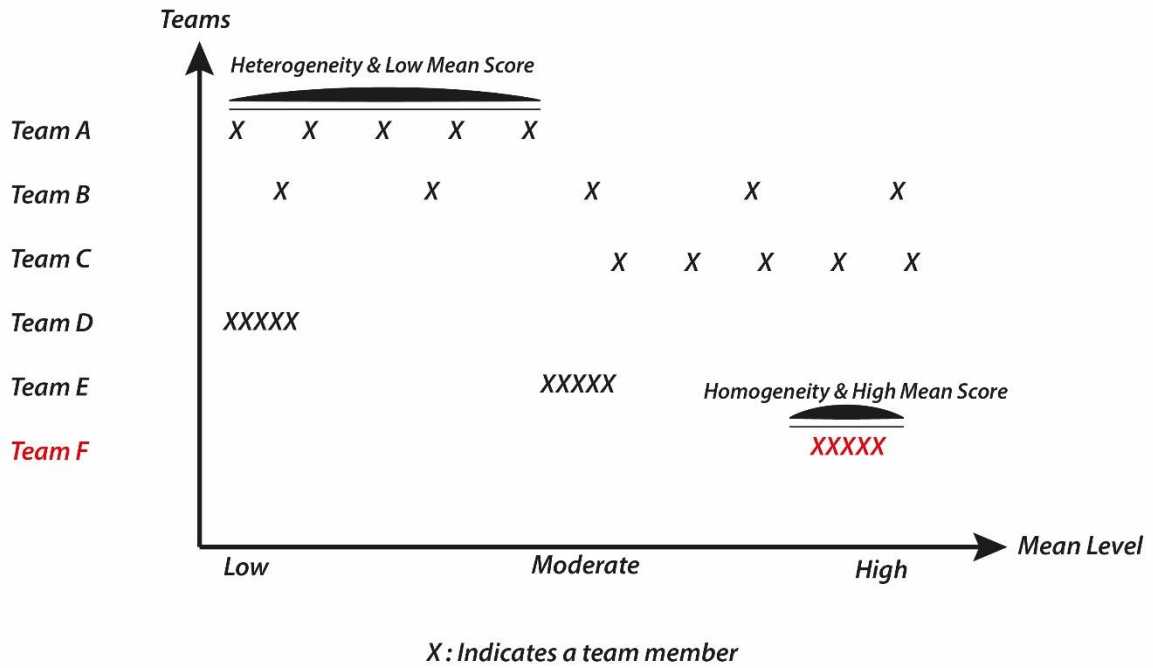
Table 2.5: Explanations of Performance Expectations of Team Types Based on the Mean and Variability Levels of Openness

TEAMS	LEVEL	VARIABILITY	CREATIVITY	REASON
A	Low (-)	High (~)	Low	Low level of openness to experience within the team reduces the acceptability of new ideas and idea sharing among members since there will be no open member who could facilitate the sharing and circulation of new ideas as well as supporting them. Strong variance among members is also not considered to be beneficial because the expectation is a linear relationship between openness and team creativity and innovation. The more open members are in the team the better their performance will be. Additionally, having high level of variety will not have a much impact on the relationship between mean level of openness and the outputs as the average level of agreeableness is low across the team.
B-1	Moderate (~)	High (~)	Moderate	The prediction is the positive linear relationship between openness and creativity as well as innovation. Therefore, moderate level of openness may also have positive impact on the team, but team B is not the most preferred one when the targets are creativity and innovation. High level of variability within the team in terms of openness to experience is considered as negative for the team. The prediction, in fact, favours the homogeneity in openness.
C	High (+)	High (-)	Moderate	Although Team C has high level of openness, the homogeneity level within the team is weak. Thus, Team C is not likely to generate the most positive outcome.
D	Low (-)	Low (+)	Low	The mean level of openness is low and also variability is low which is not seen as a promising situation for the creative and innovative performance. Indeed, having been deprived of open members, team D may be the weakest link for the outcomes.
E	Moderate (~)	Low (+)	Moderate	Although Team H is highly homogeneous in terms of openness to experience, its mean level is moderate. The moderate mean level of openness is not the preferred option for both creative and innovative performance when there is a possibility for composing teams that have high mean level and homogeneity in openness as team E.
F	High (+)	Low (+)	High	Team F is predicted to be the best performer in terms of both creativity as well as innovation. Because it consists of members all of whom are highly open to new experiences. Considering the expected positive linear relationship between creative and innovative performance and both homogeneity in openness and mean-level openness, this team is predicted to have the right composition in openness for the outcomes of creativity and innovation.

Figure 2.16: Summary Figure of Expected Personality Composition within Teams with Higher Creative Performance
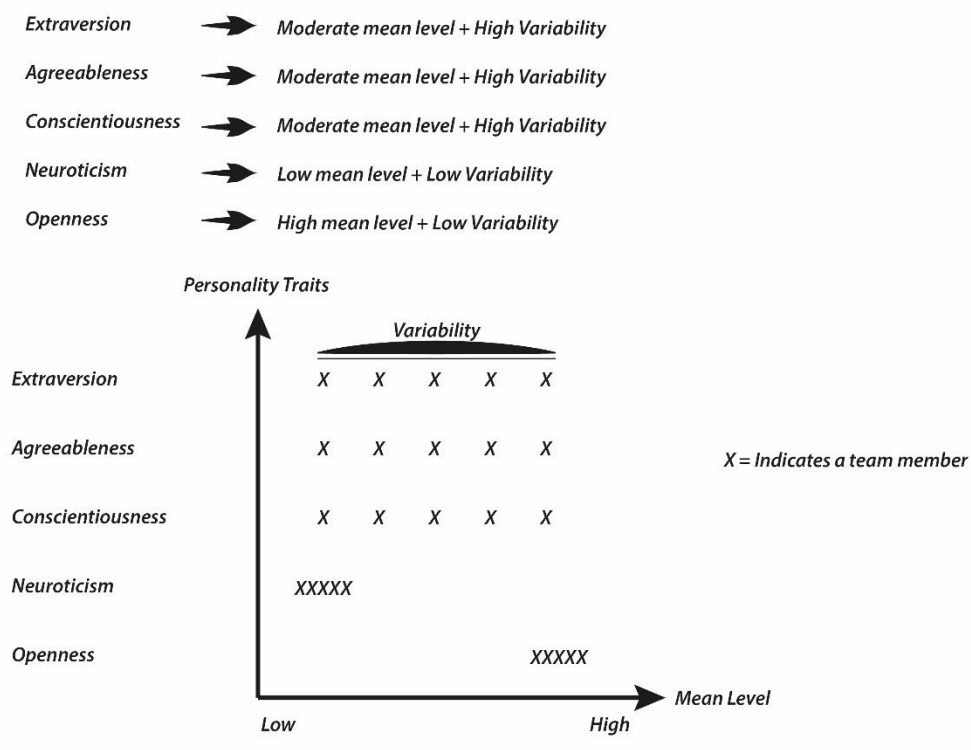
Machiavellianism

Turning to the relationship between mean levels of Machiavellianism and team performance that is moderated by variability in Machiavellinism, owing to the manipulative and selfish tendencies of Machiavellianism, the expectation with regards to evaluation of mean levels Machiavellianism on team innovative performance is negative (Molm, 2010; O'Boyle *et al.*, 2012). Drawing from this argument, teams with low mean levels of Machiavellianism may be less likely to encounter problems that are created by Machiavellian members. In contrast, teams with moderate mean

levels of Machiavellianism may still have relationship conflict and/or problems related to low cohesion. However, the most negative outcome is expected in teams that indicate high mean levels of Machiavellianism (Jaffe, Nebenzahl, Gotesdyner, 1989).

Figure 2.17: Variability in Machiavellianism is moderating the relationship between mean level Machiavellinism and team innovative performance
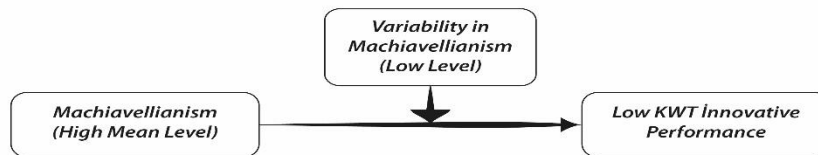
Additionally, when it comes to variability, low levels of variability with high mean levels are expected to be negatively associated with team innovative performance. Since, in a situation that has complementary characteristic and thus has high variability in Machiavellianism, teams may still have Machiavellianist members, yet in homogenous teams, the number of these individuals and their negative impact will be greater than in other circumstances (Zettler *et al.*, 2011; Jaffe *et al.*, 1989). As a result, I predict that teams that are composed of homogenous members whose mean levels of Machiavellianism is high, will have low innovative performance. *Team F* is an example of this, as shown in red in the figure 2.18 below.

H3L: *The negative linear relationship between mean level of Machiavellianism and team innovative performance is moderated by variability in machiavellinism, such that the association between high mean level of Machiavellianism and team innovative performance is most negative when the variability in Machiavellianism is low.*

Figure 2.18: Team Types Based on Their Mean Levels and Variabilities in Machiavellianism
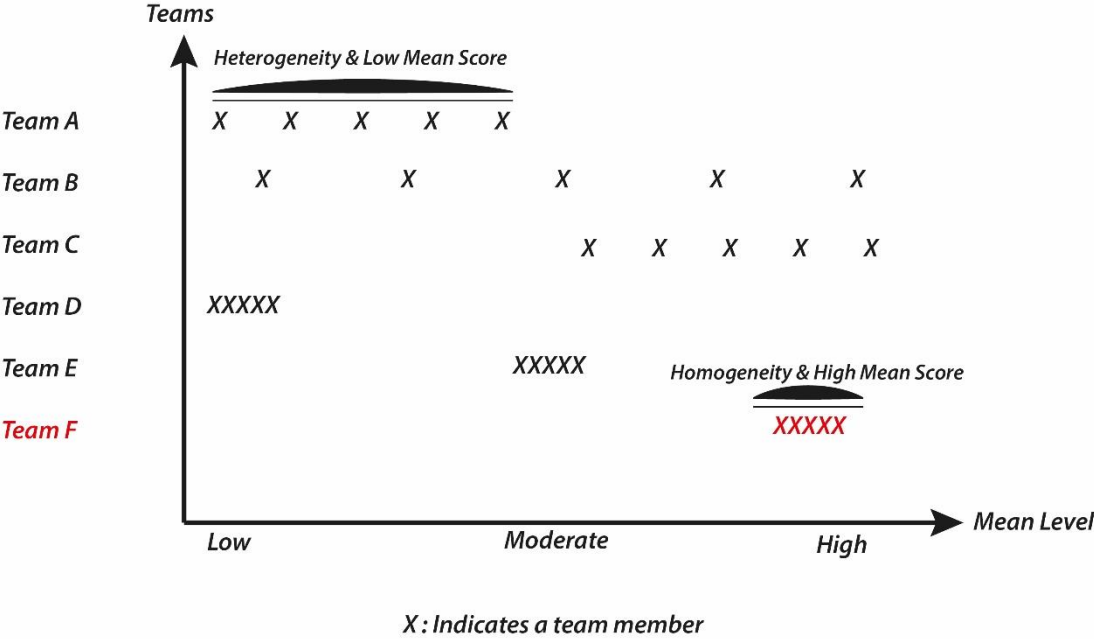
Narcissism

Moving on to the moderating relationship between variability in narcissism, mean levels of narcissism and team innovation, it can be argued that in comparison with low and moderate

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mean levels of narcissism, high mean levels of narcissism is expected to create the most negative outcome for teams because a narcissistic personality comes with attitudes that may cause relationship conflicts, and low communication and cohesion levels (Campbell, Bush, Brunnel, and Shelton, 2005). In fact, research has also found negative associations between narcissism and team performance (Resick, Whitman, Weingarde, and Hiles, 2009; Campbell *et al.*, 2000). Drawing on these arguments, the homogeneity of highly narcissistic members is also expected to create the most negative innovative performance (Campbell *et al.*, 2000). It can be argued that teams with high or moderate variability in narcissism may still involve narcissist members, yet these teams may be less negatively associated with innovative performance compared to teams with low variability in narcissism and since, in the latter situation, the number – and so the negative influence – of narcissists is likely to be higher. *Team F,* as shown in the figure 2.20, could be good example of the team type most in accord with the arguments above.

H3M: *The negative linear relationship between mean level of narcissism and team innovative performance is moderated by variability in narcissism, such that the association between high mean level of narcissism and team innovative performance is most negative when the variability in narcissism is low.*

Figure 2.19: Variability in narcissism is moderating the relationship between mean level narcissism and team innovative performance

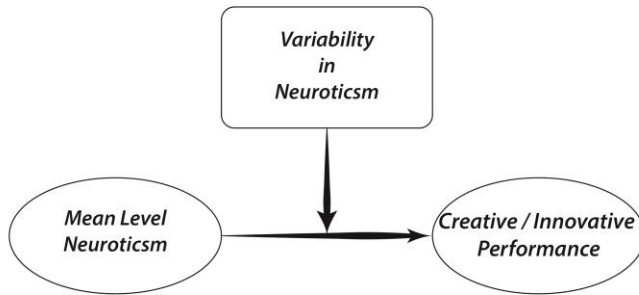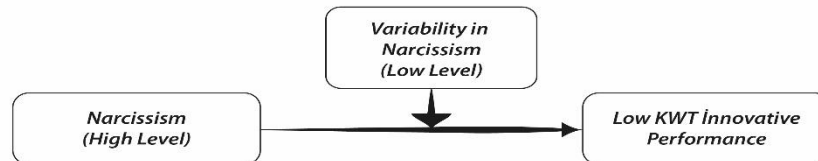**Figure 2.20: Team Types Based on Their Mean Levels and Variabilities in Narcissism**
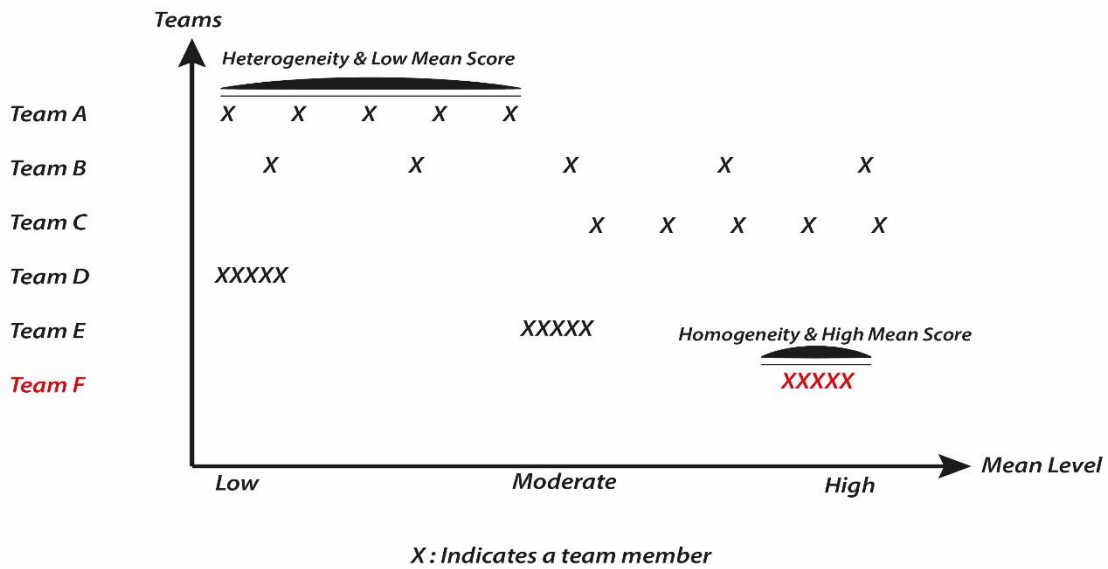
Psychopathy

Turning to the moderated relationship, the expectation is a low level of variability (homogeneity) and high mean levels of psychopathy creating the most negative outcome in terms of innovation. Having potentially disastrous attitudes of psychopaths in hand, high mean levels of psychopathy in teams is likely to create a considerable number of problems, not to mention, this level is expected to be more strongly related to negative outcomes compared to low and moderate levels of psychopathy (Spain, Harms and Lebreton, 2014; Jonason *et al.*, 2012). Indeed, in their study, O'Neill and Allen (2014) found a strong negative relationship between psychopathy and team performance since teams with low mean levels of psychopathy are the ones that do not include psychopaths, and this help teams avoid the problems that can be created by psychopathic members. In addition, teams with moderate mean levels of psychopathy may still have problematic issues, particularly problems related to relationship conflict and team cohesion, yet this mean level is still expected to create less negative outcomes in comparison with teams that have high mean levels of psychopathy (Scherer *et al.*, 2013).
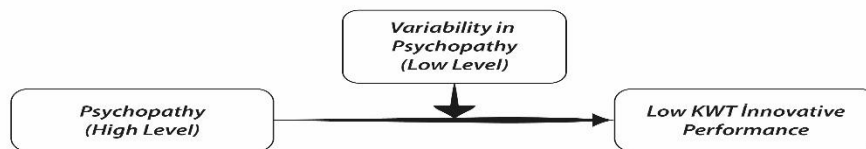
When it comes to variability, low levels of variability are predicted to be related most to negative outcomes. Teams that have homogeneity in members, all of whom have high mean levels of psychopathy, are the ones that involve more problematic members than others (i.e., teams that have moderate and high variability in psychopathy). To put it another way, although teams that have complementary nature and moderate or high variability in psychopathy may involve psychopathic members and may encounter the aforementioned team problems, these configurations are expected to have a less negative influence than teams that are homogenous in psychopathy (O'neill and Allen, 2014). Bringing all these arguments together, teams that are homogenous and have high mean levels of psychopathy are expected to show the least innovative outcome. Once again, *Team F*, shown in red in the figure 2.22 below, is expected to be most representative of this type.

H3N: *The negative linear relationship between mean level of psychopathy and team innovative performance is moderated by variability in psychopathy, such that the association between high mean level of psychopathy and tea innovative performance is most negative when the variability in psychopathy is low.*

Figure 2.22: Team Types Based on Their Mean Levels and Variabilities in Psychopathy
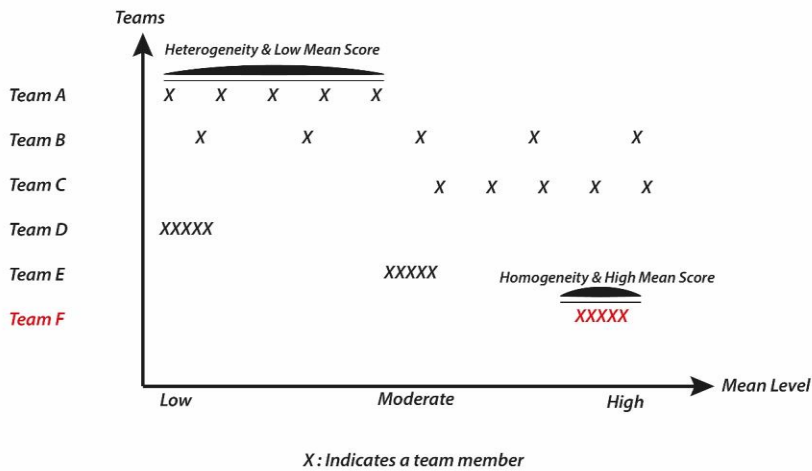
Figure 2.23: Summary Figure of Expected Personality Composition within Teams

Extraversion → Moderate mean level + High Variability

Agreeableness → Moderate mean level + High Variability

Conscientiousness → Moderate mean level + Low Variability

Neuroticism → Low mean level + Low Variability

Openness → High mean level + Low Variability

Machiavellinism → Low mean level + Low Variability

Narcissism → Low mean level + Low Variability

Psychopathy → Low mean level + Low Variability

Personality Traits

Variability

Personality Trait	Low				High
Extraversion	X	X	X	X	X
Agreeableness	X	X	X	X	X
Conscientiousness			XXXXX		
Neuroticism	XXXXX				
Openness					XXXXX
Machiavellinism	XXXXX				
Narcissism	XXXXX				
Psychopathy	XXXXX				

Mean Level

Low   High
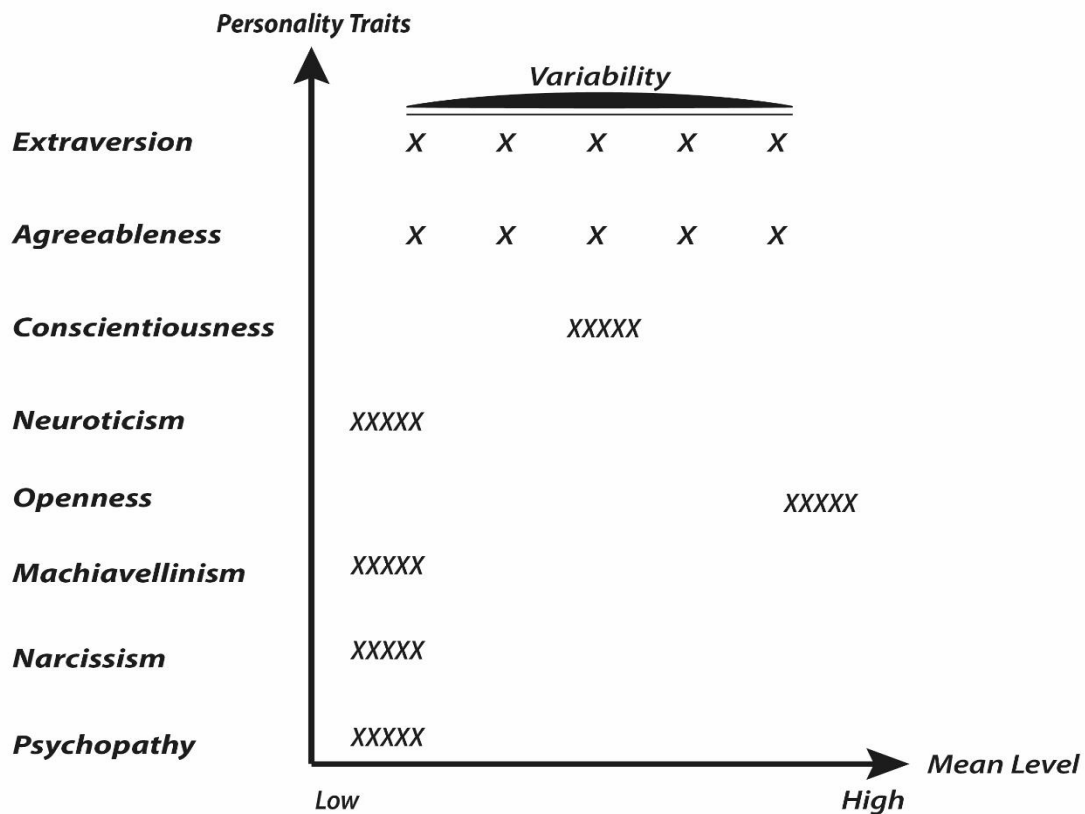
X = Indicates a team member

2.4. CHAPTER SUMMARY

In order to develop a solid understanding, in this chapter I introduced the conceptual framework and explained the constructs along with the related literature upon which I conclude by proposing the hypotheses. In this sense, first of all, the key input (personality traits), process (team processes) and output (creativity and innovation) variables were introduced under the IPO conceptual model. Add to this, the role of these input, process and output variables within the conceptual framework was examined. Then, based on this literature review, the logic behind the direct, mediated and moderated relationships among personality traits, proceses and outputs were discused. İn the end of this chapter, the hypotheses for this research were proposed in order to contend with the leading motive of this research "investigating the role personality composition and team processess on team creativity and innovation". Having reviewed the literature and developed the hypotheses for this thesis, the next section will discuss the philosophical underpinnings and methodological approach behind this research.

CHAPTER.3:   **METHODOLOGY**

3.1 INTRODUCTION

This chapter will firstly introduce two dominant research paradigms in management and work psychology related research. Based on the explanation and comparison of these two differing approaches, the reason for adopting a methodology for this research will be explained. Following on this, the information will be given about the design of this research including the nature of Study 1 and the Study 2 along with the justification of conducting these two studies. While Study 1 is mainly investigating the role personality composition on creativity in student teams, Study 2 probes the relationship between personality traits, team processes and team innovation in knowledge intensive real business context. Finally, the chapter ends with the information about ethical considerations for both studies conducted for the creation of this thesis.

3.2 RESEARCH APPROACH AND PHILOSOPHICAL ASSUMPTIONS

There are two main paradigms that dominate the social science and therefore management and organisational psychology related studies. Although there is no consensus among researchers regarding how to name these approaches, interpretivism and positivism are the ones most used (Bryman and Bell, 2003). These two paradigms are divided into 3 aspects based on their assumptions regarding the nature of reality (ontology), the nature of knowledge within this reality (epistemology), and the way of reaching that knowledge (method). In fact, it is claimed that a qualified research design should embrace the researcher`s choices regarding these assumptions (Sumner and Tribe, 2008; Guba and Lincoln, 1994). The interpretivism bases its ontological stance on socially constructed reality (relativism). Therefore, the main

epistemological assumption is that truth and the knowledge are constructed by the individuals within a particular context (interpretivist epistemology). Having this epistemological view in hand, interpretivists mostly use qualitative methods as interviews, observation etc., to reach a knowledge through understanding perceptions of the actors who construct the reality in that specific context. On the other hand, the positivist stance rests upon the realistic ontological premises which assume that the existence of the society is concrete and free from the social actors (realism). Following this, the epistemological view of positivists can easily be represented by a natural scientist who takes an objectivist stance and conducts investigations on observable social reality through avoiding bias or influence on outcome and aims to generate law-like generalisations (objectivism) (Hassard, 1991; Remenyi et al, 1998).

To this end, in the present research positivist paradigm is adopted for both studies. Therefore, I have a realist view on social entities and my assumption is that these entities have an external reality, and, in line with the realist ontological stance, the epistemology of this research will be objectivism. According to objectivism, methods used in natural sciences can be applied to social sciences (Johnson and Duberley, 2010) and quantitative methods can be used based on this assumption (Easterby, et al, 2008). In other words, the main approach of positivist research is to build theories by observing cause and effect relationships in social reality, develop hypotheses based on the theories and test these assumptions to reach generalizable empirical results (Bryman and Bell, 2007). In this research project the focus will be on reaching empirical generalisations and verifying causal effects between personality traits, innovation and creativity related group processes and team outcomes (Bryman, 2012). Positivist approaches and quantitative methods will underpin the methodology of this research in order to explain the nature of the relationships between highlighted variables and to contribute to the body of knowledge developed in management and work psychology domains.

3.3 RESEARCH DESIGN

This thesis consists of two distinct parallel studies that have been designed to test the developed hypotheses and thus evaluate the relationship between personality composition, team processes and team creativity (Study 1) and innovative performance (Study 2). There are several reasons for conducting the studies, and these motives will be explained in this section.

The main focus of the first study is to shed light on the association between team personality configuration and creative performance using student teams. The reason behind conducting Study 1 with student teams is that previous studies investigating the relationship between personality and creativity were also all done with student teams. Thus, to make a meaningful comparison, in this study I chose a similar sample to examine the impact of personality composition on team-based creativity over time.

This research investigated the relationships over a series of two creativity oriented task sessions: the first session was in the second week, and the second was on the fifth week, of the module. In this respect, Study 1 aims to observe the impact of personality traits on team creative performance over time through the comparison of short versus longer time period results. In the first episode, teams completed a series of creativity exercises based on the unusual uses task (UUT) approach. Hence, team members were asked to develop as many ideas as possible related to unusual uses for a common object within a particular amount of time in a single session (Baird *et al.*, 2012). During the second session, the objective of the continuing (familiar) teams was to develop realistic business plans in an Enterprise and Entrepreneurship module in a UK-based University in Week 5. Study 2, on the other hand, probes the association between personality composition, team process variables and innovative

performance of teams. In this regard, this study used knowledge worker teams operating in innovation-oriented R&D firms. In other words, Study 2 explores innovation that requires a setting that promotes novel idea generation and the solid implementation of these ideas. Therefore, a knowledge-intensive real business context was chosen.

In this regard, both studies include the testing of different yet similar hypotheses. As discussed in detail in the beginning of hypotheses development section creativity and innovation are similar and highly correlated processes. Therefore, identical hypothesis statements are used to increase the clarity and fluidity of the thesis. In this sense, each study tests mostly similar hypotheses in two distinct settings with different process and output variables. Additionally, although the generation of novel ideas could happen in any environment, innovation necessitates the implementation of these ideas, which also requires related resources, team inputs and processes (Davila, Epstein and Shelton, 2006). Therefore, the context of Study 1 is appropriate for examining the impact of personality composition on team creative performance. However, in order to investigate the association between personality and innovation, a real business context that incorporates an innovative setting was considered more appropriate to the generation of more insightful data (Thamhain, 2003; Gumusluoglu, Karakitapoglu and Hirst, 2013).

It is worthwhile noting that, both Study 1 and Study 2 were conducted at the same time, in parallel. Add to that, because creativity is a processor of innovation, examination of the impact of personality composition on both creativity and innovation related outcomes would provide a deeper insight in understanding the role of personality. Also, considering the fact that, the hypotheses for both studies are similar, testing those in two distinct real world settings could also provide additional understanding.

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Taken together, this thesis was designed to examine the role of personality on team creative and innovative performance in two distinct settings. These studies are conducted simultaneously and the teams in both settings have different characteristic features. These differences may be due to a number of aspects. In comparison with the professional work teams (KWTs) student teams are expected to have less teamwork experience and be less interdependent (Peeters et al, 2006). Additionally, while the chosen student team context (in other words the module design) was appropriate to measure creative performance as the module incorporates creativity related tasks, knowledge intensive R&D context was suitable for assessing the innovative performance of knowledge worker teams.

Another distinction between the two studies is that the team processes used to investigate mediating relationships were different. Whilst Study 1 incorporates 'team trust', Study 2 includes eight innovation-related team processes as mediating variables. Team trust was chosen as a process variable in Study 1 for to several reasons. First, owing to the time limits of the module and not to distract the learning environment of the students, investigation of only one process was allowed. Second, team trust is chosen due to its compatibility with the context of this study, as the literature suggests a strong association between team trust and creativity (Barczak, Lassk and Mulki, 2010). Third, the investigation of the mediating role of team trust on the relationship between personality traits and team creativity is new to team personality composition literature, which has been left essentially uninvestigated to date. To this end, Study 1 extends the knowledge as to the interplay between personality traits, team processes and creativity. Study 2, on the other hand, focuses on team innovation, and it applies eight innovation-related team processes as suggested by Hulsheger and co-workers (2009), all of which are particularly associated with team innovation. Therefore, Study 2 does not include team trust as a mediating variable.

As a result, conducting research on the role of personality on team creativity and innovation, allowed to examine the relationship in distinct team settings with comparatively different characteristic features as well as reaching more generalizable results. In this regard, the table 3.1 below summarizes the features and scopes of both Study 1 and study 2.

Table 3.1: Comparison of the Features and Scopes of Both Studies Conducted in Distinct Contexts

	Study 1	Study 2
Characteristic Features *Characteristic Features in General Based on the Team Type.*	*Student Teams* -Less team experience -Operate in shorter time period -Less interdependency among members -Creativity oriented task	*Knowledge Worker Teams* -More team experience -Operate in longer time period -Higher interdependency among members -Innovation oriented task
Inputs		
Big Five Personality Traits	✓	✓
Dark Triad Personality Traits		✓
Outputs		
Team Innovative Performance		✓
Team Creative Performance	✓	
Team Processes		
Team Trust	✓	
Participative (Psychological) Safety		✓
Task Focus		✓
Shared Objectives		✓
Support for Innovation		✓
Task Conflict		✓
Team Communication		✓

Team Cohesion		✓
Participative (Psychological) Safety		✓
Analyses		
Direct Relationship Between Personality Traits and Team Creative Performance (In Both Short and Longer Time Periods)	✓	
Direct Relationship Between Personality Traits and Team Innovation		✓
Mediated Relationships between; *Personality Traits – Team Trust Variable – Team Creativity*	✓	
Mediated Relationships between; *Personality Traits – 8 Innovation Related Team Processes – Team Innovation*		✓
Moderated Relationships between; *Mean level Personality Traits – Variability in Persoanality Traits (Moderator) – Team Creativity.*	✓	
Moderated Relationships between; *Mean level Personality Traits – Variability in Persoanality Traits (Moderator) – Team Innovation.*		✓

3.4 METHODS

The nature of the research questions and the embraced positivist paradigm informed the adoption of quantitative methods for both studies conducted in this thesis. In other words, quantitative approach was applied for gathering information in order to address the research questions. Accordingly, the chosen method determined the following data collection and data analysis actions (Saunders, Lewis and Thornhill, 2012).

Data for the Study 1 was gathered from undergraduate students operating in teams while Study 2 was conducted with knowledge workers working in teams. In accordance with the research design and approach endorsed in this thesis, survey questionnaires were used as a data collection tool in order to collect data from team members for both studies. In addition, Creative and innovative performance of teams were assessed by external judges (the module leader in study 1, and managers in study 2).

After the collection of self-reported surveys questionnaires and measurement of creative performance in both short and longer time frames the data was coded and analysed through using SPSS software. Multiple regression analysis was used to analyse both data sets. Specifically, regression analyses were used for direct association hypotheses. Additively, mediated and moderated regression analyses were also utilised in order to test mediated and moderating hypotheses respectively.

In terms of the sample, the initial study was composed of undergraduate students taking a module that requires to operate in teams for a creative task. On the other hand, the sample of the second study comprised by knowledge workers, who are highly qualified employees and

have specific work related expertise operating in teams to accomplish innovation related tasks in R&D organizations in Turkey. Data was collected based on an accessibility criteria in both studies and through using non-probability purposive sampling as this type of sampling allows the researcher home in on the samples which are believed to be critical for the research (Denscombe, 2007). In this regard, Patton (1990) underlined that: "the logic and power of purposeful sampling lies in selecting information-rich cases for study in depth. Information rich cases are those which one can learn a great deal about issues of central importance to the purpose of research" (p. 169). Therefore, conducting the studies in distinct contexts allowed me to examine the role of personality not least on team creativity (study 1) and innovation in knowledge intensive settings (study 2).

In this chapter, I have provided information and rationale for the chosen research design; methods, analysis strategies and samples that are utilized in order to answer the research questions introduced in this thesis. However, it is worth noting that details of the methods, analysis processess and the nature of samples in each study will be set in chapter 4 and 5.

3.5 ETHICAL CONSIDERATIONS

In this section, the information about how informed consent was gained, and how anonymity as well as confidentiality provided for the participants in both studies, will be explained. In addition, the way of protecting the collected data for Study 1 and Study 2 will also be explained.

Informed consent was obtained in both studies conducted and for all the data collected through questionnaires. Additionally, the participants were informed and guaranteed regarding the

privacy of the data, involvement rights and potential use of data (Saunders et al, 2007). In Study 1, information sheets were delivered to explain how the data collected from each participant would be used in the research project. What is more, the anonymity rights and the privacy of the participants, the voluntary nature of the study and the participants' rights to withdraw was explicitly explained in informations sheets provided and stated in the questionnaires delivered. Turning to study 2, the cover letter, questionnaires and the information sheet were delivered together to the participants. Privacy as well as anonymity rights of the participants and the information about consent was stated clearly both on the information sheets and the questionnaires. When the participants returned the questionnaires to the researcher this represented their consent. It is also worthwhile noting that, in both studies neither the participants nor the rankers (performance assessors) saw the information related to collected data (that includes both team survey results and external ratings) when filling the questionnaires. In addition, the researcher also did not share any related information about the results with both group. In doing so, the potential influence of knowing assessment results on team members filling questionnaires and external assessors rating particular teams was eliminated.

When it comes to ensurance of data confidentiality and the anonymity of the participants, the aim was a high level of protection for both studies. In this regard, hard papers related to study 1 and study 2 has been protected and kept in safe. What is more, no names were asked while conducting both studies to preserve anonymity of the participants. Additionally, codes given to each team only known by myself and the module leader in study 1 and only known by myself in study 2 so that I could identify which teams the participants belong to. As a result, there was no identification about participants in the outputs of both study 1 & 2.

Finally, it should be noted that, confidentiality was also guaranteed to the organisations in study 2 and no covert activities took place in this research. The two studies presented in this thesis are prepared and implemented on the basis of Research Ethics Policy of the University of Sheffield. The subject, design, methodology and the scope of both studies were approved before the data collection phase of the research by the University of Sheffield Management School research ethics reviewers. The data gathered form participants are only used for academic and research purposes for both studies and this condition was also underlined by the researcher. The approval letters can be found in the appendices section B.

CHAPTER.4: **STUDY 1- METHODS- RESULTS AND DISCUSSION**

4.1. INTRODUCTION

The fourth chapter of this thesis starts with the introduction of the Study 1 along with elaboration of its distinct features from the studies previously undertaken. Introduction is followed by the details about the methods used to address the related research questions, results of the Study 1 and the discussion on possible root causes of findings. Finally, current chapter closes with summarizing points that are related to the present study.

4.2. INTRODUCING STUDY 1

As stated previously, the main motive of the Study 1 is to probe the interplay between personality composition, team trust (mediating process variable) and team creativity. In this respect, the model presented below (Figure 4.1) conceptualizes the scope of Study 1 in terms of mediating, direct and moderating relationships among such variables.

Figure 4.1: An Extended Input – Process - Output Model of Student Team Creativity

INPUTS

PROCESS
VARIABLE

OUTPUT

PERSONALITY TRAITS
(Mean Level Scores)
Extraversion
Agreeableness

Mediated by
Team Trust

Direct Relationship

PERSONALITY TRAITS
(*Mean* Level Scores)
-Extraversion
-Agreeableness
-Openness to experience
-Extraversion
-Neuroticsm

STUDENT
TEAM
CREATIVE
PERFORMANCE

Moderated Relationship

PERSONALITY TRAITS
(*Variability* Level Scores)
-Extraversion
-Agreeableness
-Openness to experience
-Extraversion
-Neuroticsm

135

As depicted in the figure above there are three different levers of associations that will be covered in this study:

- *The first one is the mediated relationship between inputs (agreeableness, extraversion), team process variable as a mediator (team trust) and output (creative performance).*

- *The second lever is about direct relationship between mean levels of the personality traits and the team creative performance*

- *The third lever focuses on the moderating role of variability in Big Five personality traits on the relationship between mean level personality traits and the creative performance of student teams. Therefore, the third lever of the model represents a more complex association. It considers not only the effect of mean level personality on team creative performance, but also the moderating impact of personality diversity on a relationship.*

Study 1 was conducted in a University, located in Yorkshire, England. Briefly, participants were taking Enterprise and Entrepreneurship module 2014/15 under the control of the module leader. Therefore, this study has an artificial nature that brings more control on the study. This initial study is a distinct and a novel one that aims to address the gap in the team personality composition literature and also contribute to the existing knowledge. There are several features that clearly shows the novelty as well as the contribution of the study. In this regard, below I will present summarising information about the existing 4 previous investigations that are detailed in literature review chapter 2. Then based of this information I will explain the novel features of the present research and the reasons why I conducted the study 1.

Table 4.1 Summarizing Information About Previous Studies Investigating Personality Composition and Team Creativity Relationship

PREVIOUS STUDIES
1) <u>Bolin and Neumann 2006</u>   **Personality Variables**: Big five personality Traits **Aim:** Unpack the effect of personality on brainstorming performance through process mediators (social loafing, production blocking, evaluation apprehension) **Team Type:** Interactive brain storming Student groups **Sample Size:** 78 Teams **Task Type:** 2 Classic Idea Generation Task **Task Time:** Total time for two brainstorming tasks only 20 minutes **Team Level Examination:** Mean and Variance **Research Setting:** Laboratory (Artificial) context **Findings:** No support for the hypotheses
2) <u>Baer, Oldham, Jacobsohn, Hollingshead 2008</u>   **Personality Variables:** Big five Personality Traits **Aim:** To examine not only the direct impact of personality traits but also test the moderating role of creative confidence between the association. **Team Type:** Student Teams **Sample Size:** 147 Teams **Task Type:** Engaged in a total of 2 idea generation tasks during two one hour sessions covering human resource problems (session 1) and product development problems (session 2) **Task Time:** One hour sessions **Team Level Examination:** Mean **Research Setting:** Laboratory (Artificial) context **Findings:** No significant correlations between Big Five traits and creativity during either session. However, creative confidence variable within second session affected the relationships between extraversion, openness and conscientiousness.
3) <u>Robert and Cheung 2010</u>   **Personality Variable**s: Only one Big Five personality trait – Conscientiousness. Additionally, extraversion and openness to experience considered as control variables **Aim:** To test the association between conscientiousness and creative performance at team level. **Team Type:** Student Teams **Sample Size:** 55 Teams **Task Type:** Development of Rudimentary marketing plans for novel products **Task Time:** 50 Minutes **Team Level Examination:** Mean **Research Setting:** Laboratory (Artificial) context **Findings:** Conscientiousness negatively affected the team performance. extraversion and openness to experience were found to be unrelated to creative performance.

<table>
<tr><td colspan="1" align="center">**4) Schilpzand, Herold and Shalley 2011**</td></tr>
</table>

Personality Variables: Openness to experience
Aim: To investigate the association between openness to experience and creative performance at team level
Team Type: Student Teams
Sample Size: 31 Graduate Student project teams
Task Type: Participants participated in a project to develop a creative product or service to meet a market problem or opportunity.
Task Time: Semester long graded project
Team Level Examination: Mean and Variation
Research Setting: Laboratory (Artificial) context
Findings: Mean level openness was unrelated to creativity. However, it is found that variation in team level openness to experience matters for creativity.

First of all, Study one is conducted in an artificial context and the sample of the initial study was composed of undergraduate students taking a module that requires to operate in teams. In this regard, as one of the main motives of this thesis is to understand the interplay between personality composition, team process variables and team creativity, the artificial context enabled by the module was appropriate for investigating the role of personality composition on team creativity. Besides, in such a study I had got more control regarding the team size, team tenure and organizational terrain. Because, both the number of members in the teams and formation as well as disband times were determined by the module leader even before the module starts. Add to this, all of the student teams were performed under the same roof.

Secondly, the present study probes the relationship between the variables in both short and over a considerably longer time than the previously administrated investigations in the field. Stated briefly, in present research, the module lasted for 5 weeks, which gave the opportunity to examine the impact of all Big Five personality traits on creative performance at the team level over a longer time frame. To this end, this initial research has diverged from previous studies,

most of which have investigated the creative performance of teams in a single session. There is only one study, by Schilpzand and co-workers (2011), where the influence of openness to experience on creative performance over a continuous time period was investigated, and the present study distinctly probes the role of all Big Five variables on team creativity. Therefore, it creates an opportunity to observe the impact of personality on creativity in both short and longer time periods, and thus contributes to the existing knowledge. Indeed, the previous research findings underlined the importance of time as a determinant for team performance, particularly when it comes to deep level variables as personality traits (Harrison, Price and Bell, 1998; Jehn, Northcraft and Neale 1999). The root cause of this finding is that team members collaborate more over time, and thus they are more likely to share personal values and information as well as engaging in behaviours that reflect themselves (Harrison, Price, Gavin and Florey, 2002). Additionally, there are also clear arguments of scholars in the field of team personality composition as to how the impact of personality traits on performance can change depending on the time period over which they are considered (Petters *et al.*, 2006). To this end, probing the interplay between input, process and output variables over time will make a novel addition to the existing body of knowledge (Bell, 2007).

Thirdly, this study scrutinizes the moderating and mediating relationships among variables as never investigated before. In this sense, Study 1 looks at the moderating role of diversity in personality composition on the association between mean level personality traits and creative performance of student teams. In doing so it predicates on the configuration approach to team personality composition by incorporating mean (elevation) and diversity aspects of personality composition. That is, it probes the interaction effect between mean level personality traits and variability in personality on team creativity. In fact, none of the previously conducted studies examined the relationships among variables as such. What is more, the present research also

included team trust process variable and probed the mediating role of team trust on the association between extraversion, agreeableness and team creativity. Team trust was chosen as a process variable in this student team setting as there was less time and resources to explore a number of team processes due to the conditions of the study. By doing so, once again the present study separated itself both from the previously conducted studies and the Study 2 as team trust is the new variable that has a potential to mediate the association between personality and team creativity. To this end, Study 1 becomes the first one that probes the role of team trust as a mediator between personality and team creativity. As a result, these novel characteristics of the Study 1 offers an additional contribution to the existing literature, through exploring not only moderating but also mediating relationships among the variables included in the research.

4.3. METHODS

This study is quantitative in nature. The main purpose is to understand the relationship between the Big Five personality traits, trust in teams and creative performance of the student teams. In order to explain this relationship, I needed to gather information from the student teams working on a creative task. As such, and given the aim of this research, the present study was designed as survey research and therefore the widely-used Big Five personality and team trust questionnaire were used to measure personality and trust levels of the students within their teams and quantitative methods will assist to test the developed hypotheses regarding their relationship with creative performance of teams.

4.3.1 RESEARCH SAMPLE AND DATA COLLECTION

The module included 135 individuals composed in 24 teams and ranging in age from 19-25 years. Each team had 2 to 5 student members 119 individuals took part and within the scope of this research the teams were together for 4 weeks' time. The students were all assigned to their teams based on the diverse composition so that they were likely to differ based on their gender, ages and ethnicities.

The module was designed in a way to develop student's skills and knowledge about starting and running a business, and included the examination of the economical, political and societal assumptions regarding the nature of enterprise and entrepreneurship. Within the extent of this module the student teams needed to develop creative and feasible business plans and present them with a brief overview of an opportunity for a product, service or project. Relatedly, the creative performance of the student teams in longer time period was assessed in the mock presentations sessions which were held a week before assessment presentations. Therefore, these presentations were not included in the module assessments. However, the mock presentations were part of the module and thus it was important for the students to prepare the best presentation since it was the only chance for them to receive formative feedback on the mock presentations either from the module leader or the assistants before the module marking. Note that, the module marking includes original business plan presentations and an accompanying report whose contribution was 30% to final mark of the module. In this sense, by incorporating a meaningful task this study diverges from the studies that involve experiments or workshops that may not be related to the markings.

In fact, the information provided upon till now is in line with the definition of teams that is introduced in the introduction chapter as student teams have boundaries same as other teams, composed of three or more people, interact socially and share common goals. Therefore, the participant student groups involved in this study are considered as teams within the scope of this research. As a result, this module included the assessment of creativity in both short and longer time frames. Hence, the context provided by the module was appropriate for investigating the relationship between personality composition and creative performance of teams.

It is noteworthy that, the tutorials supported student teams to prepare satisfying business plan and present their elevator pitch based on that plan. Module leader led and delivered most of the tutorials and workshops covered in the module. More information will be provided about the data collection process of this research in the following parts.

In this study, the data related to number of ideas collected by gathering the papers that each team wrote all their ideas in the first task. In addition, the data related to personality and team trust variables was collected through self-completion paper and pencil questionnaires. The questionnaires were delivered to student team members by the module leader and myself. Additionally, consent forms were collected before the delivery of the questionnaires in the second phase in week 2. There was no identification of teams in any outputs of the research and there wasn't any individual or team-level feedback for this study.

Data collection process consisted of 4 different phases which are explained in deteail and summarised in table 4.2 below. First phase started in the first week of the 2014 semester 1, and it included delivery of the consent forms and information sheets for the whole research project - including mine and the lecturer's own research via the online learning environment of the

University. In the information sheets, the aim and general conditions of the research, students` privacy and participation rights and nature of the study were all explained clearly. Additionally, the voluntary nature of the study, anonymity and privacy rights of the participants were stated explicitly.

At the beginning of the first tutorial held in the first week, the module leader allocated the students to teams and, after this allocation, the module leader gave each team a code and prepared a list of these teams. Then I liaised with him to gain the prepared lists of the teams for research purposes. Later, the student team members were invited to participate in this research.

Second phase (held in Week 2) included measurement of creative performance in short time period and delivery of the Big Five personality measurement questionnaires with survey covers. At first, each student team was given a set of creativity-related tasks using the unusual uses task (UUT) method. Therefore, participants were required to generate as many novel uses as possible by using common objects within a [limited] set amount time (Baird et al., 2012). In this setting, three distinct objects (a coat hanger, a paper cup and a blank A4 sheet) were delivered to the teams and the papers that the teams wrote their ideas were collected and coded for each team after the completion of the creativity-related task. Then, towards the end of the tutorial, personality questionnaires were given to each team members. Notably, before delivering the questionnaires, I coded each questionnaire in accordance with the codes given to each team by the lecturer. Therefore, all participants in one particular team received a questionnaire that had already been identified with the same code. The personality questionnaires were distributed after all groups completed the module exercises and it took no more than 10 minutes. The students took these creativity workshops as part of the module relating to the topics of

entrepreneurial behaviour and creativity, thus, this research did not have an impact on the learning environment.

In the third phase in Week 4 team trust measurement questionnaire was delivered to student teams in the tutorial classes after all the groups finished their presentations as part of the module.

In the fourth phase (Week 5) the creative performance of the student groups over time period was ranked by the lecturer through joining the mock presentation sessions in which student groups transformed their ideas into feasible business projects (plans). In these sessions, the lecturer rated the novelty of the ideas developed by student teams. There were 8 presentation sessions in total, and each session included 3 team presentations. However, due to time constraints (some sessions were running at the same time) and the busy schedule, the module leader couldn't attend 5 sessions. In these sessions, I took notes to inform the module leader for evaluation of the teams' creative performance. I liaised with the lecturer before and after the presentation sessions and considered his suggestions and experiences in terms of the assessment of the teams` creative performance. Then we held a face to face meeting, and I provided information about each presentation of the 15 student teams. The information I provided included the main focus of the project, which service or product is planned for market launch and how, and the relevant marketing strategies developed by each team. This meeting also involved discussions about presentations through answering the module leader's additional questions in order to increase the reliability of the ranking process.

It should also be noted that the module leader is an experienced and had been running the same module for some time. I believe this also made the explanation and ranking process more

effective (Amabile, 1996). In fact, t test results for both module leaders' self ratings and the ratings based on my explanation showed no significant divergence among rankings of the module leader. The revealed t -statistics scores are 1.798 and 1.895 respectively. In addition, p values were above the required Cronbach alpha score (p value- p>.05) and thus not significant. As a consequence, the results indicated that the ranking process did not pose any issues on the results.

Table 4.2: Study 1 Data Collection Process

Week 1: 2nd October 2014 **(First Lecture of the Module)**	Students were informed about the nature of research (including the aims, objectives, participation and privacy rights etc.) Consent forms and Information sheets were delivered via online learning environment by the module leader.
Week 2: 9th October 2014 (First Student Teams Tutorial)	Consent forms were collected. Data, which is based on number of ideas generated from a creativity related unusual uses task, was collected. Delivery of the Big Five personality measurement at the end of the tutorial.
Week 4: 23th October 2014 **(Second Tutorial)**	Team trust Measurement Questionnaire was delivered to the 24 student teams.
Week 5:	Presentations were made by the student teams within week five. I met with module leader to obtain rankings for presentations. He ranked around 2/3 scores of the teams based on my explanations (the ones that I attended) and also ranked 1/3 (the ones he only attended and ranked).

4.3.1.a) Team Demographics

As mentioned before 24 Teams participated into this Study 1 and the descriptive demographical information about the teams are provided in the table 4.3 below.

Table 4.3: Demographical Data Related to Team Size

	Range	N	Min	Max	Mean	Standard Dev.
Team Size	3.00	24	2.00	5.00	4.41	0.77

The table above clearly shows that, the variability within the sample is small. It should be noted that there were only 2 teams composed of two and three members respectively. Apart from those 9 teams were composed of 4 members and the rest of the 13 teams had 5 members within the sample. The age of the members ranged from 19 to 22 and there is only one member at the age of 25.

4.3.2 QUESTIONNAIRE DEVELOPMENT

The questionnaires (Big Five personality traits and team trust) were used to measure personality and trust levels of the student group members so that the conceptual model that is introduced in second chapter can be tested. The Big Five personality and team trust measurement scales are original, existing and previously used scales that were chosen after an extensive review of the prior literature. The 5 point Likert scale, which is ranged from strongly disagree to strongly agree, was used in most of the questions apart from the ones in demographic information scale. The both Big Five personality traits and team trust scales were originally designed in English and, because the research was conducted in an undergraduate management class in an English-speaking country, there was no need for additional translation.

Nevertheless, the scales were seen and checked by the module leader and its relevance and appropriateness for the module was approved.

4.3.3 MEASUREMENT OF PERSONALITY, TRUST LEVEL AND CREATIVE PERFORMANCE OF STUDENT TEAMS

This section will present the measures that are used for determining members` personalities, trust levels within student teams and creative performance of the student groups that participated in this research. The original scales related to the measures used in Study 1 can be found in the appendices section C.1.

This study will focus on the association between personality composition, team trust and creative performance of students performing in an entrepreneurship and enterprise module in a university. In this study, Big Five personality traits and team trust quantitative measures were used to measure personality and trust level in student teams respectively. Additionally, in order to measure team creativeness in both short and longer time spans two distinct measures used. In this respect, calculation of the total number of ideas generated used to measure creative performance in a session held in week 2 and an observational approach was used to measure novelty of the mock presentation held in Week 5. The student groups and their business launch plans are ranked by the module leader, who is an experienced scholar in this area, based on their novelty level. (Alper, Tjosvold and Law, 2000). Well-known and effective IPO model of team performance is taken as ground for this approach to understand and conceptualise the relationship between the measurements used for this study (Hackman and Morris, 1975; Guzzo and Shea, 1992).

Present research uses measures of variables included in the input-process-output model of team innovation. These measures were adopted with the aim of understanding relationships between personality composition, team trust and creative performance variables in student team settings. Each of these variables and their components are essential for the creative performance of teams and all of them are explained in Chapter 2. In this part, measures of these components used for the initial study will be presented.

4.3.3.a) Measures of Input (Personality) Components:

As a widely used and suggested Big Five personality measurement instrument, "Big Five Factor Inventory (BFI)" was used as an input variable for this study. BFI is a brief, comprehensive measure of five domains of personality (John and Srivastava, 1999). There is another known Big Five personality measurement named "NEO PI-R" which was developed by Costa and McCrae (1992). Although this measurement allows differentiated measurement of each Big Five dimension comprehensively, in comparison to BFI it is lengthy and some of the items may cause difficulty in understanding for the participants. In fact, findings also show that short scales not only save time for both participants and researchers but also they reduce apathy (Bursich, 1984). In contrast to "NEO PI-R" measurement, "BFI" includes 8 to10 items for each 5 constructs and uses one or two prototypical trait adjectives which make the items more understandable and elaborative (Benet-Martinez and John, 1998). For example; 'considerate' is an adjective used for agreeableness and the item supported and presented as "is considerate and kind to almost any one". As a result, having other team processes and innovative performance scales in hand, as a comparatively short, well-known, understandable measurement that is already translated in to Turkish, the BFI measurement is chosen. This

study used Big Five personality approaches as an organising framework for the examination of student team personality composition, and creative performance relationship (Mackinnon, Cox and Baraldi, 2011). In the following section the measures related to these variables will be introduced.

Agreeableness:

This measure focuses on the reliability, cooperativeness and agreeableness levels of individuals operating within the teams. It also evaluates the coopeerativeness of the students. The agreeableness scale consists of 9 items in total. Example of items included in this measure are "I see myself as someone who is helpful and unselfish with others" and "I see myself as someone who is generally trusting".

Extraversion:

As a second dimension of personality, extraversion assesses whether the team members are energetic, social and confident. This measure looks at the potential capacity of individuals to foster communication and knowledge flow within the team. There are 8 items within the extraversion scale. "I see myself as someone who is talkative" is an example of the items that are used for the measurement of extrovert personality.

Conscientiousness:

This measure evaluates whether members of the team are task-oriented and self-motivated. Many team level studies support the idea that groups that score high in conscientiousness are generally the high-performance ones. Yet, when it comes to creative performance they do not stand out. There are 9 items within the conscientiousness scale and some of the items used to

measure conscientiousness are "I see myself as someone who does a thorough job or I persevere until the task is finished".

Openness to Experience:

Indicates the openness of the individuals to creative and alternative way of doing things and solving problems. To this end, it measures the extent to which members` acceptance of and adaptation level to new ideas and creative contributions. The scale of this personality trait consists of 10 items. The examples of the items used for this measure are: "I see myself as someone who is original and comes up with new ideas or I like reflect and play with ideas".

Neuroticism:

Teams sometimes contain anxious and emotionally defensive individuals. This measure is often likely to be a negative one and assesses the depressed and defensive personality levels. The scale of the neuroticism construct includes 8 items and in the questionnaire, there are items as: "I see myself as a person who worries a lot or I get nervous easily".

4.3.3.b) **Measure of Team Processes Component:**

Team Trust: Student team members, needed to share sparkling ideas to cultivate creativity within the team and trust as a team process variable plays a vital role in this process. The scale developed by Costa and Anderson (2011) to measure trust in teams and it was used for this research. This measure is an accesible and efficiently administrated scale of team trust and there is a considerable consensus among the facets of 21 items used in this measure (Costa and Anderson, 2011). This measure becomes prominent among many individual level trust

measures because of its ability to evaluate trust within the team level and it is also validated and suggested by other scholars who used and test this measure in distinct team contexts (Pais, Castro and Monico, 2014). Team trust measure in this research setting refers to the trust level among student team members and It assesses the level of trust on average the team members have each other. One example of the items that were used to measure trust within teams is "In this team people can rely on each other".

4.3.3.c) Measure of Output (Performance) component:

Student Team Creative Performance: This measure helps to find an answer to the question of "How creative is the team?". There are various methods that scholars have used to asess the performance of teams. To date qualitative, quantitative, observation methods have been used to measure team performance. Qualitative approaches mostly use interviews with both team members and managers to gain deep understanding regarding their perspectives on the performance of the teams (Pagel and Lepine, 2002; Grutter, Field and Faull, 2002-case study work teams) whereas quantitative approaches mostly done through adopting questionnaire scales to measure team performance or calculating the number of novel ideas generated. Observational measurements, on the other hand, are often based on the team performance assessment of field experts. They observe the teams and rank their performances (Suifan, 2010).

The present study adopted both quantitative and observation method in order to assess the creative performance of teams and there are several reasons for using such methods. Firstly, this study used the calculation of the number of novel ideas generated in order to measure the

creative performance of single session teams as it was the most suitable and effective method to use. This method of measuring creativity is named as fluency. More specifically students listed as many unusual and original uses of materials then the total number of these ideas were calculated and teams received high creativity scores simply by virtue of generating large number of unusual responses (Baird et al, 2012). This method is found as a successful one in order to identify the creative teams (McCrae, 1987).

Moving on to the creative performance of the continuing teams present research used an observational measurement in order for evaluating the creative performance through observing and rating novelty of the business plan proposals of continuing teams. In this sense, I had to adopt the conditions of the module and observation method was the appropriate one to measure the creative performance of continuing student teams as students presented their business plans (Robert and Cheung, 2010). Secondly, the usage of experienced observers who are familiar with the terrain in which the ideas are generated is suggested by the pioneering researchers of the team creative performance field (Amabile, 1996; Shalley, 1995, Zhou, 1998). Thirdly, the usage of creativity tests through generalizable surveys are criticized by the scholars (Bruner, 1962 cited in Amabile, Amabile 1982a). Since, such surveys are used for assessing a construct that has a subjective nature. In other words, the argument of objectively identifiable features common to all creativity related contexts is not an effective one (Amabile, 1982b). In fact, having a subjective nature, the effective assessment of creativity depends on the context in which it is performed. Therefore, the usage of observation method in order to assess the creative performance based on the rankings of experts who were familiar to the terrain was found crucial (Dorsey et al, 2009). As such, observation method was supported by other scholars and Amabile (1983) as a well-known scholar in creativity research stresses the importance of use of observers to evaluate creativity. Add to this, in an article where she

introduced her consensual approach to creativity she also emphasized the usage of appropriate observers who are familiar with the relevant domain and argued that a product is creative when knowledgeable observers confirm its novelty and usefulness (1982a). Therefore, in order to take advantage of the lecturer's expert knowledge and experience in that particular creativity related context, the observation method was appropriate for this study. Additively, the previous studies, which investigated the personality and creative performance relationships in teams, had also used the observation method in order to assess the creative performance of teams. Therefore, through using an observation method this study is in line with other studies.

Beck, Bryman and Liao, 2004 define 3 main observation approaches which are participant observation, reactive observation and nonreactive observation. In this study, in order to assess creative performance of student teams, mock presentations of the developed business plans of student teams were observed and ranked by the experienced module leader. Therefore, this research uses participant (passive) observation method such that the observer passively participates to the actions of the actors in order to observe the related social world actions (Bryman and Bell, 2003). It is noteworthy that participant observation method has 4 distinct approaches in itself. These approaches are complete participant, the participant as observer, observer as participant and the complete participant. In this study an outsider becomes a participant to the community through observing the presentations of each student team. Therefore, observer as participant sub-method used for the assessment of the student team creativity as the aim of the measurement is to assess the novelty of the business plans created by student teams through observing the presentations. This observation-based checklist type of method is one of the earliest measurements in team-work-oriented research. One of the earliest applications of this method in the team performance field was done by Schifflett, Elsner, Price and Schemmer (1985). In the study, researchers measured team effectiveness through

observing and rating resource allocation, orientation, time management, coordination and motivation of small military unit teams. Later on, Glickman and his associates (1987) developed a critical team behaviours checklist that consists of communication, cooperation and coordination, experience and prior training, and power relationships dimensions.

In this study, novelty measurement was used for the assessment of creative performance of the teams and both the lecturer and myself observed the mock presentations of student teams. As an expert in the field of entrepreneurship and creativity, and with long years of experience in teaching these type of creativity-involving modules, the lecturer ranked all teams in terms of the novelty level of the business plans (Schifflet et al, 1985). This type of creativity measurement is proven useful since the module leader has the advantage of being experienced and familiar with the generated business plans and having expertise to be able to judge the creativity of the teams (Hocevar, 1981).

Novelty (originality) of the ideas used as an assessment because it is the most widely recognized and fundamental facet of creativity (Mumford and Gustafson, 1988; Robert and Cheung, 2010). Of note here, however, any plan developed by a student team itself can be original but to be ranked as truly creative the presentation needed to be related to business plan in order to launch a product or service. Therefore, along with novelty, the appropriateness of the ideas was also considered by the module leader while evaluating the novelty of the proposed business plans (Runco and Charles, 1993). In this research, 1 to 5 Likert scale was used to rank the novelty (creativity) of the ideas where 1 was the lowest and 5 was the highest score in these rankings.

<u>4.3.3.d) Control Variables:</u>

The sample size of this initial study is comparatively small and therefore it was critical to choose a number of related constructs as control variables. In this regard, the relevant demographical variables are *age*, *gender* and *nationality diversity* considered as control variables. In addition to these demographical variables *team size* variable is also controlled in this study as it is found as related to group creativity (Gallupe, Dennis, Cooper, Valacich, Bastianutti, Nunamaker, 1992). The impact of the control variables was examined in order to account for the possibility of any obscuring influences on the creative oputput. However, the results demonstrated that none of the control variables have an influencing magniatude on the both short time (number of ideas) and longer time (novelty) results of the present study. Hence, the control variables were not included in the data analysis process that examined the relationship among Big Five personality traits and creative outcome of the student teams. The seperate regression results of each control variable with the creative outcome (including novelty scores) of the student teams are included in the table 4.4 below.

Table 4.4: The Results Related to the Influence of Control Variables on the Creative Outcome

	NUMBER O IDEAS			*NOVELTY*		
CONTROL VARIABLES	(B)	(β)	p	(B)	(β)	p
Age	-5.211	-.236	.267	.159	.119	.555
Gender	-.316	-.009	.966	.343	.256	.198
Nationality Diversity	-.941	-.308	.143	.263	.193	.334
Team Size	4.313	.346	.098	-.392	-.230	.279

4.3.4 VALIDITY

In this section, the aim is to validate the scales used in the study and factor analysis is a well known and mostly used technique to approve the validity of the scales (Bryman, 2012). There are two distinct type of factor analysis that are called exploratory factor analysis (EFA) and confirmatory factor analysis (CFA). Exploratory factor analysis is used to measure validity of the measures used in study one. Exploratory factor analysis looks for the relationship between variables and assists in gaining understanding of how they relate to each other. This is particularly useful for scale development and discovering unknown factor structures (Brewerton and Millward, 2001). However, the personality and team trust scales were original and pre-established scales. Additively, the sample size for Study 1 is fairly low. For these reasons, exploratory factor analysis was not conducted in Study 1 (Conway And Hoffcut, 2003). On the other hand, CFA is used for the confirmation of congruence between established items of a particular scale and correlation results among items based on the data set (Dawson, 2016). Many scholars have argued that using CFA is more useful and meaningful when the belongingness of the items of a scale were already established by previous studies (Levine, Hullett, Turner and Lapibski, 2006). In this manner, having used the original scales, confirmatory factor analysis would have been useful for this research yet conducting a CFA also requires a large sample. However, this first study has insufficient data (including 135 cases) in order to run a confirmatory factor analysis (Comrey and Lee, 1992; Norusis, 2005). As researchers use the rule of inclusion of either minumum 10 cases per item or at least 200 cases in the analysis (Thompson, 2004). In this regard, having 6 scales that have 6 items in average, the Study 1 needs a sample including at least 540 cases (6 x 9 x 10 = 360) (Dawson, 2016). To this end, there is no benefit in conducting a factor analysis in present study however, the reliability score of each scale used in Study 1 were checked in the section below.

4.3.5 RELIABILITY:

The results of reliability analysis show extent to which used data is reproducible over time or occasions. Reliability analysis generates the Cronbach's alpha scores of the scales and this score help us to assess the magnitude of the combined items to measure the same thing (Tavakol and Dennick, 2011; Downing 2004). In this study, the reliability analysis was done for all measurement scales including in the questionnaires and rankings. As indicated in the table 4.5 below all of the reliability scores of the used measures are above .70 instead of agreeableness scale. Therefore, the measures are fairly reliable (Nunnally and Bernstein,1994).

Table 4.5: Reliability Analysis

Measured Components	Variables	Cronbach`s Alpha	Number of Items
Inputs (Personality):			
	Extraversion	.835	8
	Conscientiousness	.793	9
	Agreeableness	.667	9
	Openness	.725	10
	Neuroticism	.761	8
(Team) Processes:			
	Team Trust	.852	21

4.3.6. DATA AGGREGATION

In this research, the creative performance is defined at the team level. Hence to make the team level inferences aggregation of the data was necessary (Kozlowski and Klein, 2000). This aggregation in group level performance related studies supported and suggested by Gully, Devine and Whitney (2012). Therefore, the personality and team trust ratings of the individual

members were aggregated to team level through calculating the means of these ratings. In this regard in order to justify using group mean score for indicating team level variables; it is critical to show that there is a satisfactory level agreement within the group through calculating ICC (1), (2) and Rwg(j) (Bliesse, 2000; James Demaree and Wolf, 1993; Lebreton and Senter, 2008). It is reported that, in order to calculate the amount of variance in individual responses that can be represented at group level (ICC (1)) the values calculated need to be higher than 0.12 James (1982). Additionally, Klein and her colleques indicated that ICC (2) value related to reliability of the group means recommended to be higher than 0.50 that is the absolute minimum score (Klein et al, 2000). In addition to these values, the rwg(j) value was aslo calculated in order for evaluating within group agreement and to determine whether individual scores of the members is eligible to be aggregated to team level (James, Demaree and Wolf, 1984). The recommended value for rwg(j) score is 0.70 and higher (James et al, 1993). The aggregation statistics about team trust process variable are presented within the table 4.6 below.

Table 4.6: Aggregation Statistics of Team Trust

VARIABLES	ICC (1)	ICC (2)	Rwg(j)	Number of Items
Team Trust	.397	0.761	.98	21

As can be seen in the table above both ICC (1) and Rwg(j) values related to within team agreement and aggregation are above expected scores indicated above all of which can be seen as a justification of aggregating individual level responses to team level data.

4.3.7 CORRELATION AMONG VARIABLES

The results given in Table 4.8 and 4.9 below represent the bivariate correlations among variables. For this type of correlation, the Pearson's correlation coefficient and two tailed significance tests were used. According to the correlations matrix, which is created based on the team level data and presented below, agreeableness is positively correlated with conscientiousness and negatively correlated with neuroticism. Neuroticism is negatively correlated with agreeableness and extraversion. Openness to experience is positively correlated with conscientiousness. In addition, trust found as positively correlated with extraversion and conscientiousness and negatively correlated with neuroticism and this suggests that when there is high level extraversion and conscientiousness and low level neuroticism within the group the trust level is also likely to be high. Moving on to the variability in teams, the same bivariate correlations and methods were used to investigate the correlations between dependent and independent data.

Table 4.7: Means and Standard Deviation Values of the Variables

Variables	Mean Value	Standard Deviation
Agreeableness (Mean Value)	3.7732	.31265
Extraversion (Mean Valuel)	3.5256	.35860
Conscientiousness (Mean Value)	3.6262	.29828
Neuroticsm (Mean Value)	2.6449	.39212
Openness (Mean Value)	3.5691	.22869
Trust (Mean Value)	3.8642	.30618
Agreeablenss (Standard Deviation)	.4151	.17883
Extraversion (Standard Deviation)	.5949	.21076
Conscientiousness (Standard Deviation)	.5340	.21497
Neuroticsm (Standard Deviation)	.5296	.20335
Openness (Standard Deviation)	.4565	.22526
Novelty Score	2.5417	1.31807
Total Number of Ideas Generated	24.3333	9.66692

The table 4.7 above represent the mean and standard deviation of the values of the variables used in this study. Based on the table above the mean level agreeableness, extraversion, conscientiousness and openness to experience are equal or above %70 within the teams. Therefore, overall teams have considerably high mean score in these traits. Additionally, as expected neuroticsm has a comperatively lower mean value and has the %50 proportion of the teams. In fact, this score of neuroticsm is not low but not high eather. Accordingly, this result tells us that each team has also neurotic members. In addition, the table provides information about the level of variability of the variables used. Drawing on this table, it can be said that the variability level is considerably low in all Big Five personality traits in other words teams are more homogenous in terms of personality. Finally, the average score of longer-term creative performance variable (novelty) is relatively low in comparison with the Big Five personality traits. Additionally, the standard deviation scores are higher than the personality variables particularly the sdandard deviation value of novelty.

Table 4.8: Correlation Table for Team Variability Elements

	1	2	3	4	5	6	7
1.Agreeableness_sd	1						
2.Extraversion_sd	138	1					
3.Conscientiousness_sd	.000	.238	1				
4.Neuroticsm_sd	.424*	.140	.179	1			
5.Openness_sd	.070	-.023	-.293	-.060	1		
6. Novelty	.098	.151	.175	-.218	.170	1	
7. Number of Ideas	.199	.178	.169	-.092	-.180	-.206	1

Table 4.9: Correlation Table for Team Mean Level Elements

	1	2	3	4	5	6	7	8
1.Agreeableness_m	1							
2.Extraversiom_m	.226	1						
3.Conscientiousness_m	.550**	.059	1					
4.Neuroticsm_m	-.358	-.694**	-.214	1				
5.Openness_m	.352	.297	.432*	-.163	1			
6.Trust_m	.268	.471*	.407*	-.440*	.238	1		
7.Novelty	-.156	-.011	.016	.021	.244	-.003	1	
8.Number of Ideas	.028	.241	.221	-.350	-.023	.301	- .206	1

4.4. RESULTS

This section is designed for the demonstration of the statistical data that indicates the relationships between personality composition, team trust and novelty as a creative performance variable of student teams. The results section of the thesis involves both the presentation of the statistical methods used to analyse the data collected, and the results related to test of hypotheses. Multiple regression analysis was applied to test the hypotheses and SPSS software version 21 was used to do all analyses.

There are 3 main analysis results in Study 1. First ones are results that are related to linear and curvilinear relationships. Second ones are realted with mediated associations and the last ones are the results of moderated regression analyses. In the first part of the results section, hypotheses (including direct ones indicated in figure 4.2 below) related to mean level personality traits and teeam creativity will be tested and results of these tests will be displayed. Hypotheses predicting direct relationships were tested via linear and curvilinear regression analyses. Moving on to the second part, the focus will be on test results of mediated hypotheses that were tested by mediated regression analysis. The final section includes testing of moderating relationships (indicated in figure 4.3) and presentation of related results. These moderating relationships were tested through moderated regression analysis.

This study also involves control variables, which are demographical variables *age*, *gender* and *ethnicity* of the student team members and *team size* variable. I have controlled these variables in order to account for possible obscuring effects. For instance, teams composed of relatively higher-aged students might be associated with increased creativity and this finding may have a confounding influence on the results that are supposed to be related to impact of personality on team creativity. However, none of the control variables have

significant association with dependent variable that is why they are not included within the data analysis process.

4.4.1 HYPOTHESES TESTING

The aim of this section is to test the hypotheses that are proposed in section 2.3. The hypotheses will be used to examine the relationship between input, process and output variables, in order to understand the dynamics among personality composition, team trust and creative performance.

4.4.1.a) The Direct Linear and Curvilinear Relationships Between Mean Level Inputs, Outputs:

The hypotheses related to mean levels explain the relationships between input elements (Big Five personality traits) and output (creative performance) factors. As mentioned above there are two distinct measures of creative performance used in Study 1 based on the conditions of Study 1. In this regard, firstly the creative performance of teams in short time frame is evaluated through calculating the total number of ideas generated by student teams in a creativity oriented task session held in Week 2. Then linear regression analysis was used to test the impact of personality traits on creative performance of teams. Secondly, in Week 5 the observation method was used in order to measure team creativity (originality of ideas included in the presentation of business plans of each student team) and test the predicted associations between personality traits and creative performance in a longer time period. The related hypotheses (H1A, H1C, H1E, H1G, H1I) and multiple regression analysis was used in analysis. Specifically, linear regression analysis was used for the hypotheses representing linear (H1G, H1I) and curvilinear relationships (H1A, H1C, H1E). The Big Five

personality traits variables and their interaction with team creative performance were tested through related syntax commands by using SPSS 21 software. The results related to each short and longer-term measures are shown in the table below and values for each dimension represents a separate regression scores.

Table 4.10: The results of the team level Input - Output Related Analyses

	NUMBER OF IDEAS (Short Time Frame - STF)			NOVELTY (Longer Time Frame - LTF)		
PREDICTOR VARIABLES	**(B)**	**(β)**	**p**	**(B)**	**(β)**	**p**
Team Inputs						
Extraversion squared	-2.287	-.261	.216	-.142	.112	.589
Agreeableness squared	-.159	-.041	.876	-.155	-.272	.255
Conscientiousness squared	1.014	.116	.591	-.169	-.134	.514
Neuroticism	-3.222	-.350	.094	.022	.017	.934
Openness	-.232	-.023	.915	.302	.225	.258

***p≤0.001, **p≤0.01, *p≤0.05

The results in Table 4.10 indicate that there is no direct and statistically significant relationship between Big Five personality traits and student team creative outcome in both short term (single session teams) and long term (continuing teams – 4 weeks) settings. As can be inferred from the results there is no statistically significant curvilinear relationship between mean levels of extraversion, agreeableness, conscientiousness and creative performance of student teams. Therefore, the results reveled that hypotheses H1A, H1C and H1E are not supported. Another finding that inclined with hypothesis H1G signals no significant interaction between mean level neuroticism and team creativity. The final

hypotheses H1I regarding association between openness and creative performance also not

supported by the results.

Figure 4.2: Results of the hypotheses related to mean level relationships

INPUT   OUTPUT

Mean Level Extraversion → Creative Performance   H1A Not Supported
Curvilinear Relationship

Mean Level Agreeableness → Creative Performance   H1C Not Supported
Curvilinear Relationship

Mean Level Conscientiousness → Creative Performance   H1E Not Supported
Curvilinear Relationship

Low Mean Level Neuroticsm → Creative Performance   H1G Not Supported

High Mean Level Openness → Creative Performance   H1I Not Supported

4.4.1.b) Mediated Relationships between Input, Mediator and Output Variables

In this section, the mediated relationships between inputs (extraversion, agreeableness), team trust variable and creative performance outcome (novelty) will be presented. It should be further noted that as the questionnaires related to team trust delivered and collected in Week 3 of the module only the longer-term novelty measure was used to test the mediating role of team trust on the relationship. The table 4.11 indicates results of the mediated regression analysis that is conducted through spss commands via using SPSS 21 software. As the table below indicates, none of the associations between inputs, mediators and outputs are revealed as significant because there is no resemblance between higher and lower confidence limits scores of both agreeableness and extraversion related relationships. In other words, the mediation results were insignificant as all of the confidence intervals includes zero.

Table 4.11: Mediated results of Mean Level of Extraversion - Team Trust - Creative Performance

Hypothesis	Independent Variable	Mediating Variable	Dependent Variable	Mediating Score (LLCI)	Mediating Score (ULCI)
H2a	Extraversion	Team Trust	Novelty	-.0978	.5231
H2c	Agreeable	Team Trust	Novelty	-.3207	.0748

4.4.1.c) Moderated Relationships between Input, Moderator and Output Variables

Study 1 also investigates the moderating role of variability in Big Five personality traits on the relationship between mean level personality traits and creative performance of teams in both short and longer period of time.

The figure 4.2 below embodies the hypotheses that imply moderated association between inputs and outputs. The moderated regression analysis was used to test the moderated hypotheses (H3A, H3C, H3E, H3G, H3I). Once again, the interaction between variables were tested through using related syntax commands by using SPSS 21 software.

Another objective of the current study is to investigate the moderating impact of variability in a trait on the relationship between mean level personality and student team creativity in both short and long time frames. As mentioned above 2 distinct creativity measures were incorporated to test the moderating associations. In other words, the aim is to test and compare the moderating impact of heterogeneity (level of spread in responses of the members) on the proposed associations both in short period of time (in a single session) and over time (4 weeks time). In this sense, standard deviation approach was used to measure variability in a specific trait in order to calculate the difference of each trait from the group mean (Dawson, 2011). It is worthwhile noting that there are other approaches to measure variability and one of the most prominent one is "Euclidean distance" approach (Harrison and Klein, 2007). However, this method is not considered as an alternative calculation of the variability in this research as it does not in congruence with the aim of probing the moderating impact of variability (heterogeneity-level of spread in the responses) on the relationship. Simply put, as Dawson (2011) clearly explains Euclidean distance method does not investigate the deviation of scores of each member from the average score of the group.

Instead it calculates differences between pair of individuals. In other words, through this method the mean distance of each member from all other members is calculated and then these distances are averaged and figured for each trait. Add to that, in his research Dawson (2011) also unearthed that such two indices have no practical distinction between them and therefore I preferred to use the familiar standart deviation method in my analyses.

The results of the hypotheses testing will be shown in the tables below. The first three tables represent the interaction between moderator (eg. variability in extraversion) and curvilinear relationship (the curvilinear association between mean level extraversion and creative output). Therefore, they include additional squared interactions and the fifth lever of each 3 table is particularly represents the predicted relationship.

Table 4.12: The Results of the Moderated Relationship Between Variability in Extraversion and Creative Performance

	NUMBER OF IDEAS (STF)			NOVELTY (LTF)		
	(B)	(β)	p	(B)	(β)	p
Variability in Extraversion	.546	.050	.861	-.076	-.056	.814
Mean Level of Extraversion	4.302	.445	.143	.090	.067	.827
Mean Level of Extraversion Squared	-4.592	-.524	.084	.128	.100	.686
Mean level of Extraversion x Variability in Extraversion	4.444	.304	.300	.184	.116	.656
Mean Level Extraversion Squared x Variability in Extraversion	-.2640	-.297	.402	.088	.077	.840

***p≤0.001, **p≤0.01, *p≤0.05

The results in Table 4.12 indicate that the hypothesis H3A, that signifies the positive impact of high variability in extraversion on the relationship between moderate mean levels of extraversion and creative performance, is not supported in both short and long period of time. As can be seen in the table, none of the associons are significant. This result is indicated particularly by the fifth lever of the Table 4.12 that shows the interaction between moderator (variability in extraversion) and squared independent variable (mean level of extraversion).

Table 4.13: The Results of the Moderated Relationship Between Variability in Agreeableness and Creative Performance

	PERFORMANCE MEASURES					
	NUMBER OF IDEAS *(STF)*			*NOVELTY* *(LTF)*		
	(B)	**(β)**	**p**	**(B)**	**(β)**	**p**
Variability in Agreeableness	2.158	.226	.340	.021	.015	.963
Mean Level of Agreeableness	-3.579	-.392	.299	.220	.164	.439
Mean Level of Agreeableness Squared	1.113	.285	.372	-.309	-.542	.068
Mean Level of Agreeableness x Variability in Agreeableness	-11.048	-.673	.099	1.387.	.581	.110
Mean Level of Agreeableness Squared x Variability in Agreeableness	5.787	.655	.161	-.719	-.552	.180

***p≤0.001, **p≤0.01, *p≤0.05

Based on the results above, it can be inferred that the hypothesis H3C, which underlines the positive impact of high variability in agreeableness on the relationship between moderate mean level of agreeableness and creative performance of teams (including both novelty and number of ideas measures) is not supported in both short and long time periods.

Table 4.14: The Results of the Moderated Relationship Between Variability in Conscientiousness and Creative Performance

	PERFORMANCE MEASURES					
	NUMBER OF IDEAS (STF)			NOVELTY (LTF)		
	(B)	(β)	p	(B)	(β)	p
Variability in Conscientiousness	1.642	.163	.576	.050	.037	.885
Mean Level of Conscientiousness	2.290	.246	.362	.071	.053	.848.
Mean Level of Conscientiousness Squared	2.010	.229	.450	-.110	-.088	.759
Mean Level of Conscientiousness x Variability in Conscientiousness	-.173	-.015	.959	.411	.257	.375
Mean Level of Conscientiousnes Squared x Variability in Conscientiousness	1.023	.125	.742	-.036	-.030	.933

***p≤0.001, **p≤0.01, *p≤0.05

Table 4.14 shows that hypothesis H3E test results do not reveal any significant positive moderating impact of high variability in conscientiousness on the relationship between moderate mean level of conscientiousness and creative performance of student teams in both short and time frames including both novelty and number of ideas scores.

The tables 4.15 and 4.16 below show the moderated linear relationships. In this regard, the results within the third lever of the table are particularly helpful for understanding the nature of the moderated relationships since it includes the values representing the impact of moderator (eg. variability in neuroticsm) on the relationship between independent (eg. mean level of neuroticsm) and dependent variables.

Table 4.15: The Results of the Moderated Relationship Between Variability in Neuroticism and Creative Performance

	PERFORMANCE MEASURES					
	NUMBER OF IDEAS (STF)			NOVELTY (LTF)		
	(B)	(β)	p	(B)	(β)	p
Variability in Neuroticism	-.111	-.012	.962	-.100	-.075	.753
Mean Level Neuroticism	-2.472	-.268	.280	.077	.057	.814
Mean Level of Neuroticsm x Variability in Neuroticsm	2.013	.179	.519	-.156	.095	.722

***p≤0.001, **p≤0.01, *p≤0.05

The table 4.15 above represents the results of the hypothesis H3G. In particular, the values in the third level represent the predicted positive impact of low variability in neuroticsm on the relationship between mean level of neuroticsm and creativity related outcomes. However, as can be seen from the table none of the relationships presented in the table are statistically significant in both short and longer time span.

Table 4.16: The Results of the Moderated Relationship Between Variability in Openness to Experience and Creative Performance

	PERFORMANCE MEASURES					
	NUMBER OF IDEAS (STF)			NOVELTY (LTF)		
	(B)	(β)	p	(B)	(β)	p
Variability in Openness to experience	.373	.037	.875	.404	.301	.179
Mean Level Openness	-.355	-.048	-.868	.229	.171	.410
Mean Level Openness x Variability in Openness to experience	-1.598	-.162	-.590	-.173	-.172	.427

***p≤0.001, **p≤0.01, *p≤0.05

The final moderating hypothesis is H3I and the table 4.16 shows the results related to this hypothesis. According to these results above there is no significant positive impact of low

variability in openness on the relationship between high mean levels of openness and novelty of ideas created from both one session and continuing teams. Once again, the figure below summarizes the hypotheses and the results of the hypotheses tests.

Figure 4.3: Results of the Moderating Hypotheses

INPUT   MODERATOR   OUTPUT

Variability in Extraversion (High Level)

Mean Level Extraversion → Curvilinear Relationship → Creative Performance — H3A Not Supported

Variability in Agreeableness (High Level)

Mean Level Agreeableness → Curvilinear Relationship → Creative Performance — H3C Not Supported

Variability in Conscientiousness (High Level)

Mean Level Conscientiousness → Curvilinear Relationship → Creative Performance — H3E Not Supported

Variability in Neuroticsm (Low Level)

Low Mean Level Neuroticsm → Creative Performance — H3G Not Supported

Variability in Opennes (Low Level)

High Mean Level Openness → Creative Performance — H3I Not Supported

4.5. DISCUSSION

In this chapter, the relationship between personality composition and creative performance of the student teams was examined through study 1, and the results related to this relationship have been presented. In this section, the main findings of the first study will be discussed and illustrated.

Based on the results presented in the previous section, none of predicted associations between personality traits and team creativity provided either supplementary or complementary fit. In other words, there is no significant correlation between the input and output variables that are presented within the input-output hypothetical framework. Therefore, all the relationships presented within the model were unsupported both within short and longer time frames and, consequently, the hypotheses proposed in study 1 did not find any support. There may be several reasons for the weakness of relationships predicted through hypotheses and these reasons can mainly be grouped under methodological, contextual or theoretical reasons.

As regards to the methodological reasons, one possible issue can be the reliability scores of the Big Five variables used in the present research. However, most of the scores were above the expected level .70, and extraversion has a score is above .80, It is of note here however, the reliability of the agreeableness variable is below the minimum expected reliability score of .70. Nonetheless, all the scales used to measure the Big Five personality traits were original and validated ones (John and Srivastava, 1999). To this end, it can be said that the reliability scores were sufficient and they are not expected to obscure the findings of this research.

On the other hand, the distribution of the data may also be an explanatory factor behind such findings. However, the distribution of all the variables (apart from agreeableness) used in the present research are approximately symmetric, whilst the distribution of the agreeability variable is negatively skewed. This means that the variables with roughly symmetric distributions are eligible to give adequate distributions within the both short time and longer time frame samples used for study 1.

As a result, methodological factors are not expected to pose on issue and give way to insignificant findings. It should be further noted that, as Study 1 was conducted in a similar setting with prior studies (including student team in western context) and thus the context also not expected to obscure the results of the study. To this end, theoretical reasons come to the front as the root cause of the insignificant associations between personality traits and team creativity as the short time results of the current study mostly coincide with the findings of the previous research and the findings indicates that influencing magnitude of personality does not change in longer time span (4 weeks time).

In this regard, the first prediction in this study was that of the positive relationship between a moderate level of extraversion and the creative performance of student teams. However, the findings show that there is no relationship between moderate mean-level extraversion and student teams' creative performances not only in short period of time but also in longer time period. As stated in the hypotheses development section, there is strong theoretical and research support for the stimulating role of extraverts on team communication and knowledge-sharing that is particularly essential for creative outputs (Costa and McCrae, 1992; Barry and Stewart, 1997; Barrick *et al.*, 1998; Van Vianen and De Dreu, 2001). However, previous research findings contradict the theoretical arguments, finding no between extraversion and team creativity in different contexts (Bolin and Neuman, 2006;

Robert and Cheung, 2010). Add to that, the findings of this research are in line with the findings of previous investigations as regards the association between mean-level extraversion and team creativity in both short and longer time span. One possible explanation for this finding is that extrovert individuals may not have adequate levels of creative confidence to have an impact on team-level creativity, since in their study, Baer and co-workers (2008) found that creative confidence is the prerequisite for mean-level extraversion to result in high-level team creativity. Alternatively, the absence of a strong incentive in extrovert members can also be a reason for ineffectual results in terms of creative performance. In fact, Bouchard (1972) found that teams with high mean extraversion perform well when the members are highly motivated, and performed less well with members who are less incentivised. It is also worth noting that both short and longer term results showed the same pattern and this is strong indicator of the insignificant association between elevation in extraversion and creative performance. Additively, the insignificant association also revealed that the strength of the extraversion does not increase over time.

The second hypothesis was related to agreeableness and its influence on student teams' creative performance, predicting a curvilinear relationship between agreeableness and creative performance of the teams since both theory and research findings favour a certain level of task conflict and disagreeableness in order to foster creative abrasion and idea generation among team members (De Dreu, 2006; Jehn, 1995). However, the findings of the present research indicate no significant association between agreeableness and creativity in both short and long term. One potential cause of this finding is that team members with these personality traits did not engage in constructive discussion or provide candid critical feedback about the ideas generated by other members, which is seen as pivotal to the development of novel ideas and generation of feasible solutions. To addres the claim of the

impact of agreeable individuals on team creativity may strengthen over time Study 1 investigated the influence of agreeableness on both one session and continuing teams. However, the related association was insiginificant in both settings. In fact, these findings support previous findings with regards to the relationship between mean-level agreeableness and team creative performance (Driskell *et al.*, 1987). In addition, based on these findings, other scholars have argued that agreeableness may have a weak predictive value on creativity-related tasks and some even did not investigate its relationship with the creative performance of the teams (Bolin and Neuman, 2006).

Contrary to expectations, the present inquiry did not find any considerable correlation between mean-level conscientiousness and the creative performance of student teams in both short and longer time settings. However, previous investigations found mostly positive relationships with team performance (Barrick *et al.*, 1998; Neumann *et al.*, 1999) or, conversely, negative relationships with team creative performance (Robert and Cheung, 2010). The discrepancy between current findings and previous research results can be attributed to the lack of predictive influence of the conscientious members on the generation of novel ideas, which was also stated within the model developed in the study conducted by Driskell, Hogan and Salas (1987).

The lack of significant relationships between mean neuroticism and group outcomes contradicts the theoretical predictions, however, entirely in line with previous findings (Baer *et al.*, 2008; Bolin and Neumann, 2006). In personality literature, it is believed that because of the depressive and unstable nature of neurotic members, these individuals are likely to have a negative association with team effectiveness by disrupting the climate, cooperation and cohesion within the team (Barrick *et al.*, 1998; Neumann *et al.*, 1999; Van Vianen and De Dreu, 2001). On the other hand, research projects that probed the relationship between

personality and team creativity do not indicate any significant relationships between neuroticism and team creative performance. For instance, a study conducted by Baer and co-workers did not find any correlation between neuroticism and team creativity. In addition, Bolin and Neuman (2006) investigated the relationship between emotional stability (the opposite variable to neuroticism) and creative performance and, once again, could not find any considerable association between these variables. Therefore, the present study has the characteristic of being the third study that supports previous findings and contradicts theoretical predictions. However, this study also investigated the role of neuroticsm on team creativity over time and compare it with the findings in short period of time. In doing so, it enhanced the understanding of whether the influencing strength of neuroticism on team creativitcy changes over time. Considering these mutually-supporting research studies in terms of team creativity, it can be argued that, in contrast to theoretical considerations, the expected negative effect of neurotic members and low emotional stability within teams may not be sufficient to influence the creative performance of the teams neither in short nor in longer period of time.

The final direct relationship hypothesis considers the relationship between openness to experience and team creative performance. In fact, this particular, independent variable of the Big Five frameworks is the one which is mostly associated with creativity by scholars, both at individual and team levels (Reilly, Lynn, Aranson, 2002; Taggar, 2002). In this regard, this research investigated its impact on team creativity not only in short but also in long time periods. However, it is somewhat surprising that the findings of this research do not support the idea of a positive relationship between openness to experience and creative performance of both one session and continuing teams. When it comes to previous research findings of this nature, results have been, in fact, mixed. Although some researchers found positive relationships, in line with theoretical predictions (Hunter and Cushenbery, 2015;

Schilpzand, Herold, Shalley, 2011), other studies did not find any direct significant association between mean openness and creativity (Bolin and Neuman, 2006; Baer *et al.*, 2008; Robert and Cheung, 2010). The present study 1 is another study that indicates a lack of any relationship between the variables. One possible explanation for the distinction among the findings of different investigations could be the minor differences in the methodologies and scales used.

This initial research also examined the mediating role of team trust variable on the association between personality traits and team creativity. The results of current study revelaed that team trust variable does not have a significant mediating power on the relationship. In other words, trust among members can be essential factor but the results may signify the necessity of other vital factors for student teams to be creative. The primary factors may be the lack of knowledge and experience of students for the sectors that they planning, to enter and this may cause generation of insufficient business plans instead of proposing novel projects (Suifan, 2010). As a result, the findings of the study 1 informed us that neither personality composition nor adequate level of team trust is sufficient for creativity. Therefore, future research needs to probe the role of other input and process factors on team creativity and compare the findings with the insignificant impact of existing variables.

However, it is worthwhile noting that, the results indicated considerable positive and negative relationships between input and process varibales included in this study. Firstly, it is found that mean level extraversion has a positive correlation with team trust. This may result from the communicative and socializing skills of extravert members. To put differently, teams with extravert members may be able to socialize and communicate more easily and this may cause creation a friendly and trusting climate within the team (Edmondson, 2012; Jacques et

al, 2009). Relatedly, Jacques and colleques (2009) unearthed that extraverts has high propensity trust other members in the team and add to this finding Study 1 went beyond and showed that these individuals are in fact good at facilitating trust within the team. What is more, conscientiousness trait is also found as having a positive linear relationship with trust within student teams. One explanation for this finding can be that when the team composed of highly responslible and hardworking conscientious members the propensity to trust one another among members increases to accomplish the task in hand effectively. Finally, neuroticism as a negative variable in Big Five frameworks is found to be negatively related to the team trust in current inquiry. Prior research also revealed a strong negative association between neurotics and propensity to trust (Jacques et al, 2009). Given this, this result is also an explainable one as reluctant, depressive and anxious nature of neurotic members who have low propensity to trust other members of the group may create a friable atmosphere within the team that may cause decline within the members' trust among each other.

In this study, the impact of variability levels of personality traits on the relationship between mean-level personality composition and creative performance is also investigated for each of the five predicted relationships in both short and longer time span. The literature involves studies that investigates the impact of diversity in deep level factors (including personality composition) on performance of teams. However, to the best of my knowledge, there is no study in the literature that investigates moderating power of variability on the relationship between mean-level personality composition and team creative performance by comparing both short and longer time results. Starting from here, the aim of the present inquiry is not only to investigate the relationship between mean-level personality composition and team creative performance, but also to probe the moderating power of variability in personality composition on the relationship. In doing so, the most complex configuration approach is adobted and thus both mean level and variety level of personality are investigated together.

As such, this two-way investigation is expected to provide further understanding with regards to the association between personality composition and team creative performance. However, the results indicated that the variability of personality traits which is underpinned by complementary model of person environment fit approach, does not have a moderating power on the relationships between independent (personality traits) and dependent (creative performance of student teams) variables.

The first hypothesis on the positive relationship between moderate mean level of extraversion and creative performance predicts that this relationship is most positive when the variability in extraversion is high. However, the results show that a high level of variability in extraversion as a moderating factor does not indicate a significant effect on the association between moderate mean-level extraversion and creative performance of student teams. This finding demonstrates that neither mean level of extraversion nor variability-level extraversion play an essential role in generating novel ideas.

Moving on to the moderating hypothesis test results on agreeableness, once again, the present study did not generate any significant findings on the relationship between mean level agreeableness and team creative performance through the moderating role of high levels of variability in agreeableness. Therefore, the expected influence of diversity of agreeable members on the relationship between mean levels of agreeableness and creative performance within the team does not supported.

In this study, it has been found that high variability in conscientiousness did not have an impact on the association between moderate mean-level conscientiousness and creative performance. Based on these findings, it can once again be inferred that variability in conscientious members of student teams does not influence the expected curvilinear

relationship between mean-level conscientiousness and team creative performance. One possible reason for this finding is that conscientious individuals may not play a vital role in novel idea generation, and focus more on well-defined tasks. Therefore, their diversity structure within the teams does not have any particular impact on the relationship.

Turning to the findings on the impact of neuroticism with low variability on the association between mean-level neuroticism and creative performance, the findings show that the expected negative impact of high neuroticism on creative performance is not influenced by a low variability level of neuroticism. This finding indicates that along with mean-level neuroticism, a variability-level neuroticism does not indicate any considerable association. This finding coincide with the previous research and indicates that when the matter is creative performance of team neuroticsm does not play a significant role in determining the performance (Baer et al, 2008, Bolin and Neumann, 2006).

Final hypothesis is about the relationship between the high mean-level openness to experience and creative performance that is moderated by variability level openness to experience. Once again, the findings of the present research do not indicate a strong moderating relationship. Openness to experience is seen as the variable that is most closely related to creativity in the Big Five personality framework (Bechtoldt el al., 2007). Accordingly, the theoretical indication is towards homogeneousness of these individuals within the team context (Baer et al., 2008). However, in a study conducted in 2010, Schilpzand and co-workers (2011) found that, in fact, diverstiy in openness to experience is important for creativity. Although this finding is an unexpected one, the researchers argued that, along with the open members, there needs to be some members who are low in openness to experience to assist the team in evaluating ideas and to choose the best possible idea to pursue (Litchfield *et al.*, 2017; Schilpzand *et al.*, 2011). They push this

argument further and state that this may be because the members high in openness are highly focussed on developing ideas and dominating the associated discussion, which may hinder the others members' contributions and distract them from creativity (Schilpzand *et al.*, 2011). However, the Big Five framework suggests that members who are open to new experiences are the ones who are most open to others' contributions and most willing to support alternative approaches, instead of dominating discussions (Peeters *et al.*, 2006; LePine *et al.*, 2011). What is more, the findings of the present study do not give much credit to the variability of openness to experience regarding its influence on the proposed relationship. Additionally, and contrary to the arguments above, Baer and co-workers found that members with low mean-level openness are associated with either a neutral or negative influence on creativity as contingent upon their creative confidence. As a result, it is clear that there are mixed findings and different arguments with regards to the influence of variability on creativity. Therefore, any further research needs to evaluate the heterogeneity and homogeneity of openness to experience and its impact on creative performance of teams further.

Taken together, the findings of this initial study indicate that when it comes to creative performance, at least in the context of student teams, the personality of the individuals does not play a vital role on team-level idea generation. Therefore, the results of this research demonstrate that team-level creativity may be more complicated than individual levels. Furthermore, the influence of mean and variability-level personality configuration may be weaker than the individual-level impact. The findings of the present study were mostly in line with the theoretical basis and predictions of the aforementioned studies that mostly focused on the personality and creativity relationship on team levels in short time period (Driskell *et al.*, 1987, Bolin and Neumann, 2006; Baer *et al.*, 2008; Robert and Cheung, 2010; Schilpzand *et al.*, 2011). Additionally, the results signify weak associations between

personality and team creativity in team level in longer term period and it is unearthed that the influencing strength of each Big Five trait do not depend on the time members spent together. Additively, by obtaining similar insignificant results in both time periods this research indicated that team personality configuration does not have an impact on the creative performance. To this end, the decision-makers, particularly the ones responsible for the formation of such termporary teams as student teams, need to be careful when considering the personality composition of the teams that aim for creative results.

Given these findings for study 1, this research project goes further and investigates the personality composition and team-effectiveness relationships in a real business R&D context, where the target of developing novel ideas and implementing those ideas for innovation and competitiveness is crucial. I believe that the following research, that is conducted in a highly creative and innovation-oriented, knowledge-intensive context, will contribute to the existing findings and discussion on the complex role of personality composition on team-level innovation.

Considering the findings and related discussion above The Study 1 also fills the gaps in the literature and make contributions to the theoretical basis in team personality composition research in three aspects: Firstly, it looks at the personality and team creativity association in both short and continuing time period and thus observes the influencing strength of personality traits on creative performance over time. Secondly, present study investigates the mediating role of team trust personality composition and team creative performance. Thirdly, Study 1 also applies the configuration approach to personality composition and consider both variability and mean level of personality through probing the moderating role of variability in personality on the relationship between mean level personality traits and team

creativity. Notably, these contributions will be elaborated and discussed with more detail in chapter 6.

4.6. LIMITATIONS

This first study aimed to examine the interaction between the Big Five personality traits, team trust and the creative performance of student teams through the use of the input-process-output model. Therefore, it has used creative performance measures that rely upon both calculation of number of ideas generated for short time period (one session) and single performance ratings for longer time span (4 weeks). However, as can be inferred the creative performance measures were different depending on the time period owing to the context and requirements of the existing module. Therefore, usage of similar measures for both time frames would generate more reliable and comparable results. These are limitations related to the measurements that, when used in this study and in future research, can address the restrictions alongside any measurements.

What is more this study did not investigate the moderating effect of creative confidence of teams. In fact, one of the previous study examined the moderating impact of creative confidence. Baer and his colleques (2008) evaluated team confidence after completion of the creative task and then their study could reveal some significant relationships between personality traits and creative performance. However, for the current research the module restrictions and design was not appropriate to conduct such a study. Therefore, this study instead investigated a novel interaction through analysing the moderating impact of variability in personality traits on the relationship between mean level traits and creative performance. It is ofnote here however, this type of moderating relationship did not reveal any significant impact on the creative outcomes. To this end, future research may need to

include research designs that further investigates the moderating role of creative confidence in a comprehensive way.

The number of participating teams (in other words, the sample size) could be more than 24. Additionally, this study is conducted in an artificial setting, which naturally raises questions as to whether the results of this research can be generalised to teams operating in work organisations. These reasons constitute the other limitations of this study. Although there are studies that examine the same relationship using sample sizes and settings similar to the present study (Schilpzand *et al.*, 2011), the number of teams participating were relatively limited and some possibly significant relationships may have remained undetected during the data analysis. Therefore, future investigations that cover work-related settings with bigger sample sizes may produce more reliable and generalised results. Having said that, this study did not apply the selection rate formula for the participant teams in oder not to reduce the statistical power of the data. In fact, a research conducted by Biemann and Heidemeier in 2012 support this argument. In the study, it is found that the exclusion of teams in order to improve the statistical power is ill advised and may fail to improve the conclusions that researchers draw from their findings (Biemann and Heidemeier, 2012). Nevertheless, as there is still possibility to have an impact on the findings, the results after the elimination of teams using Dawson's formula were checked. After the application of the formula 2 out of 24 teams were eliminated. However, even after this elimination the statistical analyses showed that all the test results were similar with the findings in hand before the application of the formula.

Moreover, the reliability score of the agreeableness, which is represented by the Cronbach alpha value, is below .70, which signifies a weak predictive magnitude for the relationships between agreeableness and other variables. Future research may use alternative original

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scales to measure either the influence of all Big Five variables or only the agreeability variable.

Finally, the duration of the current investigation was relatively short, since students only worked as a team for four weeks. In addition, considering the other modules that the students took at the same time, the meeting periods of the student teams might not be considered particularly intensive. To this end, when compared to most work groups that engage in creative tasks within organisations, the team tenure and cooperation level of student teams is significantly less than for real work teams. indeed, with prolonged time spans and cooperation, the influence of personality may have found to be significant.

4.7. CHAPTER SUMMARY

This chapter contains the initial study (Study 1) of this thesis, in which the relationship between personality, team trust variable and creative performance of student teams was examined. The personalities of the team members were determined through using the well-known Big Five personality traits framework. Accordingly, the association between personality traits, team trust and student teams' creative performances has been conceptualised using well-known IPO framework, which is used for conceptualisation of variables related to team performance. Surprisingly, none of the hypotheses were supported by the results of the analysis section. In this regard, as opposed to the findings associated with general team performance within the literature, these findings indicate that personality has a surprisingly passive role when teams perform such complex tasks as novel idea generation.

This study will now be followed by an extended second study that probes the relationship between personality and team innovative performance with more variables in a real-world, knowledge-oriented R&D work context. Additionally, the coming study will use an original measure with multiple items to rank innovative performance; it will involve far more work teams, most of which have been operating for longer periods, and often with far more intense interactions in comparison to the present study. Therefore, the Study 2 has considerably less limitations in comparison with the Study 1 whilst bringing new dimensions to the discussions related to personality composition and team performance.

CHAPTER.5: **STUDY 2 – METHODS – RESULTS AND DISCUSSION**

5.1. INTRODUCTION

This chapter has the similar pattern of structure with the previous chapter. In this sense, it firstly introduces the Study 2 and discusses the novel characteristics of the research. This introduction section is followed by the methods, results and discussion parts of study 2, which are builded upon the review of the literature and developed hypotheses. Methods section involves discussion and justifications regarding the methods used in order to address the research questions. Moving on to the results part, this section of the theses includes the results that are generated by data anlaysis through using the methods introduced beforehand. Discussion part on the other hand embraces the findings of study 2 and embraces underlying reasons. This section also informs the reader about the contributions of the study 2 and end up with limitations of study 2 that is followed by general summary of the chapter.

5.2. INTRODUCING STUDY 2

Comparing to first study, Study 2 has more variety with regards to the organisations involved, a larger number of teams and participants surveyed, and also examines more variables with the particular focus on team innovation instead of creativity (see Figure 5.1). There are number of reasons behind to convey this research and these reasons will be elaborated in this section.

First of all, the focal point of study 2 is to understand the direct or mediated influence of personality composition on team innovative performance in firms whose main focus is to innovate through knowledge worker teams. Specifically, by way of this latter study, the relationship between both bright and dark side personality traits, innovation related team processes and team innovative performance will be examined. To this end, the study aims to bring additional arguments to the team innovation literature and extend the scope of the IPO model of team innovation through highlighting the influence of personality and process dimensions of teamwork.

Second of all, this study investigates both mediating and moderating relationships among personality traits, innovation related team processes and team innovation. In this sense, firstly based on the Hulsheger, Anderson and Salgodo's meta-analysis that is conducted in 2009 the eight innovation related team processes were used as mediating team process factors between personality traits and team innovation. As explained in the literature review section these variables were "team participation, task focus, shared objectives, support for innovation, task and relationship conflict, team cohesion and team communication". Additionally, Study 2 also examines the moderating impact of personality diversity on the association between personality traits and team innovation. As a result, having looked at both moderating and mediating relationships between variables this study has a potential to make an additional contribution to the existing literature in personality composition in teams.

Last of all, the output of this research is distinct from study one and it is innovation. Hence, to effectively investigate the role of personality composition and team processes on team innovation, this second research is conducted in the relevant team based, knowledge intensive and innovation oriented, real R&D context. To this end, the next section will

introduce the knowledge intensive context and the nature of knowledge worker teams operating in this type of setting.

Figure 5.1: Extended Input - Process - Output Model of KWT Innovation

INPUTS

PROCESS VARIABLES

OUTPUT

-Shared Vision (TCI)
-Participative Safety (TCI)
-Support for Innovation (TCI)
-Task Focus (TCI)
-Team Cohesion
-Communication
-Task Conflict
-Relationship Conflict

PERSONALITY TRAITS
(*Mean* Level Scores)

BIG FIVE PERSONALITY TRAITS

-Extraversion
-Agreeableness
-Openness to experience
-Extraversion
-Neuroticsm

DARK TRIAD PERSONLITY TRAITS

-Machiavellianism
-Narcissism
-Psychopathy
.

Direct Relationship

Moderated Relationship

KNOWLEDGE WORKER TEAM INNOVATIVE PERFORMANCE

BIG FIVE PERSONALITY TRAITS
(*Variability* Level Scores)
-Extraversion
-Agreeableness
-Openness to experience
-Extraversion
-Neuroticsm

5.2.1. KNOWLEDGE INTENSIVE CONTEXT

The main focus of study 2 is team personality composition in a knowledge-intensive context. Therefore, this section starts with an introduction to a knowledge-oriented work context and its differences from other work contexts. The emphasis is then firstly on knowledge-intensive firms operating in this particular context, and secondly on knowledge workers and the associated teams who operate in these firms.

Organisations have started to operate differently with recent changes and developments in their technological and economical environments. Particularly with the effect of globalisation, competition has become fiercer between economies and therefore between companies. In the new business era, factors like quality and quantity are entirely secondary; customer loyalty and organisational focus depend more on creativity and the distinctive approaches of innovative companies (Bessant and Tidd, 2011).

In today's business environments, conditions are entirely different to those of the past. With the effect of industrial revolution, the economy of developed countries started to become organised. In these organised economies, firms were mainly capital-intensive. These organisations, which are broadly called bureaucracies, were managed by traditional management and organisation theory assumptions. According to these assumptions, employees were not able to take the initiative and were often seen as workers who are there to follow managers' orders (Cole, 2004).

However, beginning with the late sixties and early seventies, post-modern thinking and approaches started to evolve (Blackler, 1995). In two decades' time, with the salient changes in society, technology and economy, the dominance of bureaucracies started to be questioned by both management academics and practitioners (Peters and Waterman, 2004).

Currently, finding new ways of operating and attracting customers through newly-developed products and services is essential (Shipton, Fay, West, Patterson, Birdi, 2005). To these ends, new knowledge needs to be created within organisations. Creation of new knowledge, changing faster than the markets, and competing with strong organisations is not compatible with traditional management approaches and bureaucracies (Hendry, 2006), because in today's turbulent business markets, organisations need to benefit not just from managerial ideas, but all workers' contributions as well. Hence, the controlling powers of managers needs to be decreased and organisations need to have flat hierarchical structures. What is more, communication flow should be free around the organisation, rather than rigidly structured one-way communication (Robertson and Swan, 2003a).

All of these developments have effectively directed key actors' attention to understanding the nature of knowledge and knowledge work in post-bureaucratic organisations with new managerial approaches. In addition, the strategic importance afforded to the generation of new knowledge by organisations has increased. It is also recognised that knowledge has a crucial effect on solving problems, innovating new approaches, products or services, and understanding changes in the environment (Nonaka and Takeuchi, 1995). Therefore, the mantra of "knowledge is one of the most crucial assets" is now being taken seriously by actors within competitive organisations.

The recent surge of interest in knowledge work has also heightened the strategic importance afforded to expertise and the critical knowledge of employees by organisations. Additionally, bringing knowledgeable workers together to interact, share and create knowledge for innovation became a high premium strategy for managers in non-traditional entities (Swan, 2011). Today, more and more organisations are encouraged to place greater emphasis on

knowledge-oriented collaborations and transform them into knowledge-based, innovation-driven agencies (Swart and Kinnie, 2003; Wikstrom and Norman, 1993).

The main focus of knowledge-intensive organisations is to adopt to fast-moving global markets, particularly through following changes in technology and science, as well as dealing with complexity, chaos, flexibility and disorganisation (Alvesson, 2004, Parker, 1992). Knowledge-intensive firms (KIFs), generally operate in turbulent environments and are defined as "*organisations where knowledge is used by intellectual and competent workers to create value and gain competitive advantage*" (Alvesson, 2004). Knowledge-intensive companies are the organisations that focus on innovation and knowledge creation. Management, engineering, IT consultancies, law or accountancy firms, research and development units and advertising agencies can be given as examples of knowledge work organizations (Swart and Kinnie, 2003; Starbuck, 1992). Although estimates indicate that these firms employ 10-15% of the entire global workforce, they can be highly valuable and considerably influential. In fact, these firms can change the course of these industries through creating new knowledge and innovation (Alvesson, 2004).

As can be understood from the examples of KIFs, there are different types of knowledge-intensive firms according to their operative focus. In literature, there are distinct approaches to the question of how to classify these new types of firms. Lowendahl (1997), for example, categorises KIFs according to their strategic focus as Client-based (e.g. law and accountancy firms), Solution-based (e.g. management consultancy firms) and Problem Solving-based (e.g. advertising agencies, web design firms). However, it seems that not all researchers agree with her categorisation. Alvesson (2004) devised different types of classification, which divided knowledge-intensive firms into two types, which are professional service firms (e.g. management consultancies, advertising agents, etc.) and R&D

companies, which encapsulates organisations that for the most part focus on tangible product innovation. While this latter taxonomy may be true and simpler than the former one, it also seems to exclude new types of knowledge-intensive firms which are internet-based, knowledge-intensive firms such as search engine firms (e.g. Google, Yahoo, etc.) or social media companies (e.g. Facebook, LinkedIn) (Prashantham and Young, 2004; Lyer and Davenport, 2008). Table 5.1 summarises all types of knowledge-based firms.

Table 5.1: Types of Knowledge Intensive Firms (KIFs)

Knowledge Intensive Firms	Examples	Strategic Focus
Professional Service KIFs	Management, Engineering or IT Consultancies, Law or Accountancy companies, Advertising agencies	Providing solutions to client firms.
Tangible Product Based KIFs *	R&D firms, Software Development Companies	New product development
Internet based KIFs	Social Media Firms, Internet based Search Engine firms etc.	Proposing new services to their customers or public through internet.

The focus of this research will be on the second Tangible Product Based KIFs

In these knowledge-based organisations, the emphasis is often on knowledge-oriented employees. Analytic, intellectual and theory-guided knowledge is the key factor and a distinct focus for KIFs in comparison to other agencies, where knowledge is seen as a primary means of production and accelerator of innovation. This knowledge is owned, captured, created and managed by knowledge workers, so that creativity and innovation occurs (Clegg *et al.*, 1996; Scarbrough, 1999) Therefore, knowledge workers are the most valuable assets of these organisations (Newell *et al.*, 2009). The definition of the term 'knowledge worker' encompasses highly-educated professionals who work in non-standard settings and apply theoretical and analytical knowledge to deal with complex tasks and new knowledge creation within their organisations (Drucker, 1994).

However, it is important to note that there is no precise, common description of knowledge-intensive firms and knowledge workers because there are different forms of KIFs that recruit different kinds of specialists. This has caused some researchers to argue that knowledge work is included in all sorts of work (Knights, Murray and Wilmott, 1993). Yet, here, the main focus is on firms that employ and benefit from experts whose knowledge and skills are often the determinant factors of competitiveness and innovation. Software Development Engineers who work on new web design or Internet-based services, or other specialist engineers, designers responsible for new product development, or management consultants whose knowledge, expertise and creative problem-solving skills are crucial for client firms, can be given as examples of such experts.

All in all, a knowledge-intensive context and the firms and actors involved in this context have certain distinct characteristic features that brings new discussion and approaches to investigations of organisations and working life. The actors' capabilities towards the creation of new ideas and knowledge, as well their transformation to new offerings, is becoming the new focus of knowledge-intensive organisations. Therefore, bringing knowledge workers together, and the formation of effective teams, are the principle strategies of managers. Teamwork and effective collaboration, in particular, have been found to be amongst the key drivers of innovation (West, 2012; Zahavy and Somech, 2001). In effect, the formation of teams that can benefit from 'masterminds' and devise creative and innovative projects is a crucial challenge in this context (Newell *et al*., 2009; Ichijo and Nonaka, 2009). To this end, the focal point of the present research is that of teams performing in knowledge-intensive firms; the nature of teamwork in a knowledge-intensive context will be discussed in the next section.

5.2.1. a) Team Work in a Knowledge Intensive Context:

Some researchers have begun to argue that it is time to reconsider our perception of teams, and there is a need to update how we look at teams according to recent changes in organisations and their approaches to teamwork (Murase *et al.*, 2012). The main reason for this change is because in the last two decades, competitive markets have become more innovation-driven, and organisations have had to consider redesigning their structures and strategies to become more innovative (Tissen, Andriessen and Deprez; 1998). Research shows that innovation is more likely to occur if knowledgeable people with distinct job-relevant expertise come together to share knowledge and perform effectively (Woodman, Savyer and Griffin, 1993; Bell and Fisher, 2012; Tannenbaum *et al.*, 2012).

Knowledge worker teams are composed of knowledgeable experts and deal with complex problems. Distinct from other types of work teams, in a knowledge work context it is often highly-educated star performers that collaborate and act together (Mankins, Bird and Root, 2013). Therefore, one of the biggest challenges is to combine the individualistic skills that each knowledge worker brings and create a stronger and more effective team synergy.

In knowledge-intensive firms, the main target is to create new knowledge and to actively innovate. Hence, knowledge workers generally form a team in order to seek unknown knowledge for innovation. Therefore, teaming up is important for knowledge workers to first generate creative ideas, and then add value to those ideas via implementing them in an effective manner. What is important here is that, although productivity is still important, it is downplayed by creativity and innovation in this context. Hence, the prior focus on innovation and performance assessment is mostly dependent on how innovative these teams are.

In knowledge-intensive organisations, the structures of teams are likely to be different compared to the ones in other organisations (Lindkvist, 2005). Mechanistic structures and well-defined tasks are the main characteristics of traditional teams. However, these characteristics are usually inappropriate to teams operating in a knowledge-intensive context. Instead, project-type organisation is found to be more appropriate to innovation-driven companies because it enables the open, networked and non-standardised environments necessary to, in particular, radical innovation. Thus, knowledge worker teams are formed in a more organic way. In other words, they have loose and autonomous structures. As knowledge workers have high degrees of freedom and control over their jobs, the teams they create are also designed to be autonomous. What is more, these teams are often designed in order to solve various complex problems and deal with ambiguous work-related issues. Therefore, the tasks in hand are often ill-defined and non-routine, as opposed to traditional work teams with mostly clearly outlined targets and routine job descriptions.

In innovation-oriented teams, more often than not, it is unusual for team members to have the all relevant knowledge (team's intellectual capital) for the creation of unknown knowledge. Thus, members' network and lobbies (social capital) can be extremely crucial to these teams in order for members to reach, learn and apply the deficient knowledge to achieve their task (Newell *et al.*, 2009). Additionally, project-based organisation enables team members to use their autonomy and discretion so that new knowledge can be created. While doing this, it is also essential to bring together appropriate members with the diverse skills and knowledge crucial to achieving the aims of the project at hand (Mintzberg and McHugh, 1985). Thus, task related diversity had been found to be crucial for teams operating in knowledge-intensive contexts.

However, heterogeneous combination can be achieved either by highly mechanistic or organic means, through use of multidisciplinary or transdisciplinary teams, respectively. Multidisciplinary teams have members with different expertise and backgrounds, and are only responsible for their particular tasks during teamwork. This type of collaboration does not necessitate a high level of interaction between individuals (Van Der Vegt and Bunderson, 2005). Conversely, transdisciplinary teams are defined as teams whose members, again, have mostly different backgrounds and skills, but are mutually responsible for the outcome of their project. Hence, the interaction between members is expected to be high in this type of teams (Stokols *et al..*, 2008) innovation and new knowledge creation is more likely to occur in transdisciplinary teams, rather than multidisciplinary ones, because in this type of teamwork, the knowledge that comes from different individuals with different expertise and experience is integrated more dynamically through intense communication, so that new types of knowledge and ways of doing things can be created (Newell *et al.*, 2009).

The interaction, knowledge-sharing, formal and informal dialogues are found to be crucial in creating new knowledge and eliciting innovation (Nonaka and Takeuchi, 1995). Therefore, in knowledge-intensive organisations, knowledge workers generally work in teams so that they can easily share information and create new knowledge (Mohrman, Cohen and Mohrman, 1995; Fox, 2003). Additionally, cognitive cohesion (team cognition) among team members in knowledge worker teams is essential to the circulation of knowledge in the team and the development of its overall synergy. Yet it is not so easy to create this synergy, because members of such teams generally come from different backgrounds, which creates knowledge boundaries that team members need to overcome to share deep tacit knowledge and develop new shared meanings. Scholars suggest continuous collaboration for prolonged periods through transdisciplinary work (Newell *et al.*, 2009; Sijtsema *et al.*, 2011). Additionally, development of trust among members is also seen as essential (Newell and

Swan, 2000). After the development of shared meanings, interaction and knowledge-sharing among members becomes more effective. To this end, members can share knowledge over and above that expected from each individual as relevant to their specific tasks.

Furthermore, it is argued that an enabling context also needs to be provided which involves physical, virtual and shared mental space to ensure effective interaction among knowledge workers (Johns and Gratton, 2013). As can be understood, along with face-to-face interaction, active usage of information and communication technologies can also be essential. Moreover, creation of a shared mental space (i.e., shared understanding, ideas, emotions) is particularly important to the process of knowledge creation (Nonaka and Konno, 1998). Mental models help the group of individuals to reach its predetermined objectives. Hence, it is crucial that members need to acknowledge and understand each others' knowledge within the team (He, Butler and King, 2007). In this regard, team members with t-shaped skills may play a pivotal role facilitate deep tacit knowledge sharing within the team. Since individual specialists with t-shaped skills assist team to maintain meaningful and synergistic communication among members. In fact, this type of skills called as t-shaped skills as the vertical part of the "T" signifies the deepness and the horizontal part of the "T" implies broadness of the skilss and knowledge (Madhaven and Grover, 1998). That is to say, t-shaped skills not only signify the owner's deep knowledge of a discipline (such as materials engineering) but also ability interprets the interaction between his/her discipline and some other disciplines (like polymer processing) (Tsai and Huang, 2008). At this point, some members' wider intellectuality and understanding capabilities (t-shaped skills) can facilitate knowledge flow within the team so that shared understandings among members can be gained regarding the situations faced by the team (Leonard, 1998).

Moreover, in diverse, innovation-oriented teams, the intense interaction and discussions may result in some task-related conflicts among knowledge workers, also known as "creative abrasion". This type of conflict between team members, who don't know each other well and have different knowledge with diverse backgrounds, are likely to occur. Yet it is argued that management should not interfere with creative abrasion as it facilitates the development of creativity within the team (Oster, 2011).

On the other hand, it is also important to note that there are a number of factors that can easily have a negative impact on the creation of new knowledge and the development of new products or services within these teams. The most important of important of these is knowledge boundaries. According to Carlile (2002, 2004) there can be up to three boundaries that can affect the dialogue, interaction and knowledge-sharing within a team; additionally, these boundaries can change according to the novelty of the task the team is facing. The first boundary is the easiest one to overcome, known as the 'syntactic boundary,' that develops due to any language differences among team members, so that misunderstandings can happen. The second boundary is the 'semantic boundary'. This type of boundary comes into existence owing to the distinct interpretations and meanings given by members. In such boundary situations, members may have difficulty in understanding each other and building common understanding, therefore members' knowledge cannot be easily shared. Carlile argues that in these situations, the information that members have needs to be translated so that individuals may find the opportunity to recognise the different ideas and approaches of others. The third boundary is the 'pragmatic boundary'. This type of boundary generally occurs in novel tasks because of the different interests of the members. In such complex situations, language translation may not be enough for the parties involved, and knowledge transformation may become necessary to convince members towards common action (Carlile, 2002, 2004). Along with these knowledge boundaries, power

dynamics, groupthink, group polarisation and conformity issues (mentioned above) within the team can also have a detrimental effect on knowledge creation.

With regards to leadership and control, it is argued that leaders do not have much power over knowledge workers. Indeed, because these teams are composed of highly independent individuals, the leader does not have much authority to control knowledge workers. As a result, some scholars argue that concretive control is more likely to occur among knowledgeable experts when they form a team (Courtney *et al.*, 2007). Additionally, because each individual member's skills and expertise can be crucial deoending to the problem encountered, continuous power redistribution is likely to occur within knowledge worker teams (Newell *et al.*, 2009).

When it comes to leadership, more visionary, cooperative and participative styles are found to be favourable in a knowledge-intensive context. To this end, transformational leadership can be considered as an umbrella leadership concept that is widely associated with innovation-oriented, postmodern organisations (Gumusluoglu and Ilsev, 2009). Transformational leaders lead their teams toward innovation through articulating a compelling vision, building constructive relationships and both inspiring and intellectually stimulating the members of the team (Karakitapolu-Aygun, Gumusluoglu, 2013; Eisenbeiss, Van Knippenberg and Boerner, 2008; Paulsen, Callon, Ayoko and Saunders, 2013).

Table 5.2: A table of Comparison Between KWTs and TWTs

Knowledge Worker Teams (KWTs)	Traditional Work Teams (TWTs)
The main focus is on new knowledge creation and innovation (Nonaka and Takeuchi, 1995)	The main focus is effective and efficient teamwork (West, 2012)
Work in various, uncertain and challenging tasks (Janz, et al, 1997)	Work in well-defined and routine task.
Functional diversity leans towards being high. (Cross-functional or even cross-organisational teams). Therefore, there can be high level of knowledge boundaries among team members. (Lewis, 2004)	Functional diversity is low. (Departmental teams)
Networking is crucial to fill knowledge and expertise gaps (Newell and Swan, 2000).	These teams tend to be internal and networking is not crucial.
Cognitive cohesion and synergy is essential for innovation (Sijtsema et al, 2011; Mankins et al, 2013)	Social cohesion and synergy is essential for efficiency.
Deep tacit knowledge exchange (Shani, Sema & Stebbins, 2000)	Explicit knowledge exchange.
Continuing redistribution of power among team members	Team leader or the manager has the power.
Transformational leadership is appropriate type for KWTs. These teams are highly autonomous therefore concertive control is likely to be occur among team members (Courtney et al, 2007)	Leaders of these teams have often more directive style.
There is often continuous collaboration and knowledge flows (Sijtsema et al, 2009)	Low-level mutual interdependence and little knowledge exchange.

All in all, gathering these experts within groups may not be enough for team innovation (Knippenberg, De Dreu and Homan, 2004; Fay, Borrill, Amir, Haward, West, 2006; Tannenbaum, Mathieu, Salas, Cohen, 2012) since individuals may have different backgrounds, and this can create some unique challenges to effective teamwork. Accordingly, social categorisation theory argues that individuals are prone to simplify and categorise members of the group. Thus, they comply with in-group members rather than out-group ones (Tajfel and Turner, 1986). Moreover, even knowledge workers may experience difficulties in fruitful interaction and knowledge-sharing, as well as cohesion within the team (Milliken and Martins, 1996; Van der Vegt and Janssen, 2003). Therefore, innovation-

related team inputs and processes may enable innovation within organisational groups (Guzzo and Shea, 1992, West and Anderson, 1996; Maier *et al.*, 2015).

5.3. METHODS

In this section of study 2, the first part is allocated to information about research samples and data collection. Following this, the information about the research sample and process of data collection will be provided and the used way of developing the questionnaires will be explained. Finally, statistical data which includes the reliability rates and the correlation scores of each variable will be presented.

This study was designed with the aim of understanding the relationship between Big Five and Dark Triad personality characteristics, innovation-related group processes and innovative performance of knowledge worker teams. The present study is quantitative in nature and it was conducted as a survey research. Accordingly, questionnaires were used to measure personalities and quantitative methods assisted me to test the developed hypotheses regarding the relationship between the factors.

5.3.1 RESEARCH SAMPLE AND DATA COLLECTION:

The data was collected through self-completion paper and pencil questionnaires. The questionnaires were delivered to team members by me or supervisors of each team. More information will be given about this process in the following parts. The research was conducted in 13 knowledge-intensive research and development organisations and in 4 R&D departments of technology-related firms operating in Turkey. These firms and departments

mainly operate in R&D in areas such as information and communication technologies, and electronics (Gumusluoglu, Aygun and Hirst, 2013). Existing contacts were used for data collection. Additionally, new contacts were also developed through continuing access. Accordingly, the contact details of the key employees in other organisations who may provide access were reached through using networks of organisations in the existing contact list.

The sample covers 53 knowledge worker teams including 292 individual participants, so that it can be comparable to other studies conducted in this research area. All samples will consist of knowledge worker teams. The age of the individual participants for this study ranged from 19 to 56. The sample included 225 (77%) male, and 67 (23%) female volunteers.

Data collection process started with senior managers and key personel. They were contacted and interviewed to determine the teams and their members who could participate in this research. After these processes, team members were invited to participate. The aim of the research was explained to the participants and I guaranteed to protect the participants' anonymity and privacy rights. Accordingly, in order to identify which team is which, I coded each team involved in this study. After that, and before delivering the questionnaires, I coded each questionnaire in accordance with the code given to each team. Therefore, all participants in one particular team received a questionnaire that had already been identified with the same code. Since every member within the team received a questionnaire with the same code, it is not possible to identify the individuals. Additionally, some companies preferred the delivery of the questionnaires to be done through a selected supervisor from the company rather than the researcher, in which cases I provided individually sealed envelopes with the documents enclosed. The supervisors were informed that the

participants' involvement in the study was voluntary and there was no obligation for participation. This voluntariness was also mentioned in the participant information sheets. On the other hand, a few firms required online delivery of questionnaires. In this situation, I contacted through online with such firms and sent online questionnaires to the firms for filling and received the questionnaires through e-mails.

Team innovative performance assessments were done by external assessors (supervisors, managers etc.), and there was one assessor per team. Therefore, the researcher visited or contacted the firms after some time (more than one month later) to acquire from assessors the completed innovative performance assessment questionnaires.

4.3.1.a) Team Demographics

As mentioned before 53 Teams participated into this Study 2 and the descriptive demographical information about the teams are provided in the table 5.3 below.

Table 5.3: Demographical Information Related to Team Size

	Range	N	Min	Max	Mean	Standard Dev.
Team Size	22	53	3.00	25.00	6.66	4.22

The table above clearly shows that, team size is 53 and the variability within the sample is considerably higher then Study 1 . As can be seen from table the size of the teams range from 3 to 25. However, it should be noted that there is only one team that is composed of 25 members and other than this the nearest biggest team size was 14. This thesis did not applied the selection rate formula and this is considered as a limitation for the Study 2 (Dawson, 2003). The age of the members ranged from 19 to 56.

5.3.2 QUESTIONNAIRE DEVELOPMENT

The questionnaire developed for study 2 involved the scales of variables that are included in the extended input-process-output model. Each scale was used for measurement of the variables in the model, and all the scales in the questionnaire are original and validated scales by previous studies. The 5-point Likert scale was used for all the scales included in the questionnaire and the Likert scale was ranged from 'strongly disagree' to 'strongly agree'.

All of the scales involved in the questionnaire are originally designed in English. Since the present study was administrated in Turkey, the measures were translated from English to Turkish in order to collect the data effectively and obtain reliable data. The translated version of the questionnaire was controlled by one of my colleagues by comparing both the English and Turkish versions of the questionnaire. Additionally, translated scales were also compared against previously translated versions of the same scales used in research. Then, a Turkish speaking colleague, who is aware of the research aim and the subject, controlled the Turkish version of the questionnaire and my two colleagues and I were involved in the translation process to finally evaluate, discuss, and compromise on the questionnaire that was used in study 2.

5.3.3 MEASUREMENT OF PERSONALITY, TEAM PROCESSES AND INNOVATIVE PERFORMANCE OF KNOWLEDGE WORKER TEAMS

This part will introduce the measurement types that were used in this study to measure personality (input), team processes (process) and output variables (team innovative performance). The original questionnaires including scales of each measures used in Study 2 can be found in the appendices section C.2 and C.3.

As mentioned in study one, both studies embrace the team input-process-output approach to conceptualise relationships of particular variables in teamwork context. The focus of the first study was on the relationship between Big Five personality traits, team trust and creative performance of student teams. Moving on to the present study, the relationship between personality traits (this time both Big Five and Dark Triad), team processes and innovative performance is under investigation. Therefore, the IPO model of team innovation is also considered as appropriate for this research for the aim of understanding this complex relationship between the variables (West and Anderson, 1996). However, to test the predicting processes of team innovation and their roles as mediators in the model, the expanded version of the team innovation model will be applied in the present study (Hulsheger, Anderson and Salgado, 2009).

5.3.3.a) Measures:

The measures used for study 2 are included in the extended IPO model that conceptualises the main focus of study 2. These measures are endorsed in order to understand the impact of personality composition on knowledge worker team innovative performance through innovation-related team processes. All of these measurements are crucial for discovering the determinants of team-based innovation in knowledge intensive context. Data collected through questionnaires, and the Likert scale was used for all measures which ranged from "totally disagree" to "totally agree". Each of these variables are explained in the literature review chapter (2) and summarised in the extended IPO model of Innovation.

Measures of Input (Personality) Components:

Big Five Personality Traits: As a widely used and suggested Big Five personality measurement instrument, "Big Five Personality Inventory" was used for this study as BFI is a brief, and comprehensive measure of the five domains of personality (John and Martinez,

1988; John and Srivastava, 1999). This measurement is comprised of agreeableness, extraversion, conscientiousness, openness to experience and neuroticism scales that are composed of 44 items in total. These measurements are the same ones that are used in the study 1 and explained in that part in more detail.

Dark Triad Personality Traits: 27-item Dark Triad Personality Inventory SD3. was used for the measurement of Machiavellian, narcissistic and psychopathic personality traits (Jones and Paulhus, 2014). The Dark Triad personality scales, which are included in the Dark Triad measurement, are original and previously used measures (Maples, Lankin and Miller, 2014). However, in order to increase the reliability of the scales in this setting some of the items were eliminated from the scales (please see appendix section C.2). In addition, Likert scale that consists of 5 points was used to measure these personality traits that ranged form 'strongly disagree' to 'strongly agree'.

Machiavellianism: The measure of the Machiavellianism personality investigates the manipulative tendencies of the team members. In other words, it focusses on the level of the manipulative manner of individuals. The scale originally consists of 9 items. However, in order to increase the reliability of the scale in this particular setting 6 items scale was used. Example of items used in this measure: "most people can be manipulated" and "it is wise to keep track of information that you can use against people later".

Narcissism: The second measurement factor of the Dark Triad focuses on egoistic dispositions; thus the aim is to evaluate the narcissistic (self-involved) levels of the teams. There were originally 9 items within the narcissism scale yet in order to increase the reliability of the scale to an acceptable level 4 items used to measure the narcisstic

personality. Some examples of items from the scale are; "I know that I am special because everyone is telling so" and "Many group activities tend to be dull without me".

Psychopathy: The third dimension of dark personality is related to careless and selfish inclinations among team members. This measure also focuses on the level of psychopathy within teams and the scale once again consists of 9 items, however in order to have a high reliability score the number of items reduced to 6. "Payback needs to be quick and nasty" and "People who mess with me always regret it" are the examples of items that are used in this measurement.

Measures of Team Processes Components:

In order to measure the first four innovation related group processes West and Anderson`s Team climate inventory (TCI) model was used (Beaulieu et.al, 2014). Additionally, to measure the last three group processes, which are *team cohesion* (Koys and Decottis, 1991), *group communication* (Keller, 2001) and *task and relationship conflict* (Jehn, 1995), existing developed scales were used. This data was also gathered from the team members.

Shared Vision: Team vision is the first and foremost process involved in the aforementioned TCI approach of team innovation. This process stresses the importance of building shared objectives within teams by way of saying to make sure that every member is on the same page about the vision of the collective effort. Shared vision and following three team process measures were proposed by West and Anderson, and the short 19-item version of this scale was obtained from the work of Beaulieu and her associates (2014). The scale consists of 4 items. An example item is "How clear are you about what your team`s objectives are?"

Participative Safety: This team process was originally created by West and Farr in 1990. As explained before, this process is about ensuring each member's comfortable participation, particularly during the idea sharing practices. This scale comprises 6 items one of which is "People feel understood and accepted by each other".

Support for Innovation: Distinct from participative safety, this process emphasises the importance of mutual support and encouragement for the ideas created within the team. Therefore, sharing ideas in an easy manner within the team is not enough for innovative outcomes. Teams also need to support these shared ideas and build on these thoughts. There are 5 items included in this scale. One of these, for instance, is, "Members of the team provide and share resources to help in the application of new ideas."

Task Focus: The fourth and final climate innovation inventory process is interested in team members` focus on the tasks in hand. This process is considered vital for both the creativity and implementation phases of the innovation, because it helps the group to prevent from painful distractions along the way (Tjosvold, Tang and West, 2004). The scale used for measuring task focus within teams, involves 4 items. "Do members of the team build on each other's ideas in order to achieve the highest possible standards of performance?" is one of the items of the scale used for measuring the task focus level of the teams.

Team Social Cohesion: This variable is about the extent to which member's feel attachment to their team and their eagerness to be a part of the team. This process variable is the one that triggers sharing and a togetherness attitude within the team. Accordingly, social cohesion within the team has been considered as a necessary precondition for team innovation by scholars (Woodman et al., 1993; Montoya and Workman, 2013). In this

respect, an original and validated social cohesion scale that is developed within the psychological climate instrument by Koys and Decotiis (1991) was used. As this measure is closely in line with the putpose of this research and valiadated by (Montes, Moreno and Morales, 2005) in a team setting. There were 5 items within the scale. One of the items was "There is a personal interest in the team".

Team Communication: The relationship between effective communication and team innovation is a well-known association. Idea and knowledge-sharing among members has been found to be a strong determinant of team innovation. (Ancona and Caldvell, 1992, Keller,2001). Therefore, the present research also included this variable as a predictor of team innovation. An example of an item involved in this measure is "How frequently are there task related communication inside your team?", and there are 4 items that come with the scale.

Task Conflict: Creative abrasion among team members has been argued as another important predictor of team innovation, since intense communications and building on ideas may result in creation of new knowledge and innovation within the team (Leonard, 1998; Davenport and Prusak, 1998). In addition, research supports these arguments and underlines the importance of task-related conflict and minority dissent (Shalley and Gilson, 2004; De Dreu and West, 2001). There were 4 items used in the task conflict scale and one of the items is stated as in the statement; "How often do people in your team disagree about opinions regarding work being done".

Relationship Conflict: The final innovation-related process measurement is relationship conflict. As can be understood from the name of the variable, it measures the extent to which conflicts are related to members' interrelationships. This process variable is

mostly accepted as negative (De Dreu, 2006) and was also found to be negatively related to performance outcomes (Jehn, 1995). This scale also comprsed of 4 items and one of them is "How much tension is there among members in your team?".

Measures of Team Output:

Team Innovative Performance: Team innovative performance was assessed by the external judges of each team using a questionnaire (Alper et al, 2000, Taggar, 2002). Additionally, each team had one assessor (manager or supervisor) who rated the innovative performance of the related team. In other words, judges were asked to evaluate innovative performance of the knowledge worker teams in R&D context. Team innovation measurement developed by West and Wallace`s in 1991 was adopted for this research as it is incongruence with the West's conceptualization of team innovation. In fact, in one of the early study of West and Farr (1990) that mainly underpins the West's conceptualization of innovation at team level, team innovation is defined as the introduction and application of new ideas, processes, procedures or products that are designed to be useful (West and Farr, 1990). In this regard, the measurement includes statements regarding development of new skills and innovative approaches as well as initiation of new procedures and methods in order to accomplish innovation oriented work tasks. What is more, the measure was also used by Michael West himself and Anat Drach Zahavy as well as Anit Somech who are also well-known scholars in the field of team innovation (West and Farr, 1990; Zahavy and Somech, 2001 & 2013). To this end, the measure is considered appropriate in order to evaluate the team innovation successfully.

This measurement originally consists of 4 items. However, one of the item ("The team initiated improved teaching strategies and methods") was not relevant for the real-world knowledge intensive business context as the main tasks of knowledge workers in this

particular setting did not involve teaching activities. Therefore, only 3 items of the measurement were used for this research (Please see appendices section C.3). This developed scale focuses on the initiation of new procedures, developing innovative ways to reach team targets, and improving and developing skills to facilitate innovation (Zahavy and Somech, 2001). It is ofnote here however, the scale has a broad nature in terms of measuring innovative performance including idea generation and implementation phases. In fact, within the literature there is no widely accepted and known innovation measurement that effectively seperates the generation and implementation behaviours of the actors. In fact, because the both factors are often highly associated researchers tend to use an overall measure to assess the innovative performance of teams (Scott and Bruce, 1994; Rogers, 1995).

Control Measures:

The sample used in this study can be considered as moderately small. Hence, it was important to decide on the number of control variables that are relevant for the present study. Accordingly, the control variables listed below were worth considering and thus are included in this study so as to account for the possibility of any puzzling effects on the research results.

Leadership Measure: Leadership is an acknowledged element that is found to be an important antecedent of team innovation (West and Hirst, 2003). More specifically transformational leadership style is suggested as an important factor for teams to be innovative (Eisenbeiss, Van Knippenberg and Boerner, 2008). In this regard, this study principally used transformational leadership variable because it was also argued and found to be appropriate for innovation oriented teams operating within knowledge intensive R&D context (Courtney, Navarro and O'Hare 2007; Gumusluoglu et al, 2013). However, in this

study the priority is given to the personality traits and mediating role of team processes on innovative performance of knowledge worker teams. Thus, the well known transformational leadership measure that was developed by Carless, Wearing and Mann (2000) was used as a control measure. The leadership variable is aggregated through a calculation of mean values of the leadership rankings of each member within a particular team.

Demographical Variables: The variables as gender and age were also used as control variables in this research with the purpose of eliminating potential alternative influences on the results observed in this research (Baer et al, 2008)*.* Additionally, because team level performance is the focal point of this study, the individual level variables such as gender and age were aggregated to the team level. With regards to age, the average scores of age is calculated for each team and gender variable is aggregated through computing the proportion of men within the whole sample. The results demonstrated that gender variable is significantly related to innovative performance of knowledge worker teams. Therefore, only the gender was added as control variable in the data analysis. The table 5.4 below shows the association scores of control variables with team innovative performance.

Other Control Variables: Team size, team tenure and organizational context were also included as control variables in this study as they might have an influence on the innovative outcome of knowledge worker teams. Team size refers to the total number of the members that is reported in the questionnaires. In fact, previous research indicates a significant relationship between team size and innovative performance therefore team size was also controlled in this study (Hulsheger et al, 2009). In addition, team tenure is included as additional control variable as this factor also found significantly related to innovation (Katz, 1982; West and Anderson, 1996). Finally, Organization context variable is controlled in this latter study as teams investigated in this study are from 17 distinct organizations

operating in different sectors (Including 13 R&D and 4 technology firms). However as indicated in the table 5.4 below the regression results related to these variables and the innovative outout were also not significant. To this end, these additional control variables were not included in data the analysis process.

Table 5.4: Values Related to Association Between Control Variables and KWT Innovative Performance

CONTROL VARIABLES	R²	(B)	(β)	p
Transformational Leadership	.007	.142	.086	.539
Gender (Proportion of men)	.129	1.118	.360	.008
Age	.008	-.015	-.091	.519
Team Tenure	.004	-.002	-.059	.673
Team Size	.001	-.007	-.034	.811
Organization	.058	-.046	-.240	.083

5.3.4 VALIDITY ANALYSIS

Factor analysis is a technique that is used for measuring the validity of the measures. It assists to examine if the items of a scales belong together while being distinct from other scales (Dawson, 2016). For this purpose, exploratory factor analysis was conducted in Study 2 as the scales used in this research are considerably new to a knowledge intensive setting. Moreover, this study has a moderate sample size and thus requires an exploratory factor analysis (Dawson, 2016). In this regard, this study has an exploratory nature. Principal axis factoring was used as an extraction method. A KMO test waca in order to see adequacy level of sampling used for each scale, and a Barlett test was included to understand how sufficient the correlations of scale items are.

On the other hand, confirmatory factor analysis was not conducted in Study 2 due to the insufficient sample size (Dawson, 2016). As stated earlier, there are two main reasons for

not running a CFA. First, the scales used in this research were original and commonly used so that the researcher has a strong assumption that the items belong to the measures (scales) used in the study. Secondly, conducting a CFA requires adequate sample size to generate reliable outputs from the analysis. With reference to the established rule of thumb that is helpful in deciding whether or not using the CFA, a minimum 10 cases per item is suggested. In this regard, likewise Study 1, Study 2 also does not have the sufficient number of cases (Thompson, 2004). To clarify, there were 18 scales and 6 items per scale in average, and thus 1080 cases required in order to run CFA (18 x 6 x 10 = 1080). To this end, Study 2 had insufficient data (295 cases) to run a confirmatory factor analysis (Dawson, 2016).

5.3.4.a) Exploratory Factor Analysis (EFA):

Hence the name, the analysis has an exploratory nature and assesses the consistency between factor structures and actual data. In other words, it examines the associations among the items and delegates the items to scales (Dawson, 2016). Therefore, exploratory factor analysis was administrated on each scale used in this study. In this respect, principal axis factoring (PAF) was conducted on all items of each scale since it is one of the most commonly used methods and better able to recover the weak factors within the model (Winter and Dodou, 2012). Additionally, direct oblimin rotation was operated in pursuance of reinforcing correlation between the factors. The scree plots created after EFA and related theory provided a basis for determination of the number of factors used (Dawson, 2016). Eigenvalues that are greater or close to 1 are considered significant through analysing the scree plots created, and these values are used for the determination of the factors. Additionally, pattern and factor matrices included in the outputs of the EFA analyses were analysed to decide the measuring strength of used scales. Items with loadings below 0.4

were suppressed from the matrices (Hinkin, 1995). Again, it is worth noting that scales used in Study 2 are well-established measures.

The input factor for study 2 is personality variable, similar to study 1. However, as mentioned before in addition to Big Five personality scales, the Dark Triad personality traits were also included in study 2. Again, one of the well-known original Big Five personality instruments (BFI) used in study 2 (John and Srivastava, 1999). Moving on to the second Dark Triad dimension of the personality assessment, Short Dark Triad Measurement (SD3) which was developed by one of the scholars who launched the well-known Dark Triad concept (Jones and Paulhus, 2014; Paulhus and Williams, 2002) was used. The SD3 measurement of Dark Triad personality traits is an original and validated measurement which has been used by other scholars in different contexts (Funham, Richard, Rangel and Jones, 2013; Eklund and Hultman, 2015). Additionally, in order to determine the unidimensionality of the subscales, I ran EFA for each scale included in the BFI and SD3 personality measurements.

Turning to process and output variables, all of the scales that were used to evaluate team process variables, are original and validated scales, as introduced and explained within the measurement section (5.3.3) of the methods chapter (Hulsheger et al, 2009). In addition, the innovative performance scale used in this research was adopted from the article written by West and Wallace (1991). Once again, it is a validated and original measure of team innovation (Zahavy and Somech, 2001).

Based on the scree plots outputs of EFA, all scales including input, process and output variables, indicated a single prominent factor. The tables related to EFA analysis and scree plots of each scale can be found in the appendix section A. The dimensions of the used

measurements accounted for some proportion of variance in their items. These percentages are presented in table below.

Table 5.5: Cumulative Proportions of the Factor Analysis Dimensions

VARIABLES	CUMULATIVE % (ONE DIMENSION)
BIG FIVE PERSONALITY TRAITS	
Agreeableness	*26.6%*
Extraversion	*47.9%*
Conscientiousness	*38.3%*
Neuroticsm	*39.9%*
Openness to experience	*33.3%*
DARK TRIAD PERSONALITY TRAITS	
Machiavellianism	*39.9%*
Narcissism	*52.4%*
Psychopathy	*36.4%*
TEAM PROCESSES	
Team Cohesion	*61.6%*
Team Participation	*70.1%*
Team Support for Innovation	*77%*
Team Shared Objectives	*65%*
Team Task Focus	*73.8%*
Team Communication	*60.5%*
Relationship Conflict	*78.1%*
Task Conflict	*57.8%*
TEAM PERFORMANCE	
Team Innovative Performance	*60.2%*

5.3.5. RELIABILITY ANALYSIS:

In the present study, the reliability scores of all the variables included in the extended team innovation model were calculated. In order to increase the reliability of the Dark Triad Personality measures some of the items were eliminated (Please see Appendix section B-2). What is more, in order to understand the correlation among main variables the Pearson's

correlation coefficient method and two tailed significance tests were run using SPSS software. The table 5.6 below present both reliability values of the variables and mean and standard deviation values of these variables.

Table 5.6: Means and Standard Deviation of the Values of the Variables

Variables	Mean	Standard deviation	N	Cronbach`s Alpha	Number of Items
Big Five Personality Traits					
Extraversion	3.6493	.24103	53	*.840*	8
Conscientiousness	3.7834	.27751	53	.776	9
Agreeableness	3.9428	.18784	53	.639	9
Openness to experience	3.8279	.23391	53	.752	10
Neurotcism	2.4091	.26978	53	.775	8
Dark Triad Personality Traits					
Machiavellianism	2.5606	.38272	53	.693	6
Narcissism	2.6946	.38809	53	.693	4
Psychopathy	2.0860	.27809	53	.640	6
Team Processes					
Team Shared Objectives	3.9361	.33561	53	.819	4
Team Particiaption	3.8866	.47084	53	.913	6
Support for Innovation	3.7959	.47531	53	.925	5
Team Task Focus	3.5833	.45271	53	.880	4
Team Cohesion	3.8195	.49041	53	.822	5
Team Communication	3.6205	.44062	53	.776	4
Relationship Conflict	1.9115	.47347	53	.906	4
Team Conflict	2.5683	.44780	53	.749	4
Team Performance					
Innovative Performance	3.8874	.67620	53	.838	3
Control Variables					
Transformational Leadership	3.8235	.54893	53	.942	7

5.3.6. DATA AGGREGATION

In this section the values for the jutification of within team agreement and aggregation of individual level responses to team level ones, will be calculated. In this regard the ICC (1) and (2) AND Rwg(j) values were determined and presented in the table 5.7 below. ICC (1) and ICC (2) values need to be higher than 0.12 and 0.50 respectively and Rwg (j) value is recomended to be higher than 0.70 for the reliable estiamtion of within team agreement (James, 1982; James et al, 1984; Klein et al, 2000). When we look at the table below we can see that both ICC (1) and Rwg(j) values of team processes are all in congruence with the recomended scores.

Table 5.7: Aggregation Statistics of Team Processes Variables

VARIABLES	ICC (1)	ICC (2)	Rwg (j)	NUMBER OF ITEMS
PROCESSES				
Team Cohesion	.278	.618	.87	5
Participative Safety	.265	.609	.90	6
Innovation Support	.135	.401	.84	5
Shared Objectives	.069	.242	.91	4
Task Focus	.086	.288	.81	4
Team Communication	.086	.286	.81	4
Relationship Conflict	.201	.519	.84	4
Task Conflict	.187	.491	.83	4

As can be seen from the table above, although ICC (1) AND rwg values are mostly fine some of the ICC (2) scores are below the expected rates. In effect, this poses a reliabilty concern and may possibly explain some of the insignificant results found in Study 2 and hence this is a limitation for Study 2. On the other hand, however, response rate of the

involved teams in Study 2 was mostly satisfactory and which is a potential indicator of the closeness between aggregated and real team values and thus this may balance the concerns about the reliability (LeBreton & Senter, 2008).

5.3.7. CORRELATION AMONG VARIABLES

It is worthwhile to mention that, the correlation tables below indicates some notable relationships particularly between a number of personality traits and innovation related team processes. In addition, based on the results in the table, transformational leadership has also have an influencing power on the innovation related team process. Finally, gender as an another control variable is the only variable that is positively and significantly related to innovative performance of knowledge worker teams. All of these additional findings will be discussed in the discussion section.

Table 5.8: Correlation Table for Team Variability Elements

	1	2	3	4	5	6	7	8	9	10	11	12	13	14
1.Agreableness	1													
2.Extraversion	.157	1												
3.Conscientiousness	-.041	-.073	1											
4.Neuroticsm	.184	.216	.395**	1										
5.Openness	.031	.059	.323*	.084	1									
6.Machiavellianism	.160	-.133	-.122	-.151	-.178	1								
7.Narcissism	.024	.159	-.106	.093	-.083	.091	1							
8.Psychopathy	.083	-.247	.075	-.141	-.108	.238	.178	1						
9. Team Innovation	.063	.025	.111	.192	.019	.172	-.155	-.001	1					

*. Correlation is significant at the 0.05 level (2-tailed).

**. Correlation is significant at the 0.01 level (2-tailed).

Table 5.9: Correlation Table for Team Mean Level Elements

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19
1.Agreableness	1																		
2.Extraversion	.035	1																	
3.Conscientiousness	.134	.364**	1																
4.Neuroticsm	-.314*	-.248	-.454**	1															
5.Openness	.133	.210	-.092	-.016	1														
6.Machiavellianism	-.014	.384**	.143	.188	-.019	1													
7.Narcissism	.006	.583**	.073	.104	.188	.552**	1												
8.Psychopathy	-.220	.251	-.004	.317*	.008	.650**	.543**	1											
9.Transforamational Leadership	.207	.289*	.069	.035	-.070	.232	.214	.111	1										
10.Team Cohesion	.339*	.264	.004	-.095	-.022	-.049	.014	-.222	.554**	1									
11.Team Participation	.099	.354*	.222	-.150	-.188	.227	.205	.102	.601**	.606**	1								
12.Support for Innovation	.007	.423**	-.048	.083	.103	.233	.346*	.206	.664**	.550**	.620*	1	.						
13.Shared Objectives	.020	.310*	.064	.069	.002	-.010	.195*	-.061	.441**	.388**	.560**	.521**	1						
14.Task Focus	.173	.531**	.167	.024	-.028	.224	.311*	.124	.728**	.601**	.681**	.736**	.536**	1					
15.Team Communication	.259	.444**	.198	.077	-.106	.248	.277*	.036	.546**	.449**	.424**	.620**	.380**	.783**	1				
16.Relationship Conflict	-.219	-.110	.000	.110	.120	.086	.036	.198	-.401**	-.688**	-628**	-.348*	-.497**	-.424**	-.272	1			
17.Task Conflict	-.234	-.166	-.032	.109	.181	.091	.040	.194	-.333*	-.574**	-.446**	-.446**	-.578**	-.528**	-.478**	.629**	1		
18.Innovative Performance	.040	-.254	-.227	-.020	-.031	-.136	-.262	-.190	.086	.218	.146	.204	-.079	-.038	.053	-.125	.025	1	
19.Gender	-.156	-.170	-.067*	-.292*	-.055	-.267	-.381**	-.316*	-.154	-.004	.086	-.060	-.105	-.150	-.189	.005	.083	.360**	1

5.4. RESULTS

This results part of study 2 will inform the reader of the statistical methods used during analysis of the data, and the obtained results based on this data. The statistical data presented here indicates the associations between personality composition, team processes and innovative performance of teams in a knowledge-intensive R&D work context. Therefore, this section addresses the statistical methods used for the analysis of the data, and the results related to the test of the developed hypothesis. Once again, multiple regression analysis was applied in order to test the hypotheses, and SPPS software version 21 was used to do all the analyses.

Study 2 includes 3 types of analysis; linear, mediated and moderated regression analyses. Therefore, the results section will start with testing of the hypotheses that were developed and presented in the hypothesis development section. Direct hypotheses related to mean-level of inputs will be assessed first and this section is followed by evaluation of mediating hypotheses. Notably, hypotheses indicating direct relationships among input and output variables were tested through linear regression analysis, and hypotheses predicting mediated relationships were tested via mediated regression analysis. Then, in the last section, the assessment of hypotheses predicting moderated relationships (between mean level of inputs and innovative performance moderated by variability level inputs) will follow. The test results of the hypotheses will be presented in the result tables of each section.

Study 2 also includes control variables; age, gender and leadership, so that any obscuring influences can be accounted for. For instance, teams that are supervised by transformational leaders might have higher innovative performance scores, and these types of results may have a misleading influence on the results which are expected to be related to the direct, mediated or moderated relationships. However, only gender variable was included within the analysis since

it was the only variable that has a strong association with the dependent variable innovative performance.

5.4.1 HYPOTHESIS TESTING

In this part of Study 2, the hypotheses which are proposed in section 4.5. are tested and the results are presented. The results of the hypotheses testing provide information about the linear, mediated and moderated relationships among variables that are used in input-process-output model. To put it another way, the tested results of the hypotheses assist to understand the interplay between personality composition, innovation related team processes and innovative performance.

5.4.1.a) The Results Related to Linear Relationships between Mean Level Inputs and Outputs

The mean-level hypotheses were proposed to analyse the relationships between input (Big Five and Dark Triad personality traits), team processes and output (innovative performance). Multiple regression analysis was used to test the relationships among variables. Accordingly, linear regression analysis was used to test the direct (non-mediated) relationships, and mediated regression analysis was used to test the relationships that are explained by mediators (innovation related team processes). Syntax commands were used via SPSS 21 software in order to test the linear relationships between inputs and outputs and SPSS Mediate Macro was used to examine the mediated relationships among inputs, processes and outputs (Mackinnon, 2008). Additionally, age, gender and leadership were control variables of Study 2. However only

the gender construct has a significant relationship with the innovative output hence only this variable was included in the analsis. The table below presents the results related to the linear and curvilinear associations between mean level inputs and outputs, the values for each dimension represents separate regression scores.

Table 5.10: The Results of Team Mean Level Input-Output Related Hypotheses

	R²	(B)	(β)	p
Extraversion	**.189**			
Extraversion Mean Value		-.206	-.234	.087
Extraversion Squared. Value		-.108	-.151	.258
Gender (Control Variable)		.273	.309	.023
Agreeableness	**.143**			
Agreeableness Mean Value		.070	-.080	.569
Agreeableness Squared Value		-.053	-.069	.620
Gender		.334	.379	.007
Conscientiousness	**.280**			
Conscientiousness Mean V.		-.176	-.200	.140
Conscientiousness Squared. V.		.014	.021	.882
Gender		.310	.351	.012
Neuroticism	**.137**			
Neuroticsm Mean Value		.082	.093	.504
Gender		.341	.387	.007
Openness	**.129**			
Openness Mean Value		-.010	-.012	.930
Gender		.317	.359	.009
Machiavellianism	**.131**			
Mach. Mean Value		-.038	-.043	.755
Gender		.307	.348	.014
Narcissism	**.147**			
Narcissism Mean Value		-.128	-.146	.308
Gender		.268	.304	.036
Psychopathy	**.136**			
Psychopathy Mean Value		-.075	-.085	.542
Gender		.293	.333	.020

***p≤0.001, **p≤0.01, *p≤0.05

Table 5.10 above demostrated the results regarding the relationships mean level inputs and outputs. According to the table the results related to curvilinear relationships between mean

level inputs (agreeableness, extraversion, conscientiousness) and innovative performance are indicated through squared values and they are not statistically significant. In this regard, as indicated in the figure 5.2 the associations indicated in the hypotheses H1B, H1D, H1F are not revealed as notable relationships. Moving on to the findings related wit predicted linear relationships between mean level inputs (neuroticsm, openness, Machiavellianism, narcissism and psychopathy) and innovative performance, once more the input and output variables do not have considerable associations among each other. Therefore, as showed in the figures 5.2 and 5.3 below, the relationships predicted in the hypotheses (H1H, H1J, H1K, H1L, H1M) reveled as nonsignificant.

Figure 5.2: Results of the Hypotheses related to Big Five personality traits and innovative performance

<u>INPUT</u>   <u>OUTPUT</u>

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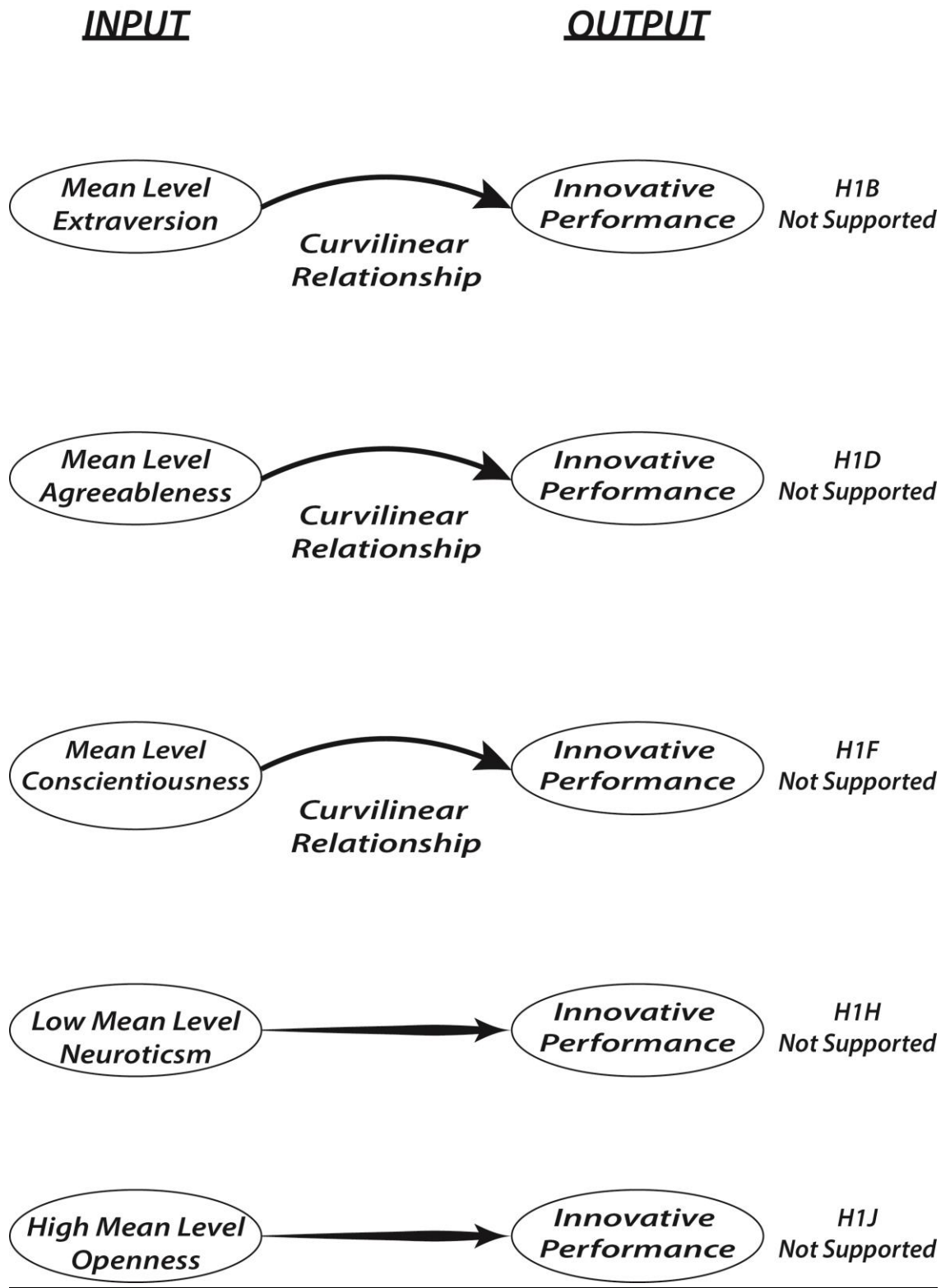
Figure 5.3: Results of the hypotheses related to direct relationhips between Dark Triad and innovative performance
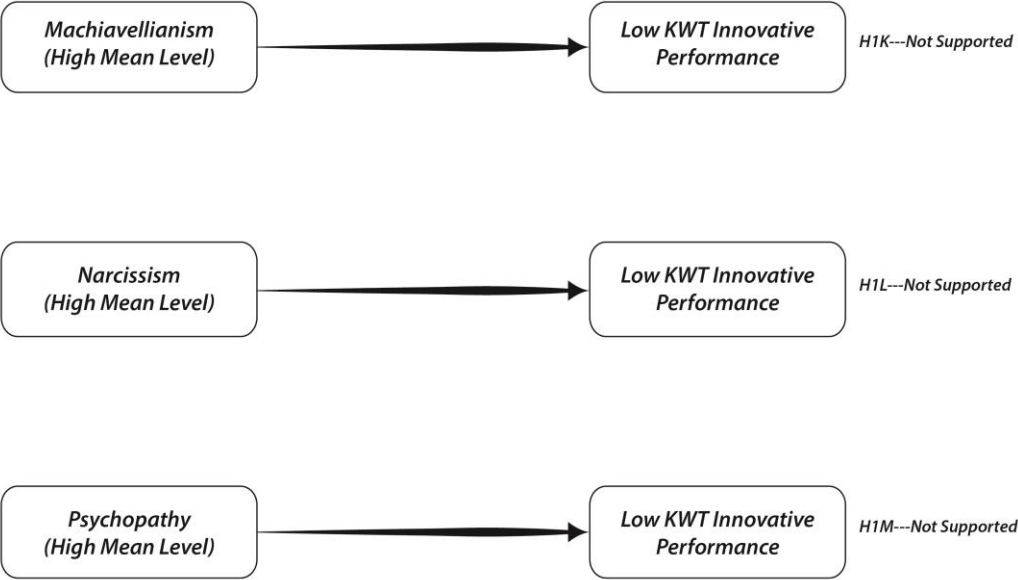
5.4.1.b) Results Related to Mediating Relationships between Inputs, processes and Outputs

This thesis used single-step multiple mediator models by incorporating several team processes and investigating their mediating role on the association between personality traits and team outputs. The present research has used more modern approaches to inference about mediating influences and thus developed its hypotheses based on the assumptions listed in the well-cited article written by Andrew Hayes (2009). In this regard, the assumptions of the conventional causal steps approach are not considered when testing the effects of mediating team processes (Baron and Kenny, 1986). In fact, Baron and Kenny's causal steps approach is now widely acknowledged as limited one in order to test intervening effects between variables (MacKinnon, Lockwood, Hoffman, West and Sheets, 2002). To put it differently, this study has directly quantified the mediating effects of team process variables by using a bootstrapping method (thanks to the appropriate SPSS macro) rather than inferring their presence from a set of tests on their constituent paths, which are based on the conditions determined for the conventional causal steps approach (MacKinnon, 2008; Baron and Kenny, 1986). The bootstrapping method was used as it has been found to be a valid and powerful method in testing mediating effects (MacKinnon, Lockwood, Williams, 2004; Williams and MacKinnon, 2008) instead of the causal steps approach, which has been revealed as being the one with a low testing magnitude (MacKinnon et al, 2002; Fritz and MacKinnon, 2007).

The table 5.11 below shows the results of mediated regression analysis. Syntax commands were used via SPSS 21 software in order to test the predicted associations among input, process and output variables. Age, gender and leadership were control variables of Study 2 however only the gender construct has significant relationship with the innovative output. As can

be seen from the table none of the hypotheses including mediated relationships found a significant support since there is no similarity between lower and higher confidence limits. To put it another way, none of the mediation results are significant, because all of the confidence intervals include zero.

Table 5.11: Mediated results of Mean Level of Inputs - Team Processes - Innovative Performance Relationship

Hypotheses	Independent Variable	Mediating Variable	Dependent Variable	Effect Size	Mediating Effect Lower Confidence Limits	Mediating Effect Higher Confidence Limits
H2B	Extraversion	Team Communication	Innovative Performance	.0002	-.0571	.0522
H2D-H2E	Agreeabeleness	Team Cohesion (H2b)	Innovative Performance	-.0112	-.2099	.0372
		Task Conflict (H2c)	Innovative Performance	.0068	-.0312	.1012
H2F	Conscientiousness	Task Focus	Innovative Performance	-.0209	-.1594	.0160
H2G	Neuroticsm	Participative Safety	Innovative Performance	-.0156	-.0956	.0179
H2H	Openness	Participative Safety	Innovative Performance	.0106	-.0641	.1743
		Team Support for Innovation	Innovative Performance	.0239	-.0284	.2059
H2I	Machiavellianism	Relationship Conflict	Innovative Performance	-.0102	-.0855	.0156
H2K	Narcissism	Participative Safety	Innovative Performance	.0396	-.0218	.1295
		Relationship Conflict	Innovative Performance	-.0047	-.1018	.0201
H2L	Psychopathy	Participative Safety	Innovative Performance	.0164	-.0108	.0954
		Relationship Conflict	Innovative Performance	-.0223	-.1212	.0223

5.4.1.c) The Results of the Moderated Relationships Between Big Five Personality Traits and KWT Innovative Performance:

In this section the focus is on the moderated relationships that are indicated in the developed hypotheses. Specifically, the relationships between mean level inputs (independent variables), variability of inputs (moderating variables) and outputs (innovative performance) will be assessed, and the results signaling the interplays between inputs, moderators and outputs will be presented. Moderated regression analysis was used to test the related moderated hypotheses (H3B, H3D, H3F, H3H, H3K, H3L, H3M and H3N) and the results of the related hypotheses tests are presented in table 5.12 and summarized in Figures 5.4 and 5.5 below.

Similar to Study 1, in Study 2 the moderated interaction between variables were tested through using related syntax commands by using SPSS 21 software. The results of the hypotheses testing will be shown in the table 5.12 below. The first three section of the table represent the interaction between moderator and curvilinear relationship between input (extraversion, agreeableness, conscientiousness) and innovative output. Therefore, they include additional squared values and interactions. The values that are presented in the fifth lever of the table are particularly represents the predicted moderated curvilinear relationships. Additively, the last 2 sections of the table include results related to moderated linear relationships and the third lever particularly indicates such interactions. It is also important to note that gender variable also included in the analysis as a control variable as it is significantly related to the innovative outcome.

Table 5.12: The Results of the Moderated Relatonship Between Big Five and KWT Innovative Performance

	B	(β)	p
Extraversion			
Gender(Control Variable)	.262	.297	.041
Variability in Extraversion	.061	.070	.724
Mean Level of Extraversion	-.229	-.260	.114
Mean Level of Extraversion Squared	-.122	-.170	.260
Mean Level of Extraversion x Varibality in Extraversion	.062	.063	.653
Mean Level of Extarversion Squared x Variability in Extraversion	-.091	-.132	.525
Agreeableness			
Gender (C.V.)	.412	.467	.002
Variability in Agreeableness	.273	.310	.138
Mean leve of Agreeableness	.128	.145	.317
Mean level Agreeableness Squared	-.069	-.089	.565
Mean Level of Agreeableness x Variablity in Agreeableness	-.155	-.155	.300
Mean Level of Agreeableness Squared x Variability in Agreeableness	-.176	-.226	.303
Conscientiousness			
Gender (C.V.)	.320	.363	.016
Variability in Conscientiousness	-.065	-.73	.683
Mean level of Conscientiousness	-.136	-.154	.310
Mean Leve of Conscientiousness Squared	.009	.013	.935
Mean level of Conscientiousness x Variability in Conscientiousness	.084	.103	.581
Mean Level Conscientiousness Squared x Variability in Conscientiousness	.083	.840	.405
Neuroticsm			
Gender (C.V.)	.292	.331	.029
Variability in Neuroticism	.095	.108	.449
Mean Level Neuroticism	.073	.083	.556
Mean Level Neuroticism x Variability in Neuroticism	.074	.108	.473
Openness			
Gender (C.V.)	.299	.339	.017
Variability in Openness	.004	.004	.975
Mean Level of Openness	-.008	-.009	.946
Mean level Openness x Variability in Openness	-.130	-.130	.371

***$p \leq 0.001$, **$p \leq 0.01$, *$p \leq 0.05$

Figure 5.4: Results of the hypotheses related to moderating associations between Big Five personality traits and and KWT innovative performance
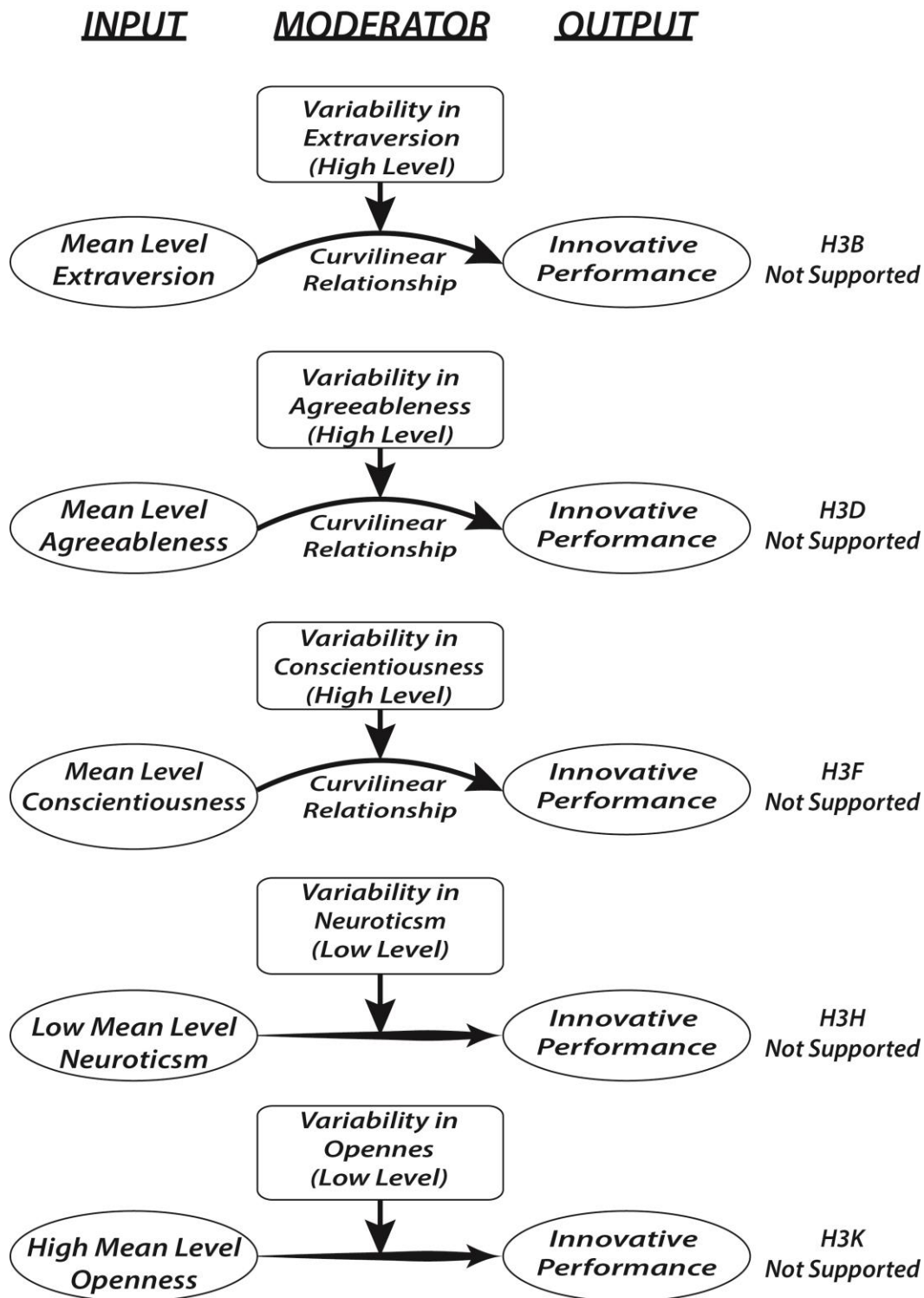
Figure 5.5: Results of the hypotheses related to moderating associations between Dark Triad personality traits and KWT innovative performance

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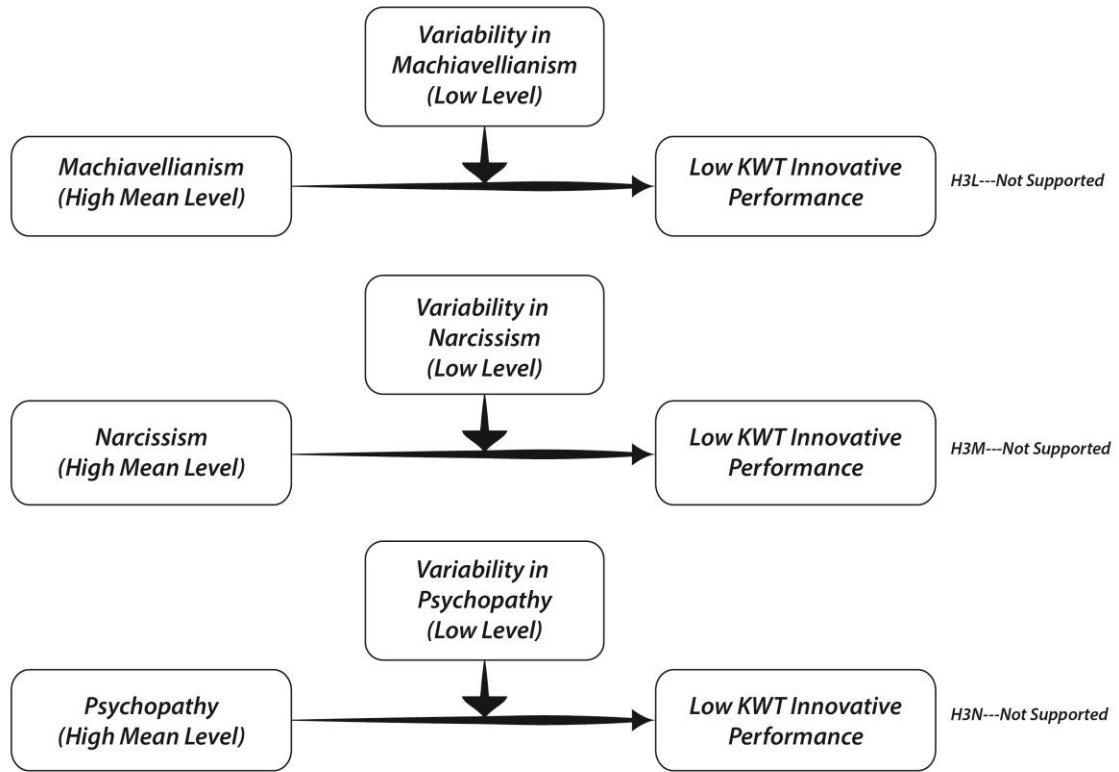
As can be seen from the results of the table 5.12, none of the hypotheses are supported with significant relationships in Study 2. In the table 5.12, the fifth lever of each extraversion, agreeableness and conscientiousness section presents the results related to moderated curvilinear relationships and the findings do not signify any notable interactions. In other words, the results revealed that variability in extraversion, agreeableness and conscientiousness do not have an influncing magnitude on the curvilinear relationships between mean level of extraversion, agreeableness and conscientiousness (respectively) and knowledge worker team innovative performance.

Moving on to the moderated linear relationships, once again test results did not revealed any notable asssociations. Stated briefly, the influnce of low variability in neuroticsm on the relationship between low mean level of neuroticsm and KWT innovative performance is not significant. Additionally, low variability in openness also do not have an influencing power on the relationship between mean level of openness and KWT innovative performance.

Table 5.13:Results of the Moderated Relationships Between Dark Triad Personality Variables and KWT Innovative Peformance

RESULT INDICATORS	(B)	(β)	p
__Machiavellianism__			
Gender (Control Variable)	1.109	.357	.012
Variability Level of Machiavellianism	.097	.109	.417
Mean Level Machiavellianism	-.006	-.007	.958
Mean L. Machiavellianism x Variability Level of Machiavellianism	.147	.168	.219
__Narcissism__			
Gender (Control Variable)	.268	.304	.039
Variability in Narcissism	-.072	-.081	.577
Mean L. Narcissism	-.097	-.110	.481
Mean L. Narcissism x Variability in Narcissism	.047	.058	.669
__Psychopathy__			
Gender (Control Variable)	.317	.360	.012
Variability in Psychopathy	-.002	-.003	.984
Mean Level Psychopathy	-.078	-.089	.538
Mean L. Psychopathy x Variability in Psychopathy	.203	.244	.069

***p≤0.001, **p≤0.01, *p≤0.05

Based on the results above, it can be concluded that, once again, none of the hypotheses (H3L, H3M, H3N) found notable support in the present study. Therefore, there are no significant relationships found regarding the negative impact of low variability of Machiavellianism, narcissism and psychopathy on the relationships between mean level of Machiavellianism, narcissism and psychopathy (respectively) and KWT innovative performance.

5.4.1.d. The Results After the Respond Rate Reduction

In order to generate results that have high reliability and perfect representation of the sample it would be remarkable to collect data without missing any participants. However, in real world social science research, it is likely to have non-responses and missing data in most cases. (Saunders, Lewis and Thornhill, 2007). Given this, the Study 2 also did not obtain full reponses from every member of the investigated teams. However, having a moderate sample in hand I decided not to apply the Dawson selection rate formula as it decreases the statistical magnitude of the data that is composed by 53 teams (Biemann and Heidemeier, 2012). Accepting this is a limitation for the Study 2, I have nevertheless operationalized the formula in order to see whether the application of the method would influence the results. In this sense, I excluded teams with low response rates through using Dawson's formula and after the exclusion team numbers were decreased from 53 to 46 (Dawson, 2003). Then, I re-conducted the analysis with the remaining 46 teams. Nevertheless, most of the results replicated the findings before exclusion and the only distinct result is about the modearing role of variability in machiavellianism on the association between mean level personality traits and team innovation. Given that, when we look at the plot below (figure 5.6) we see that when the variability in psychopathy is low and the mean level if psychopathy is high the innovative performance of a knowledge worker team reduces as predicted in the hypothesis H3N. It is worth indicating that the p value of the same relationship before the respond rate reduction was 0.69 and close to the significant rate and reducing the number respond rates in order to represent the sample in an effective way may had an influence of the significance rate of such moderating relationships. However, this type of variance was the only case in the context of present thesis.

Figure 5.6: Variability in Psychopathy Moderates the Impact of Mean Level Psychopathy on Team Innovation
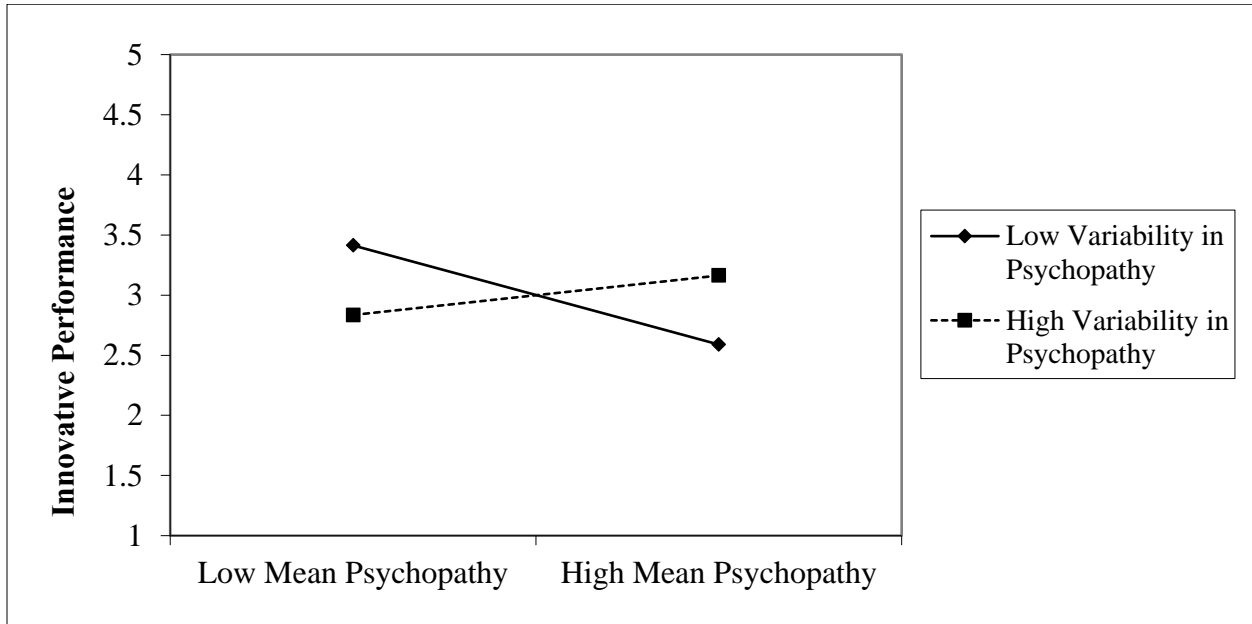
5.5. DISCUSSION

Study 2 also probes the personality composition and its influence on teams. However, as distinct from Study 1, the second study introduces additional, well-known Dark Triad personality traits and innovation-related team processes. Thus, the present study aims to understand the relationship between personality compositions, team processes and team innovation variables by using the well-known Input-Process-Output model of team innovation. It is worth noting that most studies related to team innovation analyse the other factors' (team size, task interdependence, job relevant or background diversity, etc.) influences on team innovation (Maier et al, 2015). Therefore, this study is important in terms of understanding the role of personality variables on team innovation by using an integrated conceptual model.

Innovation-related team processes analysed in the extended IPO model of team innovation include task focus, team participation, shared vision and support for innovation, team communication, team cohesion, task and relationship conflict. Of these eight determinants, the first four are predominant in terms of team innovation (West and Anderson, 1996). The latter four have gained relatively less attention. However, with this study, the interplay between these eight processes and personality and team innovation was examined in an innovation-oriented, knowledge-intensive context (Hulsheger et al., 2009).

As a result, this section addresses how personality traits relate to innovative performance and the mediating role of innovation-related processes on the relationships. Additionally, the moderating relationships that combines both supplementary and complimentary fit approaches through investigating the interplay between personality diversity, homogeneity and team innovation is also discussed in this section. Surprisingly, neither supplementary nor complementery congruence is yielded from the results and no significant relationship was detected among all input, process and output variables within the extended IPO model of team innovation. Additively, none of the predicted hypotheses were supported by the results, as in the initial study. To this end, the findings and related literature are considered, and the relationships in question are discussed below.

5.5.1. EXTRAVERSION

The first projected hypothesis predicted a curvilinear relationship between extraversion and innovative performance of knowledge worker teams. The expectation behind this prediction was that some level of extraversion is needed to ease communication. However, such levels

shouldn't be so high, or conflicts may occur due to the domination of rival extroverts. Alternatively, high extraversion leads to too much communication, which may deter the task orientation within the team (Barry and Stewart, 1997; Mohammed and Angell, 2003). However, the results of this study do not show any salient association between extraversion and team innovation.

Moreover, the present study also attempted to analyse the mediating role of team communication between mean levels of extraversion and team innovation. However, team communication does not have the magnitude to explain this relationship. Additionally, the third hypothesis considered the moderating influence of the variability in extraversion on the relationship between mean-level extraversion and knowledge worker team innovation. Once again, the results do not support this hypothesis and demonstrated that high variability in extraversion does not have any significant influence on the curvilinear association between mean level extraversion and team innovation.

These findings may indicate the importance of innovation-related communication within teams. Based on the findings, it can be said that being able to have some level of formal and informal talk within the team may not always lead to innovation. To interact and share knowledge effectively for innovation, members need to tackle knowledge boundaries, particularly in knowledge-intensive work contexts (Carlile, 2002; 2004). Thus, teams may need to include members with t-shaped skills, who have wider intellectual and comprehension capabilities that could enable them to collaborate with members or experts across disciplines in order to facilitate the deep tacit knowledge-sharing required amongst knowledge workers. Otherwise, teams may

indeed have extrovert members who facilitate talk and basic level communication, yet these types of formal and informal interactions may not be enough to deal with the complexity of innovation.

Notably, the data analysis outcomes of the current research project revealed significant associations between extraversion and the majority of the innovation-related team processes. Extraversion was found to have significant positive relationship with participation, support for innovation and communication within knowledge worker teams, since the sociable, cooperative and communicative sides of extroverted individuals may stimulate communication and a participative climate within the team (Taggar, 2002; Peeters et al., 2006). This implies that team members experience participative and supportive relationships with others in the group, if the extraversion of most of the members is reasonably high.

In effect, the findings of this study have importance with regards to certain conflicting views in the literature. There is an argument within the literature that elevation in extraversion comes with assertiveness and dominance within the team. Thus, having high levels of these characteristics results in conflicts among team members, and impairs participation along with the positive climate within the team (Barry and Stewart, 1997; Mohammed and Angell, 2003). On the other hand, others argue that extroverted individuals have a desire to work in groups and should therefore be inclined to engage in actions that assist teams in being workable (Barrick et al., 1998). Accordingly, these latter claims were further supported by the findings of this research, which reveal a positive correlation between mean-level extraversion and team communication, as well as participation (Barrick et al., 1998; Van Vianen and De Dreu, 2001). As a result, different lines of reasoning have resulted in a discrepancy within the literature

(Barrick et al., 1998), and the findings of this study corroborate the claim that underlines the positive impact of psychological states on the climate within knowledge worker teams (Watson and Clark, 1984). A possible explanation for this discrepancy is that the conflict and power-oriented characteristics - like dominance and assertiveness - are downplayed by the cooperative and participative team climate facilitated by extroverted members within the team.

Finally, when it comes to task and objective related team processes, the current study also revealed noteworthy influences of mean-level extraversion on shared team objectives, support for innovation and task focus. Once again, there are contrary views to these findings, and several scholars have highlighted extroverts' tendency to social interaction may distract the team's attention from objectives and task completion (Barry and Stewart, 1997; Mohammed and Angell, 2003). However, as stated above, this research revealed the positive impact of extroverts on task-related processes. Furthermore, the present findings of this research do not demonstrate any significant relationships between mean-level extraversion and conflict-related team processes. In light of these findings, it can be argued that in knowledge-intensive contexts, the particularly negative characteristic features of extraversion are downplayed by professional attitudes, responsibilities and positive emotional states of extroverted individuals. The energetic, proactive and sociable features of extroverts not only enhance task cohesion, but also positively influence the innovation-related processes within the team (Van Vianen and De Dreu, 2001).

5.5.2 AGREEABLENESS

All hypotheses related to agreeableness are not supported by the present study. In other words, the expected curvilinear relationship between mean-level agreeableness and knowledge worker

team innovation were not adequately supported by the results of this study. Additionally, the mediators' (team cohesion and task conflict) role on explaining the relationship was not promising. Furthermore, current research did not find any influence of the variability of agreeableness on the same relationship between mean-level agreeableness and team innovation. These results indicate the passive role of agreeable individuals when the focus is on innovation. Although previous research has found supportive results between both mean-level agreeableness (Barrick *et al.*, 1998; Neuman *et al.*, 1999; Neuman and Wright, 1999; Van Vianen and De Dreu, 2001) and variability in agreeableness (Peeters *et al.*, 2006) and general team performance, this research found no significant relationship between agreeableness and team innovative performance in a knowledge-intensive context. I believe this is a salient indicator of the influence that agreeable personalities can have on complex tasks, and in a distinct context. Put another way, innovation-oriented teams are distinct from general performance teams, and it seems that the cooperative and acceptant role of agreeable individuals may not be vital for innovation-oriented teams working in a knowledge-intensive context. To this end, agreeable characteristics may not fit with norms of knowledge worker teams; instead, individuals who ask critical questions may gain more credit in postmodern teams, particularly when innovation is the focus (Bechtoldt et al., 2007). Therefore, future research may need to focus on different personality characteristics that may play a more salient role in innovative teams.

When it comes to the relationship with team processes, the results of the current study indicate a positive correlation between agreeableness and team cohesion. Therefore, this is an important finding that demonstrates the role of agreeableness on maintaining a friendly and cohesive climate within the team. As such, this positive relationship is not surprising since, in the literature, there are arguments and findings based on the crucial role of agreeable

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individuals on generating a cooperative and positive atmosphere, such that team members can easily socialise and team up together (Barrick et al., 1998; Van Vianen and De Dreu, 2001). However, this finding posits that same positive associations apply also in a team of knowledge works whose main focus is to innovate.

5.5.3 CONSCIENTIOUSNESS

Contrary to expectations, this research does not reveal any significant findings regarding the role that conscientiousness and conscientious members play within the team. Additionally, no support was found for the mediation of personality – outcome relationship by task focus process variable. This finding is consistent with the arguments of the scholars probing the relationship between team creativity and personality. According to these researchers, conscientiousness is not appropriate for creativity-related tasks owing to the highly focused, literal-minded nature of these individuals (Baer et al, 2008). Research results are also mostly in line with the findings of the present research in that they indicate that conscientiousness does not have a predictive value in terms of team creative performance (Driskell et al., 1987; Bolin and Neumann, 2006; Baer *et al.*, 2008).

Notably, Baer and co-workers found that the curvilinear relationship between conscientiousness and creative performance is significant only if the members comprising the team have high creative confidence. Thus, one possible explanation for the findings of the present study is that this research does not include the creative confidence variable as a moderator of the predicted inverted U-shaped relationship between conscientiousness and knowledge worker team innovative performance. It may be that the conscientious members of the knowledge worker

teams investigated may not have adequate confidence for innovation, and this may lead to a passive influence on the innovative performance of the teams.

Moreover, one other research group found a negative relationship between conscientiousness and team creativity. In their study, the scholars also aimed to reveal the explanatory factors behind the negative relationships they found by testing idea sharing and use of systematic processes as mediator variables. However, they could not find any significant mediating role of idea sharing and systematic processes on the association between conscientiousness and creative performance (Robert and Cheung, 2010). Taken together, studies investigating the relationship between conscientiousness, creativity and innovation (including this research) indicate a complex relationship between conscientiousness and innovation. Therefore, more research, in particular on this topic, needs to be undertaken before the impact of conscientiousness on team innovation is more clearly understood. Basically, the implementation stage of innovation needs specific attention, particularly when it comes to the impact of conscientious members on innovation, since these individuals are highly motivated towards task completion. Moreover, a qualitative study may reveal the explanatory factors that need to be considered when scrutinising the complex association between conscientiousness and innovation.

Moving on to the relationship with innovation related team processes, the prediction was mainly on positive relationship between task focus and conscientiousness (Van Vianen and De Dreu, 2001). Contrary to expectations, this research did not find any significant association between conscientiousness and team process variables. All associations considered, this research demonstrated that task type might have an effect on the role of conscientious team members, since there is considerable discrepancy between the findings on the role of conscientious

members on general or routine team performance, and creativity and innovation-oriented team tasks. To this end, the impact of conscientious members diminishes when the task involves high levels of complexity and ambiguity (Alvesson, 2004; Baer et al., 2008).

5.5.4 NEUROTICISM

This research did not find any significant relationship between neuroticism and innovative performance. Therefore, the three predicted hypotheses related to neuroticism are not supported by the findings of this study. In other words, both mean and variability levels of neuroticism are not related to team innovation. Although the hypotheses were based on strong theory and findings in the literature related to team effectiveness (Mohammed and Angell, 2003), the recent research, which is related to creative performance instead of general performance, does not show any significant relationships. Thus, in contrast with the theoretical developments, the results revealed by this research are in line with the recent trend observed in the literature when it comes to the relationship between neuroticism and innovation (Bolin and Neumann; 2006; Baer et al., 2008). One explanation could be that in a highly competitive context, the influence of neurotic tendencies may be downplayed by the complexity of the tasks themselves and, therefore, the expected negative influence of neurotic individuals was not of sufficient magnitude, either directly or indirectly through participative safety on innovative performance.

5.5.5 OPENNESS TO EXPERIENCE

Considering the consensus in theory and research findings on opennesss to experience and its relationship with creativity and innovation at individual levels (Hammond, Farr, Schwall and

Zhao, 2011; Shalley *et al.*, 2004; Bechtoldt *et al.*, 2007), perhaps the most surprising result of this study is that relating to openness to experience. In the literature, openness to experience is arguably to be the most significant variable in terms of innovation (Hammond, Farr, Schwall and Zhao, 2011). However, when it comes to team level association between mean-level openness and creativity, the research in hand does not have supportive the findings in the literature (Robert and Cheung, 2010; Schilpzand *et al.*, 2011; Bolin and Neumann, 2006; Baer *et al.*, 2008), and in fact this research is an addition to the inquiries above. The additional contribution of this research is that it indicates that when the desired outcome is innovation rather than creative performance, the relationship is still not salient, at least in this context.

Of note here, however, when the focus is the impact of variability there is one research finding that indicates the importance of diversity in openness to experience on creative performance. Contrary to this finding, this research predicted a positive impact due to homogeneity in openness to experience based on strong theoretical arguments and the strong association of openness of individuals and innovation (Bechtoldt et al., 2007). However, with this research we see that when the focus is innovation, the variability level of openness has no influence on the relationship between mean-level openness and innovation in team levels. Baer and co-workers (2008) explain the relationship between openness and creative performance by including a creative confidence factor as an enhancer of the strength of the relationship. In this sense, any future research examining the relationship with alternative moderators may indicate new directions and assist the conceptualisation of the interplay between openness to experience and team innovation.

5.5.6 MACHIAVELLIANISM

The hypotheses that predicted the first Dark Triad trait, Machiavellianism, and its relationship between team processes and team innovative performance were not supported by this research. The first hypothesis considered the negative and linear relationship between mean level Machiavellianism and knowledge worker team innovative performance. However, this research did not reveal any impact on the teams' innovative performance. Although I expected the manipulative and self-centred nature of Machivellianists would influnce the processes related to interpersonal dynamics, relationship conflict and safety climate, it is revealed that these processes do not explain the relationship between Machiavellianism and team innovation. One explanation for the insignificant results related to predicted relations is that the negative influence of Machiavellis on the team dynamics may need a prolonged time to reveal itself as a prominent factor. Furthermore, the complexity and intensity of the knowledge work may also curtail the negative influence of Machiavellianism within the knowledge worker teams.

5.5.7 NARCISSISM

The second Dark Triad trait was narcissism, which refers to the self-praise and egotism of members. Based on the existing literature and findings regarding narcissists in a team context, I argued and predicted that the negative characteristics of narcissistic individuals may harm relationships and effective communication within the team, which may in turn have curtailed the innovative efforts of the knowledge worker team (Campell *et al.*, 2000; Gabriel *et al.*, 1994). However, the results of the present research demonstrated that the influence of narcissistic characteristics is not significant when it comes to innovative performance of teams in a knowledge-intensive context. Moreover, the mediating team processes of participative safety

and relationship conflict within teams cannot explain the relationship between mean-level narcissism and KWT innovative performance either. The reason behind these findings might share some similarity with Machiavellianism, and the expected negative influence of narcissism on team innovation through participation and relationship conflict processes may have been weakened by the complex nature of the project, which needs to be completed in a limited time period. In fact, such findings and arguments generate salient new research directions with regards to the impact of stress levels, complexity and time limits of the task on the influencing power of personality on team innovation.

Turning to the effect of variability in narcissism on the relationship between mean-level psychopathy and KWT innovative performance, it is revealed that even a variety in narcissism has no moderating impact on the relationship. Both theory and research emphasise the fact that narcissists may perform in some individual work contexts, but tend to be counterproductive in a team context (Premuzic, 2015; Judge et al., 2002).

One unanticipated finding was the positive association between narcissism and team processes that support innovation, shared objectives, team communication and task focus; previous studies have reported mostly negative influences of narcissistic personality on intragroup relationships and group outcomes (Kayes, 2004; O'Boyle, 2012). The context and task that teams need to accomplish may influence the attitudes and actions of narcissistic individuals (Nevicka *et al.*, 2011). For instance, it has been argued that narcissistic individuals may strive for good performance if they see the work as a self-enhancing opportunity that contributes to the image that wish to present in a work context. Accordingly, Alvesson (2001) clearly indicated the association between identity, image and knowledge work, and argued that identity is an important factor that generates one of the means for knowledge workers to operate together.

Moreover, the complexity and uncertainty of the innovation-oriented work itself helps knowledge workers to construct an identity and present an image around the most challenging and ambiguous organisational tasks (Alvesson, 2004; Alvesson and Robertson, 2006). In fact, narcissistic individuals are known as self-enhancers and, therefore, self-praise, identity and growth are highly essential for this type of individual (Jonason et al., 2012). Therefore, narcissistic team members may perceive knowledge work as a self-enhancement opportunity that assists them in constructing their identity, as well as building their image within the organisational phenomena. Accordingly, they may be prone to support the team, agree on shared goals, engage in discussions and focus on innovative outcomes.

5.5.8 PSYCHOPATHY

Psychopathy might be the most negatively perceived construct of the Dark Triad personality traits, and this perception is reflected within the theory and research hypotheses (Hare and Neumann, 2009 O`boyle *et al.*, 2012; Scherer, Baysinger, Zolynsky, LeBreton, 2013). However, it is somewhat surprising that in this study there is a lack of significant relationships between psychopathy and innovative performance of teams composed of knowledge workers. Moreover, it has been predicted that there is a mediating relationship between psychopathy and KWT innovation through participative safety and relationship conflict.

Given the intense focus on the negative side of psychopaths at individual levels within the literature, research findings related to general team performance also signify the counterproductive tendencies of psychopaths in teamwork conditions (Scherer *et al.*, 2013; Babiak, Neumann and Hare, 2010). However, to the best of my knowledge, there is no study that probes the specific relationship of psychopaths and their influence on team innovation,

particularly in a knowledge-intensive context. Therefore, this study may have characteristics of being the first study to investigate such a relationship. However, the results did not reveal any striking association in terms of either direct or indirect effect (through mediators) of psychopaths on the innovative outcomes of knowledge worker teams. I think this result ,once again, supports the argument of the trivial influence of personality in a knowledge-intensive context, and there is the possibility that psychopathic tendencies of individuals are easily downplayed by the complexity, ambiguity and fast-paced nature of the innovation-oriented knowledge work (Newell et al., 2009; Lindkwist, 2005).

Moving on to the variability level influence of psychopathy on the relationship between mean-level psychopathy and KWT innovation, once more, no significant relationship was observed within the results of the present research. In other words, there is no moderating impact of the heterogeneity or homogeneity of psychopaths on the main relationship. This finding can be considered as further support for the passive role of both psychopathy within teams operating in knowledge-oriented contexts.

It is worthwhile noting that the reason behind the insignificant relationships among variables could be the reliability scores. The agreeableness scale within the Big Five framework and scales of Dark Triad framework variables have relatively low reliability scores. Put briefly, the reliability scores of agreeableness and psychopathy are below the expected Cronbach alpha value of .70, and the reliability results of Machiavellianism and narcissism traits are close to the accepted value. In fact, once again, the Cronbach alpha value for extraversion was above .80, and can thus be expected to represent a considerable influence on the results. However, all the personality measures incorporated in this research were original and previous used and validated measures (Jones and Paulhus, 2014; Martinez and John, 1998). As such, the current

study revealed some significant relationships between the personality traits and innovation-related team processes. Drawing on these facts, reliability of the measures is not expected to obscure the findings of this research.

Moreover, the skew of the data may also be a reason for the insignificant relationships. However, the analysis demonstrated that the distribution of the variables, including personality traits and team processes (apart from team cohesion and team communication, which are negatively skewed), and innovative outcome are approximately symmetrical. Therefore, the aforementioned symmetrically-distributed variables are eligible to give acceptable distributions within the sample size used in this study. In addition, although Study 2 has a moderate sample it is comparable with other studies in the field and thus sample size also not expected to pose an issue on the insignificant findings (Barrick et al, 1998; Mohammed and Angell, 2003). As a result, theoretical reasons are become more significant in explaining the insignificant results between personality and team innovation, particularly when we consider the findings of Study 1 and prior research that investigates the role of personality on complex tasks as cretivty and innovation.

In all, knowledge worker teams are often designed as a project teams and membership in these teams often lasts until the project is completed (Janz et al., 1997). Besides, some members may have other responsibilities in their organisation (Tannenbaum et al., 2012). Hence, knowledge workers comprising this type of team may not always identify themselves with the team they are attached to, though this may depend on the project itself. As such, members of knowledge worker teams might not associate themselves with the psychological dynamics of the team. In addition, the tight deadlines of the projects may diminish any shared team focus on innovation at the expense of expedience (Newell et al., 2009). All of these reasons may downplay the

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influence of psychological factors, such as personality on innovative performance of knowledge worker teams. Additonally, these teams may have a more individualistic nature instead of a collectivistic one. In other words, individuals may be evaluated by other members and managers in terms of their contributions and credibility rather than their characteristic tendencies as long as the projects are completed successfully (Monsted, 2003).

5.5.9 THE IMPACT OF CONTROL VARIABLES

The findings of this research also indicate that the transformational leadership variable has a significant impact on all innovation-related team processes in a knowledge-intensive context. The linear relationship between transformational leadership and innovation-related team processes signify the importance and influence of transformational leadership, particularly within the knowledge-intensive context. Additionally, these results are in accord with previous findings within the field (Gumusluoglu *et al.*, 2013; Karakitapoglu - Aygun and Gumusluoglu, 2013). The results, in fact, demonstrate that for transformational leadership it is important to have innovative climate within knowledge worker teams. It has a positive relationship with cohesiveness, participation, communication, shared objectives, support and focus on innovation within the knowledge worker teams.

Figure 5.7: The Association Between Transformational Leadership and Team Processes
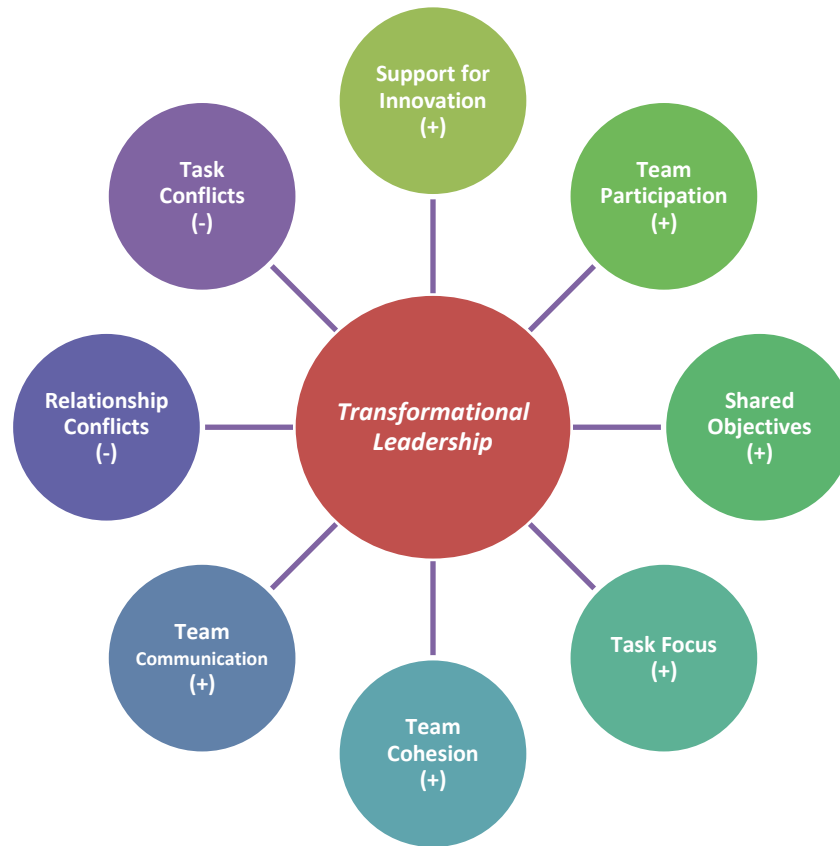
On the other hand, the findings also showed that transformational leadership has a significant negative relationship with conflict-related processes. Although the negative relationship between relationship conflicts is an expected finding, again, the negative association between transformational leadership and task conflict is an unexpected one. One possible explanation for this finding is that transformational leaders may perform effectively when there is no conflict within the team so that these leaders can use their energy to inspire, intellectually guide knowledge workers and build effective relationships with them (Bass, 1990). However, these findings may be specific for non-western contexts and thus topic needs further investigation before the relationship between transformational leadership and innovation-related team processes is clearly theorised.

What is more, gender variable which refers to the proportion of men within the teams, was found as positively and significantly related to the innovative performance of teams. Therefore, in this research context it is revealed that having male members within the teams is a positive sign for innovative performance. Of note here, however, the proportion of men corresponds to 77% of the whole sample and this result is indicator of a population which is also naturally skewed male (Gumusluoglu et al, 2013). To this end, considering gender variable as a control variable is in fact necessary to account for possible obscuring effects.

5.6. LIMITATIONS

The purpose of the current study was to examine the interaction between personality compositions, innovation-related processes and innovative performance at the team level in a knowledge-intensive R&D context. This second, in and of itself, has covered many of the limitations of the study 1. However, it still has some limitations that need to be explained and addressed by further research.

There are 53 knowledge worker teams involved in the present study and, therefore, it is comparable to other studies conducted in this research area (Barrick *et al.*, 1998; Mohammed and Angell, 2003). However, a lack of mediation effects in the present study may stem from the low statistical significance of the study, and a higher sample size would counteract this issue and increase the reliability of the data. Add to this, another limitation of the Study 2 is that, the selection rate formula was not applied in this study. However, the results after the application of the Dawson's selection rate formula indicated that most of the results were similar with the findigs in hand before the application of the formula.

In addition, the Cronbach alpha value of agreeableness and psychopathy traits are below the expected value of .70, and other Dark Triad traits, Machiavellianism and narcissism, are too close to the expected value. It is of note however, all the personality measures used in this study are original and previously validated scales. Nevertheless, having these scores in hand, the predictive power of such traits would be much higher with a larger sample size. As a result, future research may apply different personality scales with bigger sample sizes. Speaking of reliability, some of the the ICC (2) values of team processes were below the accepted values and this also may pose a reliability concern and thus it is another limitation of Study 2.

Another limitation is related to the innovative performance measurement. Firstly, the innovative performance was assessed by the manager of each team. Therefore, there is only one assessor for ranking innovative performance of knowledge worker teams. Although there are studies conducted with one assessor in well-known journals (Rosenthal, 1997; Alper, Tjoswold and Lowe, 2000), having two or more assessors is considered as being more reliable in terms of the assessment of team performance (Huselid and Becker, 1996). In addition to the limitations related to the innovation measurement, one item has been removed from the innovation measurement scale as is was not relevant to the innovation and knowledge work-oriented business context. This may limit the comparison of the results of this study with one that used the exact four-items scale (West and Wallace, 1991; Zahavy and Somech, 2001).

5.6.1 CROSS-CULTURAL ISSUES

The theoretical foundation of the personality and performance-related measures used in this study are mostly based on Western-generated research. In addition, the data included in Study 2 was collected in Turkey and, therefore, Western-based theories and measures may create some incongruence when they are applied to other contexts.

Regarding personality traits, the extent to which the words in the English language, which are used to describe the individual characteristics, represent the words that define personalities in non-Western contexts may be of concern (Wang, 2011). In fact, this is particularly critical as Big Five personality variables were revealed from the English Dictionary through assembling and coding adjectives related to personality (Tupes and Christal, 1992). Moreover, there are studies that revealed distinct personality traits with different numbers of factors ranging from three to seven in other cultures (Church, Katigbak and Reyes, 1997; Saucier, Georgiades, Tsaosis and Goldberg, 2005). For example, while a study in a Turkish context revealed three such factors, another set of research undertaken in an Italian context revealed seven factors (Saucier and Goldberg, 2001). As a result, the ideal structure to represent the personality in the Turkish context is uncertain, and therefore another limitation of the present study is the assumption as to the appropriateness of personality measures based on the Big Five and Dark Triad Taxonomies within the Turkish R&D context.

The same issue is also relevant to the innovative performance measure that was used a UK-based scale (West and Wallace, 1991). The only non-Western context in which this measurement was applied is Israel (Zahavy and Somech, 2001). There thus remains the question as to the extent to which this innovative performance scale can be used in the Turkish and other cultural terrains need to be investigated in future studies. In fact, having non-

supported hypotheses in hand, Study 2 may suffer from the limitation of assuming the applicability of Western-based innovative performance measurements in a Turkish context.

Moreover, the significant associations found between personality traits and innovation-related team processes may potentially be influenced by specific features of the Turkish culture. In fact, certain characteristics and team process factors may have been appreciated and supported in firms that are embedded in particular national and organisational cultures (Wang, 2011). The culture is inclined to collectivism rather than individualism (Hofstede, 1980; Gorenli, 1997; House *et al.*, 1999). Therefore, to maintain cohesion and adequate communication within the team, both agreeableness and extravert members may be expected by team members. In this regard, it is in fact important to consider the possible influence of the national culture on the association between personality composition, team processes and creativity and innovation in work groups. To this end, further investigation in this field regarding the role of cultural context on personality composition and team performance relationship is needed.

5.7. CHAPTER SUMMARY

To summarise, this study represents one of the first research endeavours investigating the interplay between personality traits, team process and team innovation in a knowledge-intensive context. Interestingly, the results are in accord with the findings of Study 1 and revealed that personality traits (including both Big Five and Dark Triad), neither directly nor indirectly through team process, determine the innovative outcome. However, the results of the second study unearthed significant associations between some of the personality traits and innovation-related

team processes. What is more, the control variables also found to have considerable associations with the other variables included in this study. In this regard, as a control variable gender, is revealed to be the only variable that has a direct influence on innovative outcome. Additionally, the results also indicated notable relationships between transformantional leadership and innovation-related team processes in a knowledge-intensive context. Having such findings in hand, the following chapter will now integrate the findings of the both studies and discuss the contribution that they make by addressing the questions of this research.

CHAPTER.6: **CONTRIBUTIONS AND CONCLUSION: Merging Two Studies**

6.1 INTRODUCTION

In this research, I aim to understand and investigate the role of personality composition on teams' creative and innovative performance. Thus, this study examined the direct, mediated and moderated associations among personality traits, team processes and team outputs by conducting two studies that examine similar questions but use distinct variables. In this regard, in Study 1 the focus will be on the direct association between the big five personality traits and the creative performance of student teams. In Study 2, on the other hand, the scope considers the interplay between the big five and dark triad personality traits, innovation-related team processes and the innovative performance of teams within a knowledge-intensive context.

Interestingly, the results in both studies mostly coincide with each other. In particular, the predicted direct relationships between personality traits and team outputs (creativity/innovation) were found to be statistically insignificant. Added to these findings, team processes in both studies did not mediate the associations between personality traits and team outputs as expected. Moreover, the proposed moderated correlations among mean level personality traits, variability in personality traits and team creativity and innovation did not find any support. As a result, none of the hypotheses were supported in either study. To this end, despite the lack of significant findings in both studies, this research nevertheless provides several important contributions.

First and foremost, this thesis has added two new studies to the existing limited number of studies. Having only four studies that investigated the personality and creativity relationship, this study has expanded the associated field by including a distinct design and testing the generalisability of the hypotheses. In this regard, this thesis revealed important findings including the direct relationships between inputs and process variables within the IPO model. In other words, the results of both Study 1 and Study 2 indicated that there are significant associations between personality traits and team process factors, and such findings signify the important role of personality traits in activating the team processes and thus influencing the climate within the team.

There may be several root causes for such similarities between both studies. Firstly, both groups were real teams gathered together in order to achieve a target. Therefore, the similar findings are likely to be found at team level. Secondly, creativity and innovation-related tasks were both complex in nature, and the findings of both studies showed that only personality is not the determinant factor in accomplishing such challenging team tasks. Lastly, while personality did not have a significant impact on the team outcomes, it was found to influence team processes in both studies. This could be due to the fact that it encompassed team processes that were related to team climate in both studies (Barrick et al., 1998; Bradley et al., 2013).

Apart from the similarities, there are also a few differences between the findings of the two studies. One of the important distinctions is related to the control variables and their influence on processes and output variables. In this regard, while there is no impact from the control variables observed in Study 1, in Study 2 it was revealed that the gender variable has a positive influence on the innovative performance of knowledge worker teams. It was also revealed that

transformational leadership (as a control variable) also influences most of the team process variables in a knowledge intensive context.

The differences in the findings of both studies may arise for several reasons. First of all, the contexts of both studies were different. While Study 1 was carried out in an artificially designed undergraduate module, the second study was operated in a real R&D business context and therefore such distinctions might influence the results of both studies. Secondly, although the teams were real in both study contexts, the natures of the teams were different. In Study 1, the teams were composed of students whose ages were close to each other yet they had less experience, and were from distinct cultural backgrounds. In contrast, in Study 2 the participant team members were real life knowledge workers who has similar backgrounds but, higher experience and various ages. Thirdly, although the outputs of Study 1 and Study 2 were both complex, they are nevertheless distinct. In this sense, while the outcome of creativity in Study 1 involves novel idea generation, the output of Study 2 is not only about generating novel ideas and solutions but also incorporates the application of solutions in real life problems.

Taken together, the findings of both studies not only make important contributions to the nature of associations among input, process and output variables that are incorporated in this thesis, but also makes substantial contributions to existing theory. Moreover, the findings and contributions unearth significant suggestions for the practitioners and team designers in organizations. To this end, in this section the suggestions from the results and related contributions of Study 1 and Study 2 will be elaborated, respectively. Then, the general contributions of this thesis will be discussed. Secondly, based on the findings of both studies,

the practical implications of the thesis will be addressed, followed by a section where future research directions are proposed. Finally, the section will end with a set of concluding remarks.

6.2. CONTRIBUTIONS OF STUDY 1

This research investigated the link between personality composition and team creativity by using the IPO framework where the Big Five personality traits are the inputs, team trust is the process, and team creativity is the output variable. In fact, Study 1 makes two separate contributions through its distinct design and findings.

In terms of design, student teams in an artificially designed module was chosen. Since the limited existing research in the literature used student teams in its examination of the personality and team creativity relationship, the choice of sample for this study was chosen so as to be in line with the literature in order to make meaningful inferences. However, it differentiated itself from the previous four studies by investigating the personality composition and team creativity associations over short and longer periods of time by using distinct creativity measures that calculated the number of ideas and observation ratings of student team presentations, respectively. More specifically, the previous studies investigated the effect of Big Five personality variables on the creative performance of teams either using only some of the Big Five traits (Robert and Cheung, 2010) or during only one session (Bolin and Neumann, 2006; Baer et al., 2008; Schilpzand, 2011); this study, however, distinctly examined the same relationships with all Big Five variables both in a short (one session) and over a considerably longer (4 weeks) time period. In particular, examination of the personality and creative performance, both over a short and longer time span, was crucial as it was argued, and found,

that the influencing magnitude of personality increases over time as it is a deep composition variable (Harrison et al., 2002; Bell, 2007).

Moreover, this study included investigation of mediated associations between team personality and team creativity. Relatedly, two out of four studies also investigated the role of intervening variables between this relationship. In this sense, Bolin and Neumann (2006) included social loafing, evaluation apprehension and production blocking; Robert and Cheung (2010) incorporated information sharing and use of systematic task processes as mediating variables on the personality and team creativity relationship. Given this, this study incorporated team trust as a mediating variable. Probing the mediating role of team trust was important as it is a process that is related to interpersonal associations and therefore has the potential to interact with particular personality traits (agreeableness and extraversion) that may play a significant role in intragroup relationships. Added to this, it has also been found to be a key determinant of creativity (Castello, 2009; Newell et al., 2009). In this sense, in light of the theoretical arguments and findings regarding the associations of team trust with both personality traits and team creativity, this study considered team trust as a mediating process variable between personality traits and team creativity. In doing so, Study 1 aimed to enrich the stream of research and enhance our understanding of the role of mediators on team creativity.

Finally, the current study also incorporated moderating associations among variables. Although one of the prior research efforts used creative confidence, and revealed significant findings (Baer et al., 2008), distinct from this, the design of Study 1 was built so as to be based on the configuration approach and theory of person environment fit by investigating the interaction effect between variability and mean level personality on team creativity. Hence, Study 1 goes beyond probing only mean or variability in personality in teams, as it investigates their combined

effect on team creativity and hence aims to extend existing knowledge regarding the role of personality traits on team outcomes. Thus, this study aimed to enrich the stream of team personality composition research by investigating the interaction of both mean level (supplementary fit) and variability (complementary fit) in personality traits on team creativity.

Given such distinct design-related contributions, Study 1 adds to the existing literature with its findings in three main aspects, as distinct from the previous studies. First, Study 1 investigates the role of personality on the creativity of teams. As mentioned previously, thus far, there has been only four prominent studies conducted, and therefore the existing knowledge on the associations between personality traits and creative performance is very limited. Therefore, Study 1 has the characteristic of being an additional study (with its distinct contributions) that was conducted under particular conditions and probed such particular direct associations as those between input and output variables. In this regard, the findings of Study 1 revealed no statistically significant direct associations between personality traits and team creativity over both the short and longer periods of time. As opposed to the previous arguments regarding the increasing magnitude of personality (as a deep composition variable) on general performance of teams over time (Harrison et al., 2002), the results of Study 1 have informed the existing literature by indicating no change in the influencing strength of personality variables on team creativity, even over a longer period of time.

Second, this study introduces Team Trust as a mediator between personality traits and team creativity. The research results demonstrated that the mediating role of the team trust variable is insignificant for the relationships between not only agreeableness but also extraversion and team creativity. In other words, the present study revealed that curvilinear relationships amongst

input and output variables are not mediated by team trust. However, the relationships within the correlation table show that there is a positive correlation between team trust and both the extraversion and conscientiousness variables at the team level. Additionally, this research has also revealed a negative association between neuroticism and the team trust variable. As a result, the findings of this study inform the literature regarding the insignificant mediating role of team trust, but have, however, revealed a number of significant relationships among a number of the personality traits and team trust. Given this, this study enhanced our understanding by revealing that personality traits can affect the level of team trust within the team; however, such an interaction does not relate to creative performance within teams. To this end, a subsequent future study will be required to explore the reasons behind such findings, and should investigate the interaction of personality with additional input variables (e.g., including a measuring variable of knowledge, skill and experiences of members) that are found to be conducive to creativity at the team level.

Thirdly, the current study probes the moderating role of variability in the Big Five personality traits on the association between mean level personality traits and team creativity. Previous research indicated the determinant role of not only mean level but also variability in personality traits on the general performance of teams (Bell, 2007; Mohammed and Angell, 2001; LePine et al., 2007). However, to the best of my knowledge, no previous study has examined the combined influence of variability and mean level personality on team creativity over both short and long time frames. The findings of this research, once again, did not signify any considerable association between the variables, which could provide a reference point for researchers interested in team personality composition and creative performance.

6.3. CONTRIBUTIONS OF STUDY 2

This research has investigated the link between the personality composition, innovation-related team processes and team innovation using the IPO framework. It is conducted in knowledge intensive R&D settings where innovation is likely to occur (Thamhain, 2003). Therefore, such a real business world context was appropriate for investigating team innovation. Given this, this study contributes to the existing literature through its design and findings.

In terms of design, Study 2 is designed as the one of the first research efforts to consider team personality composition and performance-related literature as it incorporates the Big Five and Dark Triad personality traits as input factors to examine their impacts on team innovation. Previous research has, for the most part, investigated the impact of the mean level of big five personality composition on general team performance (Salas et al., 1987; Barry and Stewart; 1997; Barrick et al., 1998; Peeters et al., 2006; Bell, 2007). However, to date far too little attention has been given to the effects of personality composition on creativity and innovation-related outcomes in teams. In this regard, only a handful of research efforts exist that investigate the association between personality and creativity, and no research has been found that has surveyed the impact of personality composition (including Big Five and Dark Triad) on team innovation. To this end, the current study investigated the direct influence of personality traits on knowledge worker team innovation in an innovation-oriented real-world R&D business context. Notably, the individuals (knowledge workers), teams (KWTs) and organizations (KIFs) operating in a knowledge intensive context have a distinct nature in comparison to the ones operating in a traditional setting. As a result, conducting a study within an innovation-oriented knowledge intensive context, where the main focus of the actors is innovation, creates an

additional dimension within the present study and thus extend our understanding of the drivers of team innovation in a knowledge intensive context.

Secondly, in this study the eight innovation-related team processes are included as mediating variables in order to explain the association between personality traits and innovative performance of knowledge worker teams. Such team processes were mostly used as mediator variables when team innovation is the outcome. Relatedly, prior research has examined their mediating role between other input variables such as task complexity, proportion of innovators, team KSA, resources and organizational support (West and Anderson, 1996); team size (Curral et al., 2001), task design (Suifan, 2010) and team innovation. However, the indirect impact of personality composition on team innovation has been left unexplored. In fact, the investigation of the mediating role of team processes between personality composition and team outputs is still a developing area of research. Although a handful of studies have investigated the intervening role of several team process variables such as team communication, conflict and cohesion (Barrick et al., 1998), task focus (van Vianen and de Dreu, 2001) between personality traits and general team performance, the current study goes beyond this. It investigates the mediating role of innovation-based processes (task focus, shared objectives, participative safety, support for innovation, team cohesion, team communication, task and relationship conflict) between personality traits and innovative performance at the team level. In doing so, Study 2 contributes to a growing body of literature on team composition and extends our understanding of the interaction between personality traits and team processes and their influencing magnitude on team innovation.

Thirdly, similar to Study 1, Study 2 also explored the moderating role of variability in personality traits on the association between mean level personality traits and team innovation. Of note

here, however, is that the output is innovation in Study 2, and therefore the focal point is distinct from Study 1 whose output was creativity. Moreover, in Study 2 the moderating relationships also include the "Dark Triad" personality variables along with the "Big Five" personality traits. To this end, Study 2 has the characteristic of being the first study to test the moderating associations among these variables within the field, and therefore contributes to the existing knowledge in the literature. Therefore, Study 2 enhances the existing knowledge by probing the interaction effect between mean level personality and variability in personality on team innovation.

Given the design-related contributions of Study 2, it also makes three significant additions to the stream of personality composition research through its findings on the associations between input, process and output variables. Firstly, having investigated direct associations between personality traits and team innovation, the findings suggested no significant direct associations between the personality variables and innovative performance of knowledge worker teams. To this end, the findings of Study 2 revealed that when designing a team of knowledge workers for innovation, having a good balance of personality traits within a work group may not cultivate the innovative efforts of a knowledge intensive firm. That is, this finding enlightens the existing team personality composition literature and signifies that personality composition itself does not relate to innovation and thus additional input factors may be needed. In this sense, having the correct composition of knowledge, skills and abilities (Woodman, Savyer and Griffin, 1993; Hulsheger, Anderson and Salgado, 2009; West and Anderson, 1996), resources (Guzzo and Shea, 1992) and managerial support (West, 1999) may be necessary in order to compose innovative knowledge worker teams.

Moreover, Study 2 makes contributions to the literature through its findings on mediated relationships. In this respect, this study did not find any mediating role of these team processes, yet significant associations were found between several personality traits and innovation-oriented team processes. The prior research unearthed the positive intervening role of team cohesion (extraversion, agreeableness), team communication (extraversion) and task focus (agreeableness and conscientiousness) between the indicated personality traits and the general performance of teams.   The findings of this research revealed that agreeableness has a positive impact on team cohesion. Extraversion has a significant linear relationship with all innovation-related team processes instead of team cohesion. Additionally, as a Dark Triad variable, narcissism also has positive associations with team communication, innovation support, shared objectives and task focus. These findings inform the literature by enhancing the current knowledge as to the mediating role of team processes on the relationship, and indicates an important contribution with regards to the impact of personality traits on activating innovation-related team processes.

Thirdly, the findings of Study 2, which are related to moderated associations among variables, enrich the existing literature by making suggestions as to the combined effect of both variability and mean levels of personality on team innovation. As for Study 1, the results of Study 2 did not reveal any significant moderating influence of variability in personality traits on the association between mean level characteristic traits and innovative performance in a knowledge intensive context. This finding suggests that, even with the moderating power of the variability in personality traits, the association between personality composition and team innovation remained insignificant.

Finally, one of the most important factors that may have an influence on the innovative performance of teams is the type of leadership (West and Hirst, 2003). Study 2 considers transformational leadership as an important control variable that has an influencing magnitude on innovation (Eisenbeiss, van Knippenberg and Boerner, 2008; Paulsen, Callon, Ayoko and Saunders, 2012). In this regard, considering the context of Study 2, controlling transformational leadership was crucial as prior studies found significant associations between transformational leadership and team innovation in a knowledge-based R&D context (Keller, 2006; Gumusluoglu and Karakitapoglu, 2013). Relatedly, however, the results of this research did not reveal as significant an impact of team leaders' transformational efforts on team innovation in a knowledge-intensive context as for other control variables.

That said, what is striking is that the current study unearthed the fact that transformational leadership is a powerful determinant factor that is conducive to all of the innovation-related team processes in a knowledge-intensive context. Thus, this research intensifies the significance of transformational leadership on team climate and processes, besides contributing to the existing research that has investigated the role of transformational leadership on leading knowledge worker teams (Keller, 1992; Keller, 2006; Karakitapolu-Aygun, Gumusluoglu, 2013). More specifically, previous research has investigated the association between team cohesion (Atwater and Bass, 1994), support for innovation, task focus (Eisenbeiss, van Knippenberg and Boerner, 2008). In this sense, this research extended the existing knowledge by investigating significant associations between transformational leadership and eight innovation-related team processes. Stated briefly, Study 2 on the one hand has revealed positive associations with participative safety, shared objectives, task focus, support for innovation, team communication, a team cohesion, whilst on the other hand has unearthed negative relationships with team conflict variables including both task and relationship conflict. Taken together, the findings

indicated that although transformational leadership has a strong activating power on the innovation-related team processes, these associations did not relate to the innovation outcome. To this end, the combination of transformational leadership and team processes that are under its influence may not create innovative outcomes in teams. Put it differently, a team that has a transformational leader and has various processes at adequate levels may not be powerful enough to become innovative. Thus, the composition of an innovative team may also need to include additional variables to become innovative such as the correct mix of skills, experience coupled with satisfactory resources, and managerial support.

6.4. THE COMBINED IMPLICATIONS OF STUDY 1 & 2

This thesis contributes to the organisational psychology literature. It aims to contribute to the understanding of the role of personality on team creativity and innovation. In this regard, the central objective is to improve the conceptualisation of the relationship between personality composition and team creativity in Study 1, coupled with personality composition, innovation-related processes and knowledge worker team innovation in Study 2. To this end, this section is allocated to the discussion of the combined contributions of Study 1 and Study 2 on the team creativity and innovation literature.

6.4.1 The direct influence of Personality on Team Creativity and Innovation

Research on team personality composition unearthed significant direct associations between personality traits and team member satisfaction (Peeters, Rutte, Van Tuijl, Reymen, 2006),

collective cooperativeness (Neumann and Wright, 1999) and general team performance (Barrick et al., 1998; Peeters et al., 2006; Bell, 2007). Given this, this thesis was intended to enrich the stream of research and thus probed the role of personality composition on creativity and innovation-related outcomes in team-based settings. In both studies, the results related to personality and team creativity as well as innovation are consistent with each other, and associations were revealed as insignificant. These findings signify that personality composition as an input variable does not have an indicative magnitude on team creativity and innovation. In effect, these discoveries correspond to the arguments that stress the passive role of personality when it comes to complex and challenging tasks such as generating novel ideas and implementing those ideas to create new values (Newell et al., 2009). Notably, the findings of the previously conducted studies, which investigated the impact of personality traits on team creative performance, did not reveal consistent results (Litchfield et al., 2017). Therefore, research to date has not indicated a salient positive impact of personality on the subject matter. In a similar vein, within the scope of this study it is difficult to discuss any considerable effect of personality on team creativity and innovation as both tasks are complex in their nature. To this end, although the previous research clearly showed direct links between personality and team outcomes such as member satisfaction (Peeters, Rutte, Van Tuijl, Reymen, 2006) or general team performance (Barrick et al., 1998; Peeters et al., 2006; Bell, 2007), the findings of this thesis clearly indicate that other input factors may need to be carefully considered and included when creativity and innovation are in question (Winsborough and Premuzic, 2017). This is a valuable addition to theory and will serve as a basis for future studies.

6.4.2 The Relationship between Personality and Team Processes.

The findings of the present thesis revealed that although personality does not have a strong influence on team creativity and innovation, it does have a relationship with mediating team processes. This is a notable indicator as it was found in both studies that whilst input studies personality traits do not relate to team outcomes, they do interact with team processes. Thus, current research makes theoretical contributions to the team composition literature not only by testing the mediating associations among personality, process and output variables, but also through investigating the influence of personality traits on the mediating team processes. Additionally, the overall findings of this thesis suggest that although the personality composition itself may not be a determinant of team creativity and innovation, it may influence team climate variables that are conducive to creativity and innovation (see figure 6.1.). In addition, this thesis informed the stream of work by indicating the insignificant impact of both personality traits and team process on the outcomes.

Figure 6.1. The Association Between Personality Traits and Team Processes

Team Cohesion	Team Communication	Support for Innovation	Team Participation	Shared Objectives	Task Focus	Team trust
Agreeableness	Extraversion / Narcissism	Extraversion / Narcissism	Extraversion	Extraversion / Narcissism	Extraversion / Narcissism	Extraversion / Conscientious / Neuroticsm (-)
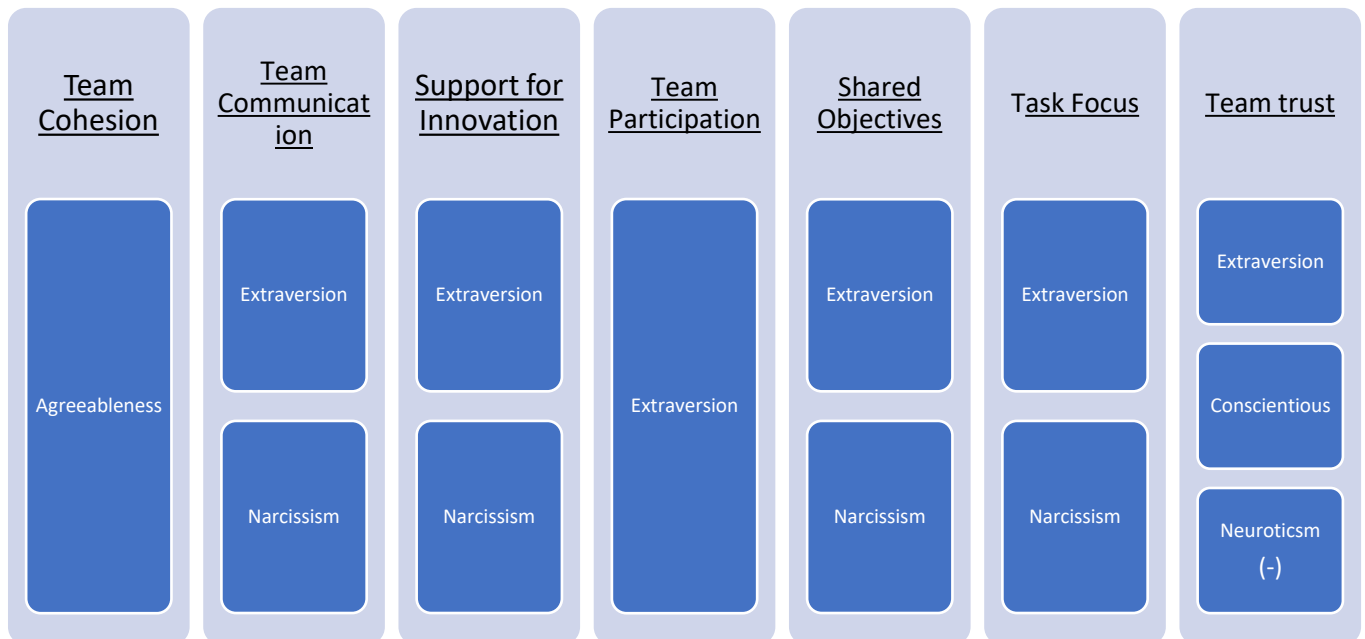
Crucially, this finding shows that not only personality traits, but also team processes themselves, may not be able to activate the creativity and innovation-related complex outcomes at the team level. To put it differently, for instance, a team that has the correct personality mix, and thus have an adequate level of participative safety and cohesion may still not be as creative and innovative as expected. In effect, the findings on the mediating associations indicate that there may be a need for additional composition factors such as knowledge, skill abilities, managerial support or resources (financial, technological) to enable the formation of teams that are creative and innovative. To summarize, these findings on both personality-team process relationships and the mediating role of team processes among personality and output variables have advanced our understanding of team dynamics.

6.4.3 The impact of context on the relationship between personality - team creativity and innovation

As mentioned before, previous research has for the most part investigated the team personality and creative performance relationship over short periods of time and in a student team setting. Thus, to make a meaningful comparison, Study 1 probed the association over both short and longer time periods within a similar student team setting. On the other hand, Study 2 diverged from the previously conducted studies by moving the discussion from an artificial setting towards a real-world, innovation-oriented business setting. To this end, although the two studies were carried out in distinct settings, the findings of both have demonstrated a consistency with each other, and the results showed that none of the personality variables relate to team creativity and innovation in such contexts. In this sense, the current findings add to the growing body of literature on team personality composition and its influence on team outcomes through

indicating the insignificant role of the context on the relationship between personality and complex outcomes.

6.4.4. Previous findings about personality and general performance of teams do not inform the influence of personality on team creativity and innovation.

As stated in the title, one of the objectives of this research was to understand the role of personality in different contexts, namely those of creativity and that are innovation-oriented. To this end, this research explores whether the effects of team personality composition on creativity and innovation are similar to the findings of previous research on general performance.

The published findings within the literature with regards to the personality and general performance relationship indicate the cogent role of mean levels of conscientiousness and agreeableness on the general effectiveness of teams. (Barrick et al., 1998; Neuman et al., 1999; Neuman and Wright, 1999; van Vianen and De Dreu; 2001; Peeters et al., 2006). Moreover, extraversion was found to be curvilinearly related to team performance (Barry and Stewart, 1997; Neumann et al., 1999) and the investigations indicated a negative association between neuroticism and team performance (Mohammed and Angell, 2003).

As mentioned in previous chapters, most of the investigations previously undertaken do not support personality variables as determinant input factors of team creativity (Bolin and Neumann, 2006; Baer et al., 2008; Robert and Cheung, 2010; Schilpzand et al., 2010). In addition to these investigations, Study 1 did not discover any significant relations between the Big Five personality traits and team creativity over both short and longer time spans. Further,

the findings of Study 2 stress the insignificant role of team personality not only on the generation of new ideas in teams but also on the implementation of those ideas. As a result, these findings do not correspond to the studies that probe the association between personality and general performance of teams (Barrick et al., 1998; Peeters et al., 2006; Barry and Stewart, 1997; Mohammed and Angell, 2003).

A possible explanation for the difference between findings might be that complex tasks, such as creativity and innovation, involve divergent thinking and novel idea generation (Shalley, Zhou and Oldham, 2004). In addition, at the team level, finding constructive solutions in order to overcome knowledge boundaries among members, developing shared understandings, and having adequate knowledge skill and abilities may also be important factors to consider in order to be able to accomplish creativity and innovation (Newell et al., 2009). To put it differently, having agreeable members may help in the creation of a positive climate within a team, or including conscientious individuals may assist teams in focussing on accomplishing tasks (Neumann et al., 1999). However, having these characteristics in teams may not be an answer to generating novel ideas and adapting to the speed of innovation speed within the market. These objectives may necessitate other crucial factors, such as having related knowledge, skills and abilities, resources, and possibly managerial support for the team (West and Anderson, 1996; Maier et al., 2015). As a result, complex tasks such as creativity and innovation may require additional factors distinct from general or routine team task requirements. This incompatibility between results related to general and complex tasks supports the argument that team personality traits for routine performance are not necessarily informative in terms of creativity and innovative efforts of teams. In this regard, this research sheds light on the existing theory by indicating the difference between the role of personality on general performance and creativity as well as on innovation.

6.4.5 The moderating impact of variability in personality traits on the association between mean level personality and team creativity and innovative performance.

Variability in team members' personalities is considered another key influencing factor within the personality composition and team performance literature (Barrick et al., 1998; Neumann et al., 1999; Mohammed and Angell, 2003; Schilpzand et al., 2010). In this regard, this research has examined the extent to which diversity in team members' personalities has a moderating impact on the relationship between mean level traits and the creative and innovative performance of teams. That is, the current study has applied the configuration approach and build upon the assumptions of theory of person-environment fit by combining not only mean level but also variability aspects, and testing the interacting influence of such aspects on creativity and innovation-related outputs.

Notably, no significant effect was observed as to the strength of the association between personality traits and performance criteria in either study. In other words, neither the complementary model nor the supplementary fit approach relates to the findings of this study. As such, probing the moderating role of personality diversity on the association between mean level personality and team performance is a comprehensive approach to examining the personality and performance relationship (Peeters et al., 2006). At this point, related findings regarding moderated associations may be the additional explanation as to the insignificant role of personality on complex tasks including creativity and innovation. Taken together, the non-significant moderating role of variability in personality that we have identified assist our understanding of the interplay between personality elevation and heterogeneity and team innovation. In addition, these findings also signify the necessity of qualitative research in order

to understand the reasons behind the insignificant role of personality. In this sense, the nature of a following qualitative study will be discussed in the future research section in greater detail.

6.5. GENERAL LIMITATIONS

As mentioned in previous chapters, this thesis consists of two distinct studies, both of which interrogates the role of personality composition on team creativity and innovation. In essence, Study 2 addresses most of the limitations of Study 1. However, there are remaining limitations common to both studies, and these will be addressed in this section.

The first limitation is about personality composition and its effects on team performance. The literature involves studies that probe the influence of the individuals with the highest or lowest personality scores in team performance depending on the task type. However, in this research, this type of relationship is not considered. Relatedly, Neuman and Wright (1999) argue that when the task is conjunctive, the effectiveness of the team may have a significant dependence on the performance of the lowest scoring member or members. For instance, If the group has a member scoring low in conscientiousness and hence having tendencies towards social loafing, this individual may significantly inhibit the accomplishment of tasks in an effective way. On the other hand, if the task is disconjunctive, the team's task accomplishment may depend significantly on the efforts of the highest scoring member (Betchtoldt, de Dreu, Nijstad, 2007; Mathieu, Maynard, Rapp and Gilson, 2014). In other words, there can be situations where at least one member's high score on a particular trait is necessary, or in other situations it may be crucial not to have any member who has a particularly low score for a given trait in order for teams to perform effectively (Bolin and Neuman, 2006).

Moreover, in this thesis, although the potential influencing factors were controlled during the data analysis process, the influence of other personality traits was not controlled when investigating the role of each personality trait on team outcomes. Yet there may be an interaction between some personality traits that may indeed influence the performance of teams (Buchanan, 1998; Witt, Burke, Barrick and Mount, 2002; Schippers, 2014).

Another limitation is that, in this study, neither the direct impact of team level elevation and diversity in personality traits on the performance of individual members, nor the influence of personality composition on the association between individual level traits and team performance, is considered. In other words, mean and variability level personality traits could be used as moderators between the individual level trait scores and job performance. In fact, recent studies conducted in the field of personality composition and team performance have started to investigate the role of personality scores on individual-level performance (Prewett, Brown, Goswami, Christiansen, 2016; LePine et al., 2011).

When it comes to the measurement of the outputs of the teams in both studies, there was only one assessor who rated the creative and innovative performance of the student teams and knowledge worker teams. Furthermore, I acknowledge that the use of multiple raters to evaluate the performance of teams in both study might have increased the reliability of the assessments and would have made the measurements more robust (Rosenthal, 1997).

This thesis also has limitations related to sample size. The sample sizes used in Studies 1 and 2 were relatively small and moderately sized, respectively. With a higher level of participation, this study would have generated more solid results, and because of the small sample sizes

some significant relationships may have remained undiscovered. Finally, in both studies the performance of the teams was assessed over a continuous time span which proceeded for approximately four weeks in each study. However, with longer time periods, the willingness of the individuals to exert creative or innovative efforts may have proven far more significant. To this end, future research efforts may address this shortcoming by conducting a study with longitudinal design so that over a prolonged term, distinct results and associations may be revealed. Thus, more robust inferences could be made regarding the influence of time span on the relationship between personality traits and team creativity and innovation.

6.6. IMPLICATIONS FOR PRACTICE

In response to high complexity and intense competition in the global environment, an increasing number of organisations are making teams their functional unit. Therefore, studies related to creativity and innovation in teamwork are crucial to providing new knowledge and suggestions for the actors in such challenging and fast-moving organisational phenomena. In effect, team creativity and innovation has gained the attention of a number of scholars, and there are investigations to understand the factors that influences teams in their ability to be innovative (West and Anderson, 1996; Zahavy and Somech, 2001; Caldwell and O'Reilly, 2003; Hulsheger et al., 2009). This research is particularly important as its scope is that of the influence of personality composition on team creativity and innovation.

Aside from its important contributions to theory, this thesis also has valuable implications for practitioners. On combining the findings of these two research endeavours, the common voice signals that personality composition is not directly related to creativity and innovation.

Additionally, even when we combine the findings with previous investigations from the literature, it is still difficult to talk about any clear and direct influence of personality on creativity and innovation at the team level, which is also mentioned in a review paper about the role of personality on team creativity (Litchfield et al., 2017). Although this does not mean that personality has no influence on the outcomes, the findings strongly indicate that when forming teams, particularly for complex tasks such as creativity and innovation, the associated managers or the decision makers need to take other input factors (having the correct knowledge, skills and experience, resources and managerial support) into account along with personality (Winsborough and Premuzic, 2017).

Moreover, the findings of both research have, quite interestingly, indicated that personality traits such as extraversion, agreeableness and narcissism may have a fortifying impact on team processes.

In this regard, the findings of Study 1 showed a clear link between team trust and extraversion, conscientiousness, and neuroticism. I believe that this is an important indicator for managers as enabling trust within the team leads to such constructive outcomes as effective knowledge sharing and creative performance (Bidault and Castello, 2009; Barczak et al., 2010). To this end, the results of Study 1 suggest that managers need to ensure the inclusion of both conscientious and extraverted members while excluding neurotic ones if they want healthy reliance and effective interaction among team members.

Moreover, Study 2 also revealed statistically significant relationships between personality traits and innovation-related team processes. Based on these findings, managers need to secure the services of agreeable members if they want cohesion within their knowledge worker teams. The findings of Study 2 also highlighted the importance of extravert members in a knowledge

intensive context. Therefore, the people who are responsible for designing teams need to ensure inclusion of extraverted members so that communication, innovation support, participation, shared objectives and task focus processes are more likely to gain strength with the high extraversion levels within teams. Apart from these Big Five characteristics, narcissism, as a dark triad trait, was also revealed as a significant determinant of communication, innovation support, shared objectives and task focus in a knowledge intensive context. Therefore, leaders of knowledge worker teams need to critically evaluate the incorporation of narcissistic members within their teams.

Additionally, the findings of Study 2 also demonstrated that the transformational leadership style is conducive to all team processes. I believe these findings indicate the importance of alluded traits and the appropriate leadership style for the creation of an innovative atmosphere within knowledge worker teams. That said, in the latter study, it was also revealed that none of the team processes are significantly related to innovative performance of knowledge worker teams. Taking these findings together, it can be suggested that, in particular, managers of knowledge-intensive organisations may also need to consider other team processes that are found to be crucial factors in knowledge-intensive contexts (Newell et al., 2009; Mutlu, 2015). In this sense, managers could enable the correct conditions for team cognition within the environment in which knowledge worker teams operate (He, Butler and King, 2007). Besides, including members who have wider intellectuality and understanding capabilities (t-shaped skills) within teams may enable shared cognition amongst knowledge workers and thus fuel innovation (Leonard, 1998).

6.7. FUTURE RESEARCH

This research comprises two different studies that examine the role of personality on team creativity and innovation. Both studies used distinct approaches to measure team creativity (Study 1) and innovation (Study 2). As indicated in the results and discussions sections of this thesis, neither personality traits nor team processes emerge as influencing factors on the performance measures utilised in this thesis. In fact, there is a possibility of finding significant associations between input, process and outputs through using alternative approaches such as using more than one rater for the measurement of team creative performance or applying alternative original measures to evaluate the innovative performance of teams. Hence, future research that addresses alternative approaches to measuring team creativity and innovation may make additional contributions to the conceptualisation of personality, team creativity and innovation relationships.

Moreover, the results of the research in this thesis indicated that not only personality, but also team processes and even transformational leadership style, are not critical factors in terms of their relationships with creative and innovative outcomes. As hinted previously, this is an interesting finding and future research needs to confront these findings. I believe that not only a quantitative study, but also a comprehensive qualitative study, may need to be undertaken to understand the assessor's reasons for not to relating the utilised input, process or output factors to each other and to discover the real determinants of team creativity and innovation based on the perceptions of the module leader (for the initial study) and managers of knowledge-intensive organisations (for the latter study) (Bryman and Bell, 2007).

In addition, this research incorporated direct, mediating and moderated associations between personality traits, team processes and creativity as well as innovation-related outputs. Although, this research investigated complex associations between the variables, it could investigate more comprehensive associations as moderated mediation or mediated moderation associations among variables. In this respect, future research that probes the moderating role of variables such as team tenure or team size on the mediating associations between input, process and output variables may enhance our understanding as to the complex associations amongst personality traits, process variables and team outputs.

Another important issue to remember is that there are, in effect, other alternative input and innovation-related process variables that have been found to be conducive to team creativity and innovation. Knowledge, skills and abilities of team members (team KSA), resources and managerial support are the other input variables. When it comes to team processes, this study predicates the innovation-related team processes that are determined within the study conducted by Hulsheger and co-workers (2009). However, there could be some other process factors that may be conducive to innovation. For instance, team cognition, that is, a cognitive activity among members of the team that emerges through the interactions of the members in reaching shared tasks, is considered an important predictor of team innovation. In fact, it is argued that these interactions lead to teams developing the shared understandings that help members to make sense of each other's technical knowledge, and thus communicate and innovate easily (He, Butler and King, 2007; Nonaka, 1994; Nonaka and Konno, 1998). Alternatively, the absorptive capacity of a team has recently gained the attention of a number of scholars with regards to its importance to innovative outcomes. The term 'absorptive capacity' was developed in a crucial paper written by Cohen and Leventhal in 1990 and, at the team level, it refers to the ability of a team to recognise the value of external knowledge, and to

capture and apply new types of knowledge to reach innovative ends within the organisational context (Mutlu, 2015). In fact, a growing stream of research has underscored the importance of absorptive capacity on innovation (Tsai, 2001; Lane, Koka, Pathak, Lane, and Thak, 2006). Besides, recent research has demonstrated a powerful relationship between teams' absorptive capacity and innovative performance (Nemanich, Keller, Vera, and Chin, 2010). To this end, focusing on the role of such additional team processes as found between input and output factors may contribute to the conceptualisation and understanding of team innovation. Finally, the investigation of other personality taxonomies and their association with team processes and creativity and innovation-related outputs can provide comparative understanding to the team personality composition literature. In this regard, another highly investigated personality taxonomy, HEXACO, has six dimensions: Honesty-Humility, Emotionality, eXtraversion, Agreeableness, Conscientiousness, and Openness to experience, can be considered as an input variable in future studies (de Vries, de Vries, de Hoogh and Feij, 2009). In doing so, the findings on HEXACO traits and their association with team process and output variables may reveal additional information about the role pf personality composition on team creativity and innovation (Lee and Ashton, 2004, 2005).

Furthermore, as mentioned, this research has revealed the significant influence of both personality traits and transformational leadership on team processes. In addition, prior research revealed the influence of personality traits on other types of team outcomes such as team member satisfaction (Peeters, et al., 2006), collective cooperativeness (Neumann and Wright, 1999), and wellbeing (van der Zee, Atsma & Brodbeck, 2004), which may also interact with both team processes and with the creative and innovative performance of teams. That is, based on the findings of this study and previous research, personality composition may play an indirect role on performance by influencing team processes or other outcomes that may be essential to

creativity and innovation in teams. Hence, future studies should examine the associations among such variables. In particular, investigation of the mediating role of the team processes used on the relationship between personality traits and such outcomes may enhance our understanding of the role of personality and team processes on team dynamics, coupled with the provision of opportunities for scholars to make comparisons regarding the influence of personality on distinct team outcomes.

In summary, the findings of this research can be investigated further not only through a quantitative approach but also with qualitative methods so as to enlighten researchers further regarding the role of personality on team creativity and innovation. In this sense, a subsequent study could also be designed to encompass two distinct studies. The first would be to conduct a qualitative inquiry whose design includes in-depth interviews, particularly with the performance evaluators of creativity and innovation-oriented teams in similar settings which may reveal additional predictors that are more conducive to team creativity and innovation. Further, it might also address the root causes of the insignificant associations between personality traits and team outputs (creativity/innovation). In fact, such a design may assist addressing questions such as: What is the value of considering characteristics of members when composing teams for creativity and innovation? How do personalities influence team processes that lead to team creativity and innovation? What are the alternative input and process factors that need to be considered? and What is the role of having the correct composition of knowledge, skill and abilities, resources and managerial support on creating creativity and innovation-oriented teams according to the decision makers perspective.

Next, a quantitative study that could build on the findings of the qualitative inquiry can be conducted, and could be designed through the use of alternative performance evaluation

measures along with more raters and a larger sample to investigate the influence of not only personality but also other input and process factors, as unearthed through the preceding qualitative study, on the performance of creativity and innovation-oriented teams in an innovation-based context. To be more precise as to the design of a subsequent study, using a performance scale that measures both the creativity and implementation phases of innovation in a separate way may give more information as to the influence of personality traits on different stages of innovation. Additionally, incorporation of the revealed (input) variables and investigation of not only their association with team creativity and innovation but also through investigating the moderating role of personality on such associations, our understanding of the role of team composition on team innovation might be enhanced. In so doing, not only can the determinant input variables that effects creative and innovative performance of teams be detected but, through an examination of the moderating impact of personality composition on the relationship between revealed input and output variables, our understanding of the role of personality on team creativity and innovation may also be enhanced. In effect, observing such associations in a study with a longitudinal design may also reveal significant correlations and generate comparable discussions. Furthermore, exploring both the direct impact of the additional (input) variables on the team processes used and the influence of the interaction between personality and additional (input) variables on the team process may also extend the existing knowledge about the association between input and process variables in an innovation-based team setting.

6.8. CONCLUSION

This thesis aimed to shed light on the role of personality on creativity and innovation at the team level. The conceptualisation of this relationship is based on the theoretical offerings of the input-

process-output framework. Through both studies, the present research indicated that at the team level, personality composition may not play a determining role when it comes to complex tasks such as generating novel ideas and transforming these ideas into innovative outcomes. However, it is worth noting that the results of both studies revealed that some personality traits have a considerable influence on team processes. Such significant relationships crucially indicate the influential role of personality traits when preparing a positive climate for creativity and innovation. Taken together, as based on the results of this thesis, it is clear that personality may not be a direct influencing factor for accomplishing creativity- and innovation-related tasks at the team level. In fact, the relationship might be a complex one, and may need to be considered with other input factors that influence team creativity and innovation. These additional factors may also show variation depending on context.

To conclude, this thesis combines two studies that are consistent with each other, and therefore make useful contributions towards conceptualising and understanding the impact of personality on creativity and innovation at the team level in two distinct contexts.

APPENDICES

A. EXPLORATORY FACTOR ANALYSIS TABLES AND SCREE PLOTS FOR USED PERSONALITY SCALES IN STUDY 2

A.1 Factor Analysis for Agreeableness:

Agreeableness scale scree plot:
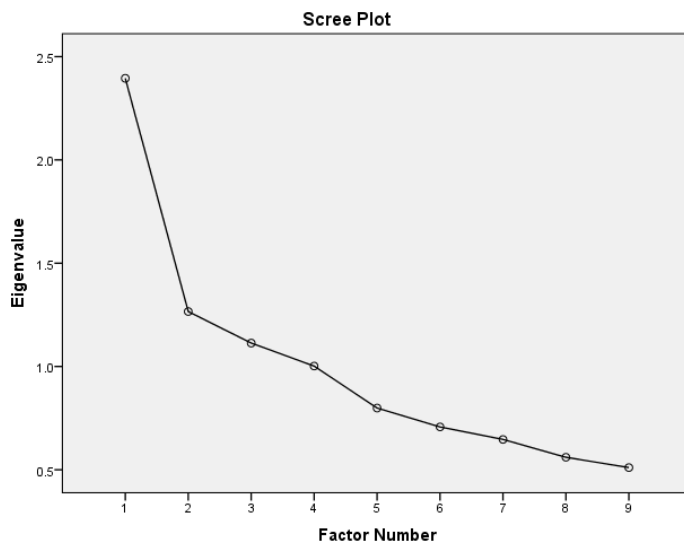
Agreeableness scale Factor Loadings:

Agreeableness Scale Items	Factor
	1
is considerate and kind to almost everyone	.624
is sometimes rude to others	.508
has a forgiving nature	.498
is generally trusting	.439
is helpful and unselfish with others	.390
tends to find fault with others	.355
can be cold and aloof	.330
likes to corporate with others	.288
starts quarrells with others	.252

A.2 Factor Analysis for Extraversion:

Extraversion Scale Scree Plot:
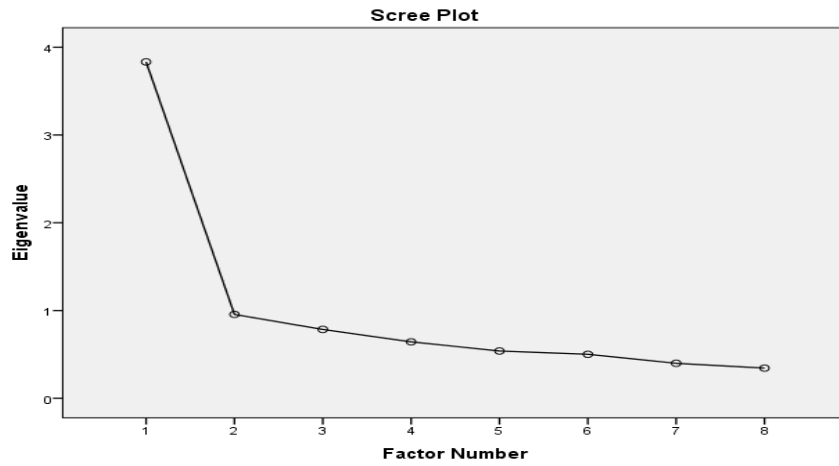
Extraversion Scale Factor Analysis Loadings:

Extraversion Scale Items	Factor
	1
tends to be quiet	.766
is reserved	.695
is talkative	.677
Is outgoing, sociable	.670
generates a lot of enthusiasm	.647
is full of energy	.611
is sometimes shy, inhibited	.528
has an assertive personality	.467

A.3 Factor Analysis for Conscientiousness:

Conscientiousness Scale Scree Plot:
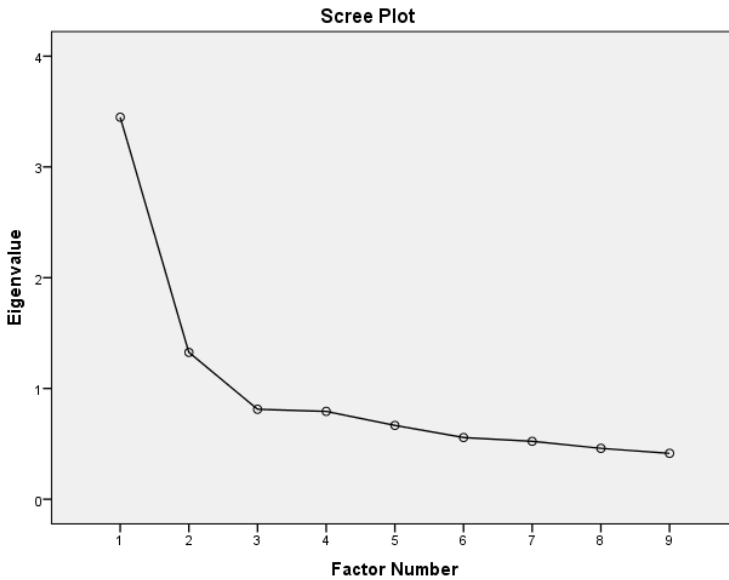
Conscientiousness Scale Factor Loadings:

Conscientiousness Scale Items	Factor
	1
tends to be quiet	.766
is reserved	.695
is talkative	.677
Is outgoing, sociable	.670
generates a lot of enthusiasm	.647
is full of energy	.611
is sometimes shy, inhibited	.528
has an assertive personality	.467

A.4. Factor Analysis for Neuroticsm

Neuroticsm Scale Scree Plot:

Scree Plot
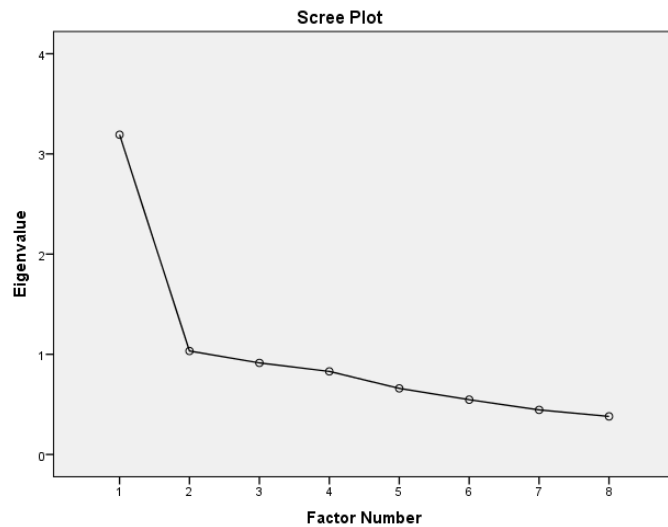
Neuroticsm Scale Factor Loadings :

Neuroticsm Scale Items	Factor
	1
can be moody	.697
worries a lot	.635
gets nervous easily	.617
can be tense	.593
is depressed blue	.563
remains calm in tense situations	.543
is relaxed and handles stress well	.468
is emotionally stable, not easily upset	

A.5. Factor Analysis for Openness to Experience

Openness Scale Scree Plot:

Scree Plot
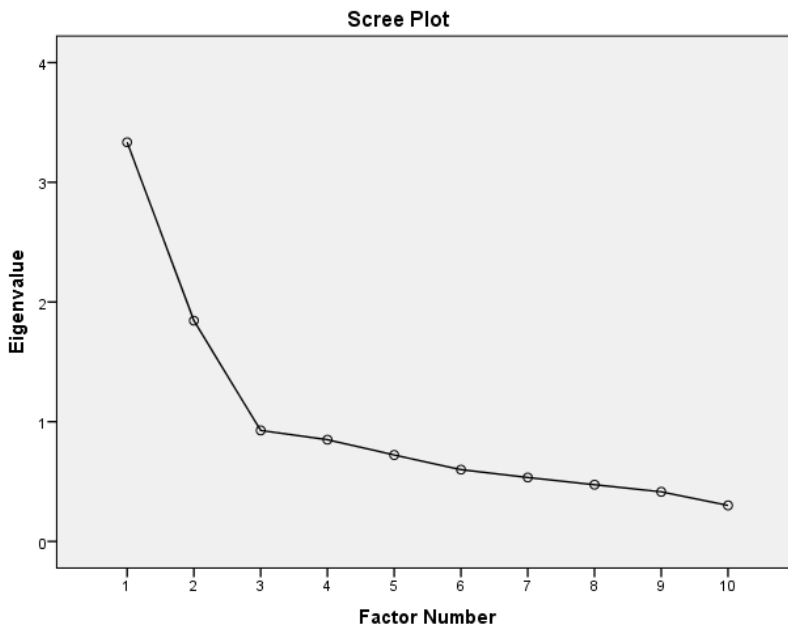
Openness Scale Factor Lodadings:

Openness Scale Items	Factor
	1
is inventive	.679
is original, comes up with new ideas	.664
likes to reflect, play with ideas	.581
is curious about many different things	.569
has an affective imagination	.553
is ingenious, a deep thinker	.522
vaalues artistic,aesthetic experiences	.427
has few artistic interest	.406
prefers work that is routine	
is sophisticated in art, music or literature	

A.2.5. Factor Analysis for Machiavellianism

Machiavellinism Scree Plot :
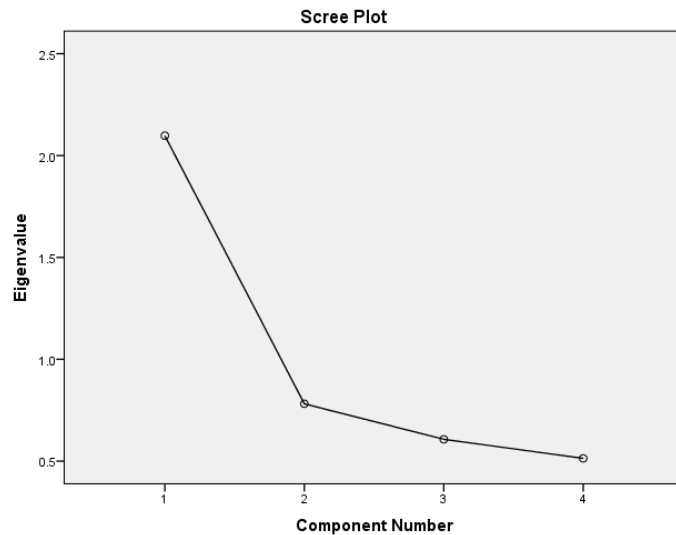
Machiavellinism Factor Loadings:

Machiavellinism Scale Items	Factor
	1
Whatever it takes, you must get the important people on your side	.688
Make sure your plans benefit you, not others	.671
It`s wise to keep track of information that you can use against people later	.668
You should wait for the right time to get back at peopl	.599
I like to use clever manipulation to get my way	.593
Avoid direct conflict with others because they may be useful in the future	.564

A.6 Factor Analysis for Narcissism

Narcissism Scree Plot:
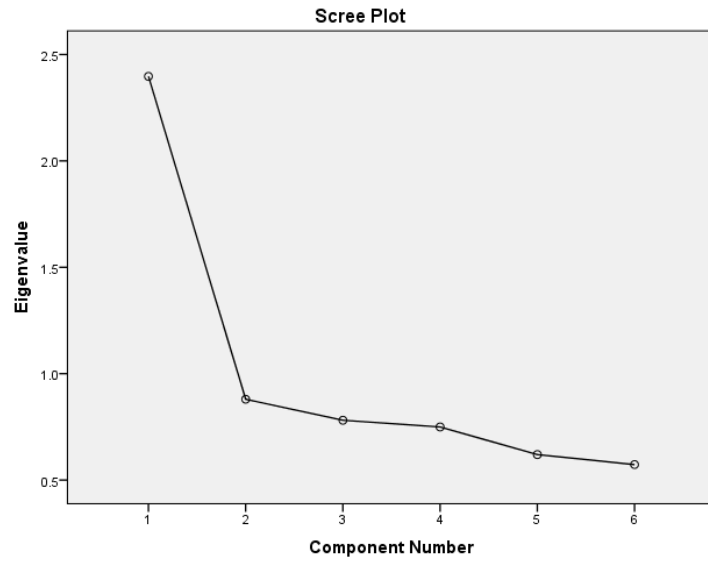
Narcissism Factor Loadings:

Narcissism Scale Items	Factor
	1
I know that I am special because everyone keeps telling me so	.785
Many group activities tend to be dull without me	.747
I have been compared to famous people	.696
People see me as a natural leader	.662

A.7 Factor Anaysis for Psychopathy:

Psychopathy Scale Scree Plot:

Scree Plot
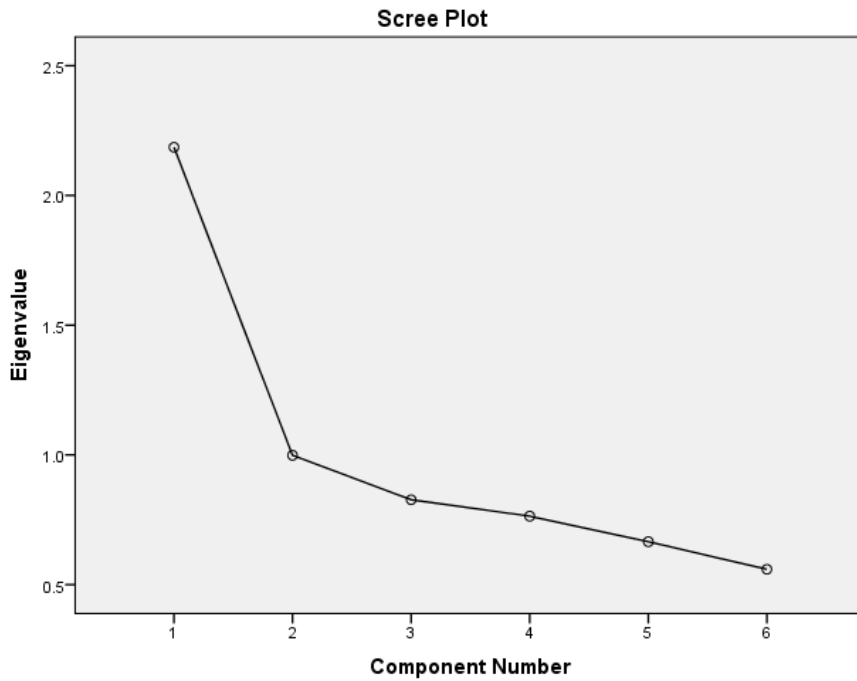
Psychopathy Scale Factor Loadings:

Psychopathy Scale Items	Factor
	1
People who mess with me always regret it	.716
You should wait for the right time to get back at people	.671
I like to get revenge on authorities	.622
People often say I`m out of control	.567
It`s true that I can be mean to others	.547
I will say anything to get what I want	.462

B. ETHICAL APPROVAL LETTERS

B.1. STUDY 1

Mustafa Doruk Mutlu
Registration number: 120184255
Management School
Programme: Doctoral Programme

Dear Mustafa Doruk

PROJECT TITLE: The Impact of Personality Composition on Creative Performance of Student Teams
APPLICATION: Reference Number 001654

On behalf of the University ethics reviewers who reviewed your project, I am pleased to inform you that on 16/09/2014 the above-named project was **approved** on ethics grounds, on the basis that you will adhere to the following documentation that you submitted for ethics review:

- University research ethics application form 001654 (dated 21/08/2014).
- Participant information sheet 002556 version 1 (20/08/2014).
- Participant consent form 002516 version 1 (18/08/2014).

The following optional amendments were suggested:

Whilst the lecturer will be making it clear that participation is voluntary I am a little concerned that students might feel some social pressure to take part - if others in the class are doing it - and might still feel they would be viewed negatively by the lecturer - even though the lecturer has said there is no penalty for not taking part. I'm not sure how you get around that apart from emphasising this point more or give them the option to mark their questionnaire in some way - so they might complete it in front of their class mates and hand it in (so it isn't obvious that they are refusing) - but they mark their survey as not to be used?

If during the course of the project you need to deviate significantly from the above-approved documentation please inform me since written approval will be required.

Yours sincerely

Malcolm Patterson
Ethics Administrator
Management School

B.2. STUDY 2

The University Of Sheffield.

Management School.

Sheffield University Management School

Date 28/05/2014

Dear Mustafa

PROJECT TITLE: Personality and Innovative work performance

On behalf of the Sheffield University Management School research ethics reviewers who reviewed your project I am pleased to inform you that the above-named project has been **approved** on ethics grounds

The research ethics reviewers are happy with the documentation you have provided and are happy to approve your research ethics application on this basis.

If during the course of the project you need to deviate significantly from the above-approved document please inform me since written approval will be required. Please also inform me should you decide to terminate the project prematurely.

Yours Sincerely

Harriet Godfrey
Research Manager
Sheffield University Management School

cc. Dawson (Supervisor)

C. QUESTIONNAIRES USED IN THIS RESEARCH

C.1. STUDENT TEAMS PERSONALITY MEASUREMENT (STUDY 1):

INFORMATION ABOUT THE QUESTIONNAIRE

This questionnaire will only be used by the researcher for the aim of understanding the relationship among team personality compostion, and the innovative performance of the team. It consists of 3 different sections and will last at most 10 minutes to complete.

Participation is voluntary to the study and you can withdraw any time you want until submission.

Section A: Demographic Information Scale

Age: _____
Gender: Male   Female

Nationality:_____

Section B: Personality Questionnaire

Statement	Strongly Disgree	Disagree	Neither agree nor disagree	Agree	Strongly Agree
I see myself someone who…					
____is talkative					
____ tends to find fault with others					
____does a thorough job					
____is depressed blue					
____is original, comes up with new ideas					
____is reserved					

___is helpful and unselfish with others				
___can be somewhat careless				
___is relaxed, handles stress well				
___is curious about many different things				
___is full of energy				
___starts quarrels with others				
___is a reliable worker				
___can be tense				
___ is ingenious, a deep thinker				
___generates a lot of enthusiasm				
___has a forgiving nature				
___tends to be disorganized				
___worries a lot				
___has an affective imagination				
___tends to be quiet				
___is generally trusting				
___Tends to be lazy				
___is emotionally stable, not easily upset				
___is inventive				
___has an assertive personality				
___can be cold and aloof				
___perseveres until the task is finished				
___ can be moody				
___vaalues artistic,aesthetic experiences				
___is sometimes shy, inhibited				
___is considerate and kind to almost everyone				

___does things efficiently					
___remains calm in tense situations					
___prefers work that is routine					
___Is outgoing, sociable					
___is sometimes rude to others					
___makes plans and follows through with them					
___gets nervous easily					
___likes to reflect, play with ideas					
___has few artistic interest					
___likes to corporate with others					
___is easily distracted					
___is sophisticated in art, music or literature					

C.2. QUESTIONNAIRE FOR KNOWLEDGE WORKERS (STUDY 2)

STUDY ON KNOWLEDGE WORKER TEAM PERSONALITY COMPOSITION AND TEAM INNOVATIVE

PERFORMANCE

INFORMATION ABOUT THE QUESTIONNAIRE

This questionnaire will only be used by the researcher for the aim of understanding the relationship among team personality compostion, innovation related team processes and the innovative performance of the team. It consists of 8 different sections and will last approximately 15 minutes.
By filling in the questionnaire you consent to take part in the research under the conditions outlined in the information sheet.

Section A: Demographic Information Scale
Age: _____
Gender: Male   Female

What is your highest qualification : Undergraduate Master PhD
Occupation:_____

Section B: Personality Questionnaire Part 1

Statement	Strongly Disgree	Disagree	Neither agree nor disagree	Agree	Strongly Agree
I see myself someone who…					
___is talkative					
___ tends to find fault with others					
___does a thorough job					
___is depressed blue					
___is original, comes up with new ideas					
___is reserved					
___is helpful and unselfish with others					

___can be somewhat careless					
___is relaxed, handles stress well					
___is curious about many different things					
___is full of energy					
___starts quarrels with others					
___is a reliable worker					
___can be tense					
___ is ingenious, a deep thinker					
___generates a lot of enthusiasm					
___has a forgiving nature					
___tends to be disorganized					
___worries a lot					
___has an affective imagination					
___tends to be quiet					
___is generally trusting					
___Tends to be lazy					
___is emotionally stable, not easily upset					
___is inventive					
___has an assertive personality					
___can be cold and aloof					
___perseveres until the task is finished					
___ can be moody					
___vaalues artistic,aesthetic experiences					
___is sometimes shy, inhibited					
___is considerate and kind to almost everyone					
___does things efficiently					

	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
____remains calm in tense situations					
____prefers work that is routine					
____Is outgoing, sociable					
____is sometimes rude to others					
____makes plans and follows through with them					
____gets nervous easily					
____likes to reflect, play with ideas					
____has few artistic interest					
____likes to corporate with others					
____is easily distracted					
____is sophisticated in art, music or literature					

Section C: Personality Questionnaire Part 2

Statement	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
It is not wise to tell your secrets*					
I like to use clever manipulation to get my way					
Whatever it takes, you must get the important people on your side					
Avoid direct conflict with others because they may be useful in the future					
It`s wise to keep track of information that you can use against people later					
You should wait for the right time to get back at people					
There are things you should hide from other people because they don`t need to know*					

Make sure your plans benefit you, not others					
Most people can be manipulated*					
People see me as a natural leader					
I hate being the center of attention**					
Many group activities tend to be dull without me					
I know that I am special because everyone keeps telling me so					
I like to get accounted with important people**					
I feel embarrassed if someone compliments me**					
I have been compared to famous people					
I am an average person**					
I insist on getting the respect I deserve					
I like to get revenge on authorities					
I avoid dangerous situations***					
Payback needs to be quick and nasty					
People often say I`m out of control					
It`s true that I can be mean to others					
People who mess with me always regret it					
I have never gotten into trouble with the law***					
I will say anything to get what I want					

-The items with stars were eleminated in order to increase the reliability score of the Dark Triad Personality scales. Machiavellianism (*), Naricissism (**), Psychopathy (***)

Section D: Leadership Questionnaire

The aim of this questionnaire is to measure "leadership" in a particular knowledge worker team. The test consists of 7 statements that must be rated on how much you agree with them. The test should not take most people for more than 2 minutes.

Are you the team leader:

☐ Yes   ☐ No

If "no" please answer the questions below. If "yes" please go to section E.

Statement	Strongly Disagree	Disagree	Neither agree nor disagree	Agree	Strongly Agree
Our team leader fosters trust, involvement and cooperation among team members					
Team leader leader treats us as individuals, supports and encourages our development					
Team leader gives encouragement and recognition to us					
Team leader communicates a clear and positive vision of the future					
Team leader encourages thinking about problems in new ways and questions assumptions					
Team leader is clear about his/her values and practices what he/she preaches					
Team leader instills pride and respect in others and inspires me by being higly competent					

Section E: Innovation Related Team Processes Scales

Cohesion in the team	Strongly Disagree	Disagree	Neither agree nor disagree	Agree	Strongly Agree
To what extent do you agree with the following?					
People help eachother in the team					
People get along in the team					
There is a personal interest in the team					
There is a lot of team spirit among team members					
There is a lot of common among team members					

Participation in the Team	Strongly Disgree	Disagree	Neither agree nor disagree	Agree	Strongly Agree
To what extent do you agree with the following?					
We have a "we are in together" attitude					
People keep each other informed about work related issues in the team					
People feel understood and accepted by each other					
There are real attempts to share information throughout the team.					
There is a lot of give and take					
We keep in touch with each other as a team.					

Support for New Ideas	Strongly	Disagree	Neither	Agree	Strongly

	Disagree		agree nor disagree		Agree
To what extent do you agree with the following?					
This team is always moving toward the development of new answers.					
This team is open and responsive to change.					
People in this team are always searching for fresh, new ways of looking at problems.					
Members of the team provide and share resources to help in the application of new ideas.					
Team members provide practical support for new ideas and their application.					

Team Objectives	Not at all		Somewhat		Completely
To what extent do you agree with the following?					
How clear are you about what your team`s objectives are?					
This team is open and responsive to change.					
People in this team are always searching for fresh, new ways of looking at problems.					
Members of the team provide and share resources to help in the application of new ideas.					
Team members provide practical support for new ideas and their application.					

Task Style	Not at all		Somewhat		Completely
To what extent do you agree with the following?					
Do your team colleques provide useful ideas and practical help to enable you to do the job to the best of your ability?					
Are team members prepared to question the basis of what the team is doing?					
Does the team critically appraise potential weaknesses in what it is doing in order to achieve the best possible outcome?					
Do members of the team build on each other`s ideas in order to achieve the highest possible standards of performance?					

Internal and Exteranal Communication in the Team	Not at all		Somewhat		Completely
To what extent do you agree with the following?					
How frequently are there task related communication inside your team?					
How often do people in your team communicate about tasks outside your team but inside the department?					
How often do people in your team communicate with people from outside of your department?					

How often do people in your team communicate with people from outside your firm?					

Task and relationship conflict in the team	Not at all		Somewhat		Completely
To what extent do you agree with the following?					
How much friction is there among team members in your work team?					
How much are personality conflicts evident in your work group					
How much tension is there among members in your team					
How much emotional conflict is there among members in your team					
How often do people in your team disagree about opinions regarding the work being done.					
How frequently are there disagreements about your ideas in your team					
How much disagreement is there among team members about decisions made					
To what extent are there differences of professional opinion in your work team.					

C.3. QUESTIONNAIRE FOR EXTERNAL ASSESSORS (STUDY 2)

STUDY ON KNOWLEDGE WORKER TEAM PERSONALITY COMPOSITION AND TEAM INNOVATIVE

PERFORMANCE

By filling in the questionnaire you consent to take part in the research under the conditions outlined in the information sheet.

Section A: Demographic Information Scale

Age: _____
Gender: Male   Female

Grade Level: Undergraduate Master PhD
Occupation: _____
How long have you been working in this organisation? _____ Years.

Section B: Team Innovative Performance Assessment Scale

This questionnaire will only be used by the researcher for the aim of understanding the relationship among team personality composition, innovation related team processes and the innovative performance of the team. The aim of this questionnaire is to measure innovative performance of the particular team and participation to the study is voluntary. The test consists of 6 statements that must be rated on how much you agree with them. The test should not take most people for more than five minutes.

Please provide the name of the team you are assessing: _____

Statement Related to Team Innovative Performance	Strongly Disagree	Disgree	Neither agree nor disagree	Agree	Strongly Agree
The team initiated new procedures and methods in the last month.					
The team developed new skills in order to foster					

innovations in the last month.					
The team developed innovative ways of accomplishing work targets/objectives in the last month.					

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