ISCTE Business School
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THE COMPREHENSIVE ASSESSMENT OF TEAM MEMBER EFFECTIVENESS (CATME): PERSONALITY PREDICTING TEAMWORK COMPETENCIES

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Project submitted as a partial requirement for the conferral of

Master of Human Resources Management

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April 2014

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- Spine -

Acknowledgements

The presented dissertation wouldn’t have been possible with the aid of several persons to whom I am very grateful.

Firstly I would like to thank Professor Silvia Dello Russo, my supervisor and former professor, for her sage advice, dedication, insightful criticisms and patient encouragement during the process of writing the thesis. Due to this learning process I have developed several skills, which without her support would probably stay latent.

Secondly I would like to thank professor Ana Passos for her initial guidance of the topic that concerns this dissertation.

I am grateful, to my mother Elizabete and my father Pedro that brought me to this world. Without their support, it wouldn't have been possible for me to be where I am today. To my grandfather Eleazar and my grandmother Palmira, which have loved me unconditionally since the start.

Lastly I am thankful, to my everlasting precious best friends who listened too much about teamwork: Carolina, Mafalda, Miguel, Silvia, João Correia and João Frias.

"It is through education that we are liberated from powerlessness, from the burden of mistrust directed against ourselves. To awaken the abilities that have been lying dormant within. To arouse and extend the soul's aspiration to become full and complete. Can there be any more sublime experience in life?"

Daisaku Ikeda

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1.Executive Summary

The following thesis explores personality as a predictor of teamwork competencies. Nowadays, work design is increasingly based on teams, therefore there is a big topic of research that focus on teamwork. Several researchers reinforce the importance of personality within organizational contexts, since different personality characteristics of team members may have differential effects on the teamwork behaviors considered effective for team performance, which have impact on the organization.

Thus, the main objectives of this thesis are to answer the following research questions: What personality traits should one individual possess in order to be a good team player? What are the personality traits that have an impact in specific teamwork competencies? Which ones are more relevant in predicting a certain competency? The resultant findings can be applied in several Human Resources systems such as performance appraisal, selection and recruitment, as well as the efficient design of work teams.

The second chapter provides a general introduction to several concepts related to teamwork (e.g., team, teamwork competencies, performance behaviors), emphasizing why teams are important in today's modern world. Further on, several teamwork models and competencies are presented in order to provide different frameworks of analysis to the readers. Still in this chapter, a conceptual bridge is made between the previously discussed models/teamwork competencies and the empirical tool that was used to measure the competencies. The used tool is named "The Comprehensive Assessment Tool of Team Member Effectiveness" (CATME), which has been developed by Ohland and colleagues (2012).

The third chapter defines the personality variables of the Big five of personality (Extraversion, Agreeableness, Conscientiousness, Emotional Stability and Openness to experience), which are the predictor variables of the study. Several hypotheses were drawn out of this chapter concerning personality traits predicting teamwork competencies (assessed by the CATME tool).

Results pointed out that at the individual level, there are several personality traits associated with certain teamwork competencies (when individuals where rating

themselves). These results show that further relevance should be given to personality when predicting competencies (e.g. conscientiousness is able to predict team competencies that are becoming more and more important in organizational contexts).

The findings of this study can be used to understand the influence of personality on teamwork competencies. Future research and practical implications in organizational settings are posited.

2.Introduction

As the world is rapidly changing, new phenomena and demands arise. Companies and organizations have a major interest in adapting to this ever-changing world, in order to become more competitive, dynamic, flexible and having economic sustainability in mind. Therefore a big topic of research focuses on teamwork, since organizational design is increasingly based on teams. Understanding team processes is crucial for the sustainability of organizations, so that managers make informed decisions. Despite the developments in teamwork research, little is known about how individuals contribute to the team intragroup processes and outcomes (Juhász, 2010) and one of the main individual factors that are studied is personality. Morgeson and colleagues (2005) have mentioned that the interactive effects between teamwork knowledge (knowing how to work in teams) and personality characteristics are an area to be explored in the future. Hogan and colleagues (1998) and Neumann and Wright (1999) also share this perspective, mentioning that personality traits predicting individual teamwork behaviors is a promising avenue of research. The dominant way of analyzing teams is usually with the input-process-output (IPO) model at high levels of analysis (e.g. personality and team performance), which implies that there are a variety of individual inputs, which will affect team outputs. It is important to mention that personality is theoretically and empirically more related to team processes measures than outcomes and outputs. Thus, team process criteria should be more strongly related to personality because there is a closer link between team processes, which reflect team interaction, than with the team outcomes (Driskell et al., 1987).

The results from two meta-analyses reinforce the importance of the personality within organizational contexts (Barrick & Mount, 1991; Hurtz & Donovan, 2000); nevertheless, little research has been done on personality and team performance at the lower construct level (Bernstein et al., 2008), e.g. sub-dimensions of personality factors and teamwork competencies. Christiansen and Tett (2013) have argued that most research on this topic focuses on high-level criterion and sometimes a broad criterion can mask underlying relationships. For instance, a broad level predictor such as extraversion is composed by different lower level constructs (assertiveness or sociability – see Driskell et al. 2006) and in turn, teamwork performance has also different lower level constructs that can be related to each of these components of

extraversion. The main question is: what are the best predictors and the best criteria to study such relationship? Research on this topic should deconstruct high level criteria and/or predictors into low level criteria/predictors (e.g. Lepine & Van Dyne, on studying cooperation and voice behavior). Christiansen and Tett (2013) argue that it is useful to examine the effects of personality on work teams to expand criterion measures beyond simple performance outcome measures, since performance is important but the teamwork processes and competencies that lead to a high level performance are also parsimonious. Hurtz and Donovan (2000) have mentioned "there is potential for improving the validity of personality predictors and several dimensions of job performance". These authors also suggested that research should aim for narrower composites of personality (e.g. subdivision of the Big 5 theory). Furthermore, multiple criteria that distinguish task performance (e.g. relevant KSAs, team monitoring) from contextual performance (e.g. interpersonal relations, cooperation) should be researched because narrower aspects of performance can be theoretically and empirically linked to different personality criteria. Therefore, research on this field can further contribute to the understanding of how personality traits affect teamwork competencies. Different personality characteristics of team members may have differential effects on the behaviors considered effective for team performance (Christian & Tett, 2013; Driskell. et al., 2006). For example, a team member who is highly conscientious might be quite good at task management and planning, nevertheless that person might not be good at having quality interpersonal relationships with other peers, for which another personality trait might be important.

Firstly, in order to understand how personality affects teamwork competencies, one should have in mind the main teamwork models, which reflect in several teamwork competencies. Secondly one should choose a personality model that can be used to study the relationship between several predictors and criteria. The next sections will give a general overview regarding teamwork theory and concepts, followed by the chosen model of personality. Furthermore one should be able to measure the teamwork competencies being predicted and for that a newly developed instrument in the literature by Ohland and colleagues (2012), (CATME) has been used.

2.Theoretical overview

2.1 Teams and individual teamwork competencies

What is a team? There are several of definitions concerning this object of study, in different categories such as sport groups, social groups, etcetera. In the workplace, a team is a group of people who dynamically interact to perform vital organizational tasks, restrained by organizational contexts in which there is some degree of interdependence between the individuals that compose teams (Dyer, 1984; Kozlowski & Bell, 2003:334). Teams face different demands (Mathieu, Maynard & Rapp, 2009) and strive to achieve certain goals. In order to function properly, a team requires interaction among its members, therefore teamwork can be described as the dynamic enactment of process mechanisms (interaction between members), which inhibits and/or contributes to team performance (Salas, Stagl, Burke& Goodwin, 2007: 190), in order to deliver superior performance trough the combination of individual efforts.

Designing work around independent or semi-independent teams is essential for organizational effectiveness, being an indispensable part of organizational life (Cascio, 1995; Hackman, 1990). Therefore, teamwork is a common need in organizations. In this context, researchers have developed the concept of emergent proprieties that results from the interaction of the components of the system from which these emergent properties come from (Salas et al, 2009). These emergent properties will not arise if one tends to look at the elements of the system in isolation (namely, individuals, inputs and outputs). Thus, the view on this matter should be holistic, highlighting the fact that "the whole is greater/different from the sum of its parts". Therefore effective teams should be able to synergistically combine the different characteristics of its team members, producing outcomes beyond the capacity of an individual member or the isolated individual contribution of each team member (Salas et. al, 2009). The former authors developed the following expression: "wisdom of collectivities" – which stands for the increased capacity to deliver superior performance based on the different interactions among team members (Salas et all, 2009). This expression encompasses the core meaning on why teams are so important in organizational settings.

Nowadays, for instance, organizations benefit from employee-assessment systems based on work competencies, which are more dynamic, flexible, and generalizable than context-dependent functional skills (Schippmann et al., 2000). There are competencies at the team level, and at the individual level, adaptable to each business needs. In general, competencies are expressed in behaviors that reflect how individuals perform successfully in a variety of circumstances. Furthermore so as to capture skills that are transferable and more indicative of work activity in contemporary organizations (Consiglio et al., 2013), to be effective in a team and delivering superior performance. In the context of working in a team there are specific competencies, which are named team competencies. Team competencies are divided in two categories: taskwork or teamwork (Morgan et al., 1986). Taskwork competencies refer to the knowledge skills and abilities (KSA's) used to accomplish individual task performance, which do not require interdependent interaction within the team. On the other hand there are teamwork competencies, which are required for members to function within an interdependent team. Overall, members should not only possess individual technical knowledge regarding their tasks, but they must also have proficiency on the social dynamics of teamwork. Another concept that is relevant to understand is teamwork performance, because teamwork performance reflects the enactment of teamwork competencies. Therefore teamwork performance is the sum of teamwork social processes and individual task work performance (Kozlowski & Klein, 2000) and it is divided into two smaller categories – *performance behaviors*, which are actions relevant to achieving goals, reflected by certain team competencies and *performance outcomes* which are the consequences of these behaviors in team setup (Mathieu et al., 2009). Performance behaviors are researched in order to understand how people behave within a certain context, within a team, with certain dynamics at different levels. To sum up, both taskwork and teamwork competencies reflect performance behaviors that in turn are followed up by performance outcomes.

The following section will give a general overview of several well-known models in this field in order to further understand team dynamics and more specifically, how individual apply different teamwork competencies in different models.

2.1.2 Teamwork models

Different models of teamwork have been developed over years of research in order to organize and understand team inputs, processes, dynamics and outputs. Some models are more generalist, adaptable to a different range of teams, tasks, and contexts of people, tasks, technologies and settings (Ilgen et al., 2005; Salas, 2009), while others focus on teamwork behaviors from a situational perspective.

In order to analyze team functioning, one should have a framework in mind. Many of these models are used to study which factors and processes make teams more and less efficient, among other topics of research. Therefore, the following models encompass the main existing frameworks to study teams, in different competencies. Further on, since individuals compose teams, more relevance will be given to the teamwork competencies of individuals. Christiansen and Tett (2013) mention that most research on studying teams and their predictors focuses on sole teamwork performance, but they point for a new set of research that focuses on subdivisions of teamwork competencies, therefore it is important to understand teamwork concepts and competencies, within each of the following models.

a) The five teamwork competencies (Big 5 in teamwork)

This model proposes five main teamwork competencies (at the team level) and was developed by Salas and colleagues in 2005.

The first category is team leadership, which in this model is defined by "social problem solving that promotes coordinated, adaptive team performance by facilitating goal definition and attainment". The authors of this model believe that to respond to increasingly complex task environments team members have to alternate their leadership function in order to take advantage of team member strengths (e.g. knowledge, skills attitudes, contacts, perspectives) – in other words, adopt a *shared leadership***.** New research has shown that shared leadership in more effective than traditional leadership structures.

The second category is adaptability, which is defined by "the team's ability to change team performance processes in response to cues from the environment in a manner that results in functional team outcomes (Burke et. al, 2006)". This is

especially essential for teams working in constant by changing dynamic environments.

The third component is *mutual performance monitoring*, which according to Salas (1995) is the ability to keep track of other team members' work whilst performing their own job, making sure that everything is being followed as expected. Teams should have a culture in which this monitoring is well accepted, in terms of mutual performance monitoring in order to increase the levels of performance. Mutual performance monitoring is a pre requisite for supporting behaviors.

The fourth component is named *supporting/backing up behavior*, which consists in helping teammates in performing their tasks when there is a workload distribution problem in the team. This leads to a back up behavior from the teammembers (Porter et al., 2003). In other words, teammates help each other when there is to much work concentrated in one or more persons in the team. This backup behavior can either be either verbal or physical.

The fifth component is the *individual orientation for teamwork*. Essentially it is an individuals' preference for working within a team (where an individual takes advantage of team member inputs) versus working in isolation. Team orientation is essential for effective teamwork. For instance, individuals tend to focus on their individual work when they are under stress, leading to overall team performance loss. An individual who doesn't have team orientation will compromise the overall performance of the team.

These five components generate three coordinating mechanisms that facilitate communication and the teamwork process. The first coordinating mechanism is shared mental models – "organized mental structures that facilitate execution of interdependent team processes" (Klimoski & Mohammed, 1994). At the team level a mental model is a knowledge framework that is partially shared and distributed among a team, which leads team members to interpret information in a compatible manner among team members, facilitating effective coordination (Salas et al., 2009). The second mechanism is closed loop communication. Teams must acquire information from the environment and distribute that information internally to perform actions (MacMillan, Entin & Serfaty, 2004). Trough communication teams translate individual understanding into team dynamic representations, which will lead to a certain action, for a certain team outcome (Cooke, Salas, Kiekel & Bell, 2004). The third mechanism is mutual trust, which stands for a shared perception that

individuals in the team will protect team interests and will perform expected actions for the welfare of the team (Webber, 2002, p205).

b) The IPO and the IMOI frameworks

The IPO model (Input, process, output) model represents teamwork trough relationships between input variables (individual and team characteristics, task characteristics, context characteristics), process variables (members' interactions, mutual performance monitoring, communication, coordination, conflict, leadership) and outcome variables (performance outcomes, productivity and satisfaction) (Ilgen et al., 2005; Mathieu et al., 2009). This model originated from the classic team literature by McGrath (1964), in order to study team effectiveness (Mathieu et al., 2009). Although this model is very much used, it has been criticized with several aspects.

The first critic to the IPO framework is that it restrains research into a linear cycle, from inputs to outputs, not having in account any feedback loops, which would lead to a new teamwork cycle. Nowadays outputs such as performance are treated as inputs for future team processes (Ilgen et al., 2005). Furthermore, one has to define periods of time in order to frame the level of analysis of team performance episodes, according to the goals of the team and the team's progress towards accomplishing them. Therefore performance episodes are "distinguishable periods of time over which performance accrues and feedback is given" (Marks et al., 2001). The IPO framework doesn't take this in account since teams can have different goals at the same time (which usually overlap). This definition of timeframe analysis is not explicit in this model. Mark and colleagues suggested that the IPO cycle should be associated with performance episodes in order to clarify and better understand teamwork (Salas et al., 2009).

The second main critic is that, over time, teams develop and the IPO model doesn't take this perspective into consideration (Salas et al., 2009). With time there are changes in team members, projects, technology and the organizational context changes; moreover one has to take in account the group structure and behaviors over time and context (McGrath et al., 2000; Salas et al., 2009). Teams and their members continuously change, interacting with themselves and with other people, making teams complex, adaptive and dynamic systems, with multiple forms and levels of

causality operating simultaneously (McGrath et al., 2000). A third critic is that within teams, there are emergent states (ES) that develop over a life of a team and impact team outcomes (Ilgen et al., 2005). Emergent states encompass cognitive, emotional or affective states (Mathieu et al., 2009). Moreover these ES are not processes. As mentioned, there are causal and more complex interactions among the different phases of the model. Having said this, the linearity of the model doesn't take this complexity in consideration (Ilgen et al., 2005). The IPO model has been widely used and accepted by researchers. It has served as a base to study and understand teams, and to gather knowledge on how teams deliver superior performance. Other models added different constructs to this model enhancing the way researchers look at team complexity.

McGrath and colleagues (2000) have developed a framework to look into team inputs in different levels. The authors describe three levels of dynamic causal reciprocal interactions: the first one is local dynamics that comprise each member's input of resources and taskwork. Then these dynamics originate group/global level dynamics, which are the norms of the surrounding system, justice climate, cohesion, status structures, group identity, conflict, leadership, that naturally emerge (emergent structures-ES), that affect the first level of local dynamics. The third level is the contextual dynamics that shape the group over time, varying according to the given organizational support, demand for group outputs and other intrinsic factors to the model, for instance. This model also affirms that teams aren't static and cyclically advance through new inputs through different levels of teamwork that interact and influence each other (Kozlowski et al., 2000).

In order to better represent reality, using the IPO model framework, Ilgen and colleagues (2005) have used recent team development theory, introducing a timeframe notion into the model, together with a behavioral categorization scheme of the ABC (Attitudes, Behaviors and Cognitions) of teamwork competencies to build up a new analysis framework (Input-Mediator-Output-Input - IMOI). One of the main goals of this model was also to address the critics that were firstly mentioned in the original IPO model. The last I in the name of the model represents the episodic performance, cyclical nature of the model in which the outputs revert into new inputs, for instance, which answers to the first critic.

The ABC teamwork competencies are discussed within each of the three phases of the team development theory, which has three phases: Forming stage,

Functioning Stage and Finishing stage (Ilgen et al., 2005). These stages made the base of creation for the IMOI model. The M (mediators) within the model comprises processes (members' actions) and emergent States (ES). This framework brings a deepened insight, a different analytic perspective compared to the IPO traditional framework, combining an exhaustive list of constructs that enhance the existing models, bringing them closer to reality, since team mechanics are still quite complex to understand.

2.1.3 Teamwork competencies – the ABC framework

It is essential to understand and identify what team competencies are required for effective teamwork in certain setups, in order to properly design team tasks, training, performance appraisal and selection, since that competencies influence all the Human Resources systems within a company. This is why it is important to differentiate taskwork and teamwork competencies. Each of these team competencies will belong to one of these three categories: attitudes (A), a behavior (B), or cognition (C). For a full description of each competency see Salas and colleagues in 2009.

Attitudes are emotional attributes necessary for effective team performance (Salas et al., 2009). Cannon-Bowers and colleagues (1995) defines attitude as "an internal state that influences an individual's choices or decisions to act in a certain way under particular circumstances". Many of the following relevant definitions received empirical support over time, and many teamwork models have developed from this knowledge.

Table 1-Teamwork Attitudes

Teamwork Attitudes	Definition	Source
Team/collective orientation	"A preference for working with others and the tendency to enhance individual performance through the coordination, evaluation and utilization of task inputs from other group members while performing group tasks"	Salas,Guthrie,Wilson,Priest &Butke (2005)
Team cohesion	"The degree to which team members exhibit interpersonal attraction, group pride and commitment of the task"	Beal, Cohen, Burke & McLendon (2003)
Mutual trust	"The shared belief that team members will perform their roles and protect the interests of their teammates"	Aubert & Kelsey (2003)

Team empowerment	"Team members collective belief that they have the authority to control their proximal work environment and are responsible for their team's functioning"	Mathieu, Gilson & Ruddy (2006)
Team conscientiousness/ Team goal commitment	"The degree to which team members feel an attachment to the team level goal and the degree to which they are determined to reach this goal"	Aubé & Rousseau (2005)

Behaviors have been coded by many researchers and have more empirical support than attitudes or cognitions because they are easier to measure. Behaviors are the competencies in action, which are needed for teamwork (Salas et al., 2009). The following behavioral competencies are considered relevant for the topic in discussion:

Table 2-Teamwork behaviors

Teamwork Behaviors	Definition	Source
Mutual performance monitoring	"The ability of team members to keep track of fellow team members' work while carrying out their own, to ensure that everything is running as expected."	McIntre & Salas (1995)
Adaptability	"Ability to adjust strategies based on information gathered from the environment through the use of behavior and relocation of intra-team resources, altering a course of action or team repertoire in response to changing conditions." (internal or external)	Salas, Sims & Burke (2005)
Backup/supportive behavior	"Ability to anticipate other team member's needs through accurate knowledge about their responsibilities. This includes the ability to shift workload among members to achieve balance during high periods of workload or pressure "	Salas,Sims & Burke, (2005)
Shared distributed leadership	"The transference of leadership function among team members in order to take advantage of member strengths (e.g., knowledge, skills, attitudes, perspectives, contacts and time available) as dictated by either environmental demands or the development stage of the team"	Burke, Fiore & Salas (2004)

Closed-loop communication/infor-mation exchange	"A pattern of communication characterized by (1) a message being initiated by the sender, (2) the message being received, interpreted and acknowledged by the intended receiver, and (3) a follow-up by the sender ensuring that the message was received and appropriately interpreted."	McIntyre & Salas (1995) Bowers,Jentsch,Salas & Braun
Problem solving	"The process of (1) identyfing and representing a discrepancy between the present and desired state of the environment and (2) discovering a means to close this "gap" – accessing to internal teammember expertise"	Bonner (2004) Jordan & Troth (2004)
Motivation of others	"Generating and maintaining goal directed effort toward completion of the team's mission"	Fleishman & Zaccaro (1992)
Conflict management	"Preemptive conflict management involves establishing conditions to prevent, control or guide team conflict before it occurs. Reactive conflict management involves working through task and interpersonal disagreements among team members	Marks, Mathieu & Zaccaro (2001)
Intra-team feedback	"The provision of information about team or individual performance either before, during, or after a performance episode"	Inzana, Driskell,Salas & Jonhnston (1996)
Task-related assertiveness	"The capacity to effectively communicate in interpersonal encounters by sharing ideas clearly and directly"	Pearsall & Ellis, (2006)
Coordination	"The process of orchestrating the sequence and timing of interdependent actions"	Marks, Mathieu & Zaccaro (2001)
Team leadership	"Ability to direct and coordinate the activities of other team performance, assign tasks, develop team knowledge, skills and abilities, motivate team members, plan and organize and establish a positive atmosphere"	Salas, Sims, & Burke (2005)
Planning	"The generation of a proposed sequence of actions intended to accomplish a set goal"	Klein & Miller (1999)

Cognitions are the necessary elements of knowledge and experience necessary for effective teamwork. In team settings cognitions have their theoretical base in the shared mental models theory, in which teams have to have a "shared understanding of the situation, the nature of the problem, the cause of the problem (Salas et al, 2009) with a high degree of conscientiousness. The relevant teamwork cognitions that were considered are the following.

Table 3-Teamwork cognitions

Teamwork Cognitions	Definition	Source
Accurate problem models	"Shared understanding of the situation, the nature of the problem, the cause of the problem, the meaning of available cues, what is likely to happen, with or without acting with the team members, shared understanding of the goal or desired outcome, and a shared understanding of the solution strategy"	Orasanu (1994)
Accurate and shared models (transactive memory and team situational awareness)	"An organized knowledge structure of the relationships among the task the team is engaged in and how the team members will interact"	Salas, Sims & Burke (2005)
Team mission, Objectives, Norms, resources	"An understanding of the purpose, vision and means available to the team for reaching the team objectives and completing the mission as well as the "shared expectations that constrain and drive the action of group members".	Graham (2003). Cannon-Bowers & Salas (1997)

2.2 Measuring teamwork competencies

In order to study teamwork competencies, one has to measure them. The main tool used measure teamwork competency is self and peer evaluation (Rhee, Basu, Parent, 2013). In team assessment, the required team competencies, knowledge, skills and abilities (KSAs) are different from individual ones (Morgeson et al., 2005). Therefore the unique set of skills for teamwork should be analyzed and evaluated (Ohland, Loughry, Woehr, Bullard, Felder, Finelli, Layton, Pomeranz and Schmucker, 2012).

Nowadays, companies desire individuals that have highly developed interpersonal and teamwork skills (Alsop, 2002). Thus, by using rating systems one can understand how peers and individuals perceive teamwork competencies. Although there are many benefits in using peer and self-evaluations, there are several biases that might occur, leading ratings away from their true values. Errors such as leniency and strictness (Inderrieden et al., 2004) are one type of these biases that may occur. Moreover, individuals who have low teamwork skills might overestimate their team skills, not being able to accurately evaluate a teammember (Jassawalla et al., 2009) and team members worry that accurate evaluations might imperil group cohesion (Saavedra & Kwun, 1993). Raters also tend to compare team members to each other rather than using objective evaluation criteria (Saavedra & Kwun, 1993). There are several peer-evaluation systems and tools, yet none of them has gained widespread attention. Nevertheless it is crucial to have a well-designed peer-evaluation instrument that can teach which teammember behaviors are important (Young & Henquinet, 2000).

2.2.1 The CATME instrument

Loughry and colleagues (2007) developed a self/peer evaluation tool (CATME-Comprehensive assessment of team member effectiveness), based on research, for use in college classes. The developers of this tool have researched teamwork literature and applied statistical methods to empirically support their work, finally creating a summarized tool. The authors firstly generated a plethora of potential items based on teamwork and peer evaluation literatures. Additionally they obtained peer evauation forms that professors used to evaluate group projects. Other forms developed by five groups of MBA students where also considered and added,

resulting in a initial pool of 392 items that reflect different types of teamwork behaviors. Then, post doctoral, graduate students and five colleague seniors categorized the behaviors and ranked them from best to worst behavior in each category, which lead to 36 categories. After this, the authors refined their categories with teamwork and peer evaluation experts and the final result was 218 items measuring 36 categories. Finally the authors conducted two studies in order to extract the main factors out of these categories, aiming to refine the measurement instrument.

In this final instrument, the following five teamwork competencies are:

1. *Contributing to the team's work*: encompasses several behaviors such as individual contributions that improve the quality of the work, helping teammates who are having difficulties, delivering assignments on time;
2. *Interacting with teammates*: comprising several behaviors such as active listening towards other colleagues, asking and showing interest towards other colleagues ideas, provides encouragement and enthusiasm to the team;
3. *Keeping the team on track*: which is reflected in monitoring the team's progress, providing constructive feedback, knowing what each team member is doing and notices problem;
4. *Expecting Quality*: this is the competency that defines individuals that motivate the team to do excellent work, strongly believing that the team can do excellent work;
5. *Having Relevant Knowledge, Skills and Abilities (KSAs*): comprising several behaviors in which individuals are expected to demonstrate the KSAs to do excellent work, not minding to acquire new skills for the benefit of the team, being able to perform any role in the team if necessary.

This instrument is condensed, easy to understand and practical, in opposition to other measurement tool in which the number of items to rate may cause hindrance to its frequent use. Another challenge is that raters might have different preconceptions of the different five levels in each of the teamwork competencies in the CATME instrument. The different levels in each competency (one to five), anchored by certain behaviors, diminish the subjectivity of the evaluation. Therefore, each of the five levels corresponds to certain expected behaviors (from poor to good performance). This is one of the main advantages of the BARS scales. The authors have applied a behaviorally anchored rating scale (BARS), by providing certain behaviors that

exemplify what rating should be given in case that a team member displays such behavior, which reduces subjectivity. The scales provide descriptions of behaviors that people at various levels of performance would typically display (Ohland et al., 2012). Furthermore the BARS instrument was introduced into the CATME tool in order to measure the five categories of team member contributions identified by the research, which reduced the number of ratings (e.g. from 132 decisions per rater - 4 member team - to 20 with a BAR instrument since the behaviors are condensed in 5 levels). The BARS instrument also adds greater inter-rater reliability and less leniency error (Campbell et al., 1973; Ohland, Layton, Loughry & Yuhasz, 2005). Additionally, team members learn about which performance behaviors are associated with a good or a bad performance.

Overall, this is a good instrument to access teamwork competencies; it is practical and consistent with teamwork literature. The following section shows different connections between this tool and the previous mentioned teamwork models, which also served as theoretical background for the development of the CATME.

2.2.2 The CATME instrument and teamwork theory

Driskell and colleagues (2006) have defined several teamwork competencies that can be predictive of certain teamwork behaviors. The relevant teamwork behaviors for this literature review are: performance monitoring and feedback (keeping the team on track), Communication and Interpersonal relations (interaction with teammates). Performance monitoring and feedback encompasses behaviors such as monitoring other team members contributions as well as monitoring team progress, identifying errors, providing feedback, giving advice for performance improvement (Driskell et al., 2006). Communication is the efficient exchange of information, ideas in a clear and timely manner. Interpersonal relations focus on conflict management, encouragement of cooperative behavior, and building team morale.

Due to the solid teamwork theory behind its construction, this instrument is very useful for teamwork competencies assessment. Therefore, the following table summarizes several concepts which are present within each teamwork theories, models and competencies that were previously presented, crossing different teamwork concepts with each of the five competencies. These conceptual overlaps recapitulate the relevance of this instrument in order to measure teamwork competencies (table 4).

Table 4 - CATME and Teamwork theory

CATME tool	*ABC Competencies*	*IMOI*	*Big 5 in teamwork*
Contributing to team work	-Backup/supportive behavior	-Adaptability -Back up behaviors	-Backup behaviors
Interacting with team members	-Team/collective orientation -Team cohesion -Team empowerment -Conflict management -Closed-loop communication	-Communication -Bonding-with others -Structuring -Conflict management	-Closed loop communication
Keeping team on track	-Team goal commitment -Team conscientiousness -Mutual performance monitoring -Task related assertiveness -Intra-team feedback	-Shared mental models -Transactive memory -Learning	-Mutual performance monitoring -Shared mental models
Expecting quality	-	-	-
Having relevant (KSAs)	-Problem detection -Shared distributed leadership -Planning	-Managing diversity of membership -Planning	-Team leadership -Adaptability

3.The five-factor model in personality

In order to deepen the understanding of personality, researchers have used several theories to access and measure different personality traits. In general, traits are defined as "enduring dispositions that can be inferred from patterns of behavior, (…) being stable across long periods of time and be similarly assessed by different observers" (McCrae & Jonh, 1992). These authors have searched for the basic dimensions of personality in order to answer to the following research question "What are the basic dimensions of personality (…) in which individuals differ in their enduring emotional, interpersonal, experiential, attitudinal and motivational styles?" Personality structure traits are the patterns of co-variation among the sub-categories within each major personality category, thus traits that co-vary will belong to the same higher hierarchical level of personality. Thus these traits are usually summarized in small factors that are described in five basic dimensions of personality (McCrae & Jonh, 1992). Furthermore, these dimensions are found in other personality traits as well in questionnaires created to operationalize a variety of personality structures (McCrae & Jonh, 1992). One of the most well accepted models that contributes for the link of personality with other research areas is the "Personality Big 5 or Five Factor model (FFM)" by Robert R. McCrae and Paul T. Costa, Jr. T, which is based upon extensive, systematic and rigorous empirical work. This model is used for individual assessment, being an organization of personality traits in terms of five basic dimensions:

- Extraversion (E) – indicates that the person is tendentiously outgoing, social, lively
- Agreeableness (A) – indicate individuals that are sympathetic, warm, gentle, trustful;
- Conscientiousness (C) – indicates that the person is organized, dependable, dutiful, persistent and motivated by goal directed behaviors.
- Emotional stability (opposed to neuroticism-N) (ES)– refers to the person as able to control stress, anxiety and depression;
- Openness to experience (O) – refers that to the person as adventurous, original, complex minded and creative.

Through empirical research, McCrae & Costa have found that all five factors regularly emerged even when measured with different instruments in different countries and ages (McCrae, Oliver; 1992). The FFM can provide a standardized language for psychologists with diverse backgrounds, transcending national languages (McCrae & Costa, 1997), being an efficient model in research organization and a guide for the assessment of individuals in different fields of knowledge (educational, organizational, and psychological). It is important to state that the five factors do not exhaust the description of personality; they only represent the highest hierarchical level of trait description. Each of the factors aggregates groups of traits that co-vary, but are not necessarily interchangeable, because each personality trait is unique in its definition. The five-factor model has gained wide acceptance in the scientific community and so far these 5 dimensions are used with both theoretical and empirical support (McCrae, Oliver; 1992). To summarize, the main pros of this model can be described in three topics: (McCrae, Oliver; 1992):

- It integrates a plethora of personality constructs, easing the communication process among researchers of many different orientations;
- It is comprehensive which can serve to build bridges of investigation between personality and other phenomena, such as individual teamwork competencies. Without this characteristic, studies using personality traits as predictors are inconclusive, because the most relevant traits may be disregarded, which is unlikely to happen when measures of all five factors are included in a study.
- To conclude, it is efficient, since personality is summarized in five representative factors.

3.1. Personality as a predictor of individual competencies in context of a team

The main research question behind this title is: What are the traits that define a good team player? Several authors such as Kozlowski, Salas and Cannon have dug into this question with several different frameworks and perspectives and concluded that each individual possesses specific characteristics (e.g. personal traits, expertise, competencies) that contribute to the team. Therefore the main goal of these researchers is to define traits and other factors that define a team player, for instance, personality traits that predict individual teamwork behaviors. To conclude, one can affirm that several correlations are to take place between core teamwork dimensions the correspondent personality predictors (Driskell et al., 2006).

To effectively study how personality traits (e.g. Big5) predict a certain teamwork behavior, many authors and theorists propose high-order factors, which are more inclusive, easy to empirically apply or lower level facets, which are more specific within personality constructs and can usually offer greater predictive validity (Stewart, 1999). Driskell and colleagues (2006) have made a review of personality traits, within the big five factors perspective, predicting different teamwork competencies. According to these authors extraversion and agreeableness predict communicating and interpersonal teamwork dimensions, whilst conscientiousness predicts performance monitoring and feedback.

An empirical study that focused on personality predictors of teamwork behaviors showed that all big five factors successfully predicted efficient teamwork (Bernstein, Radosevich, Clesca, Masco, 2008), although teamwork behaviors were not clearly defined and grouped in categories. The 465 business students that participated in this study were asked to rate themselves in several measures. Lepine & Van Dyne (2001) have conducted research on 288 business students, linking personality traits with cooperative and voice behaviors, having reached several positive correlations. Tasa and colleagues (2010) have also conducted research on university settings on predicting interpersonal and performance management behaviors managing to reach several positive correlations as well. Most of the studies performed took place in university settings. Morgenson and colleagues (2005) have predicted contextual performance and teamwork knowledge using personality traits. They have conducted research in organizational settings with several employees from different departments.

As mentioned before, all the above-mentioned studies focus on personality as predictors of teamwork behaviors. Nevertheless there are still not that many studies that encompass teamwork behaviors as main dependable variable. Usually the main focus falls under the category of performance as a whole and not in lower level categories as performance. Lepine and Van Dyne (2001) for instance, have associated done their contribution on predicting cooperation and voice behavior and others studies are required to study teamwork competencies at a lower construct level. This study contributes to this line of thought when several teamwork behaviors are studied more specifically, although each teamwork category (from CATME) is broad, there is a degree of association among each behaviors within the instrument. Another benefit of this study is the empirical application of the CATME instrument, which might be beneficial for teamwork in different organizations, as this is a reliable tool able to assess relevant work behaviors (competencies) related to personality traits, tapping different aspects of teamwork. This recently developed competency based instrument was tested in students but it is plausible to use it in organizational settings, across different jobs (clerks, professionals, consultants), across private and public organizations and different raters (Consiglio et al., 2013). Furthermore, it is possible that this instrument might be used in performance appraisal systems (which can also be integrated with other HR processes) in order to evaluate teamwork in different occupational roles, in which the BARS instrument contributes to reduce evaluation errors, since the scales are operationalized at the behavioral level. This thesis also contributes for the dissemination of this instrument, among the scientific community, by successfully predicting meaningful competencies through personality traits. There are many teamwork competencies, models and measures for teamwork performance, however there is not one instrument that is widely accepted and standardized and consistent across different studies, regarding personality traits as predictors of teamwork competencies. Moreover, many investigators have made research on personality predictors and criteria either on the individual level or at the group level in isolation rather than at both levels (Neumann and Wright, 1999). Firstly it has been convincingly shown that predictor –criterion relationships may differ when examined at the individual level (Neumann and Wright, 1999), although group scores are an aggregation of individual results. Nevertheless, when one level/perspective is examined in solation it is not possible to compare the relationship between predictors and criteria at different levels, which is crucial to understand if the processes and

dynamics between predictors and criteria are the same or different levels (Rousseau, 1985). Although the focus of this study is only at the individual level, across the following literature review, many authors adopt two different perspectives to study different predictor-criteria research, making a distinction between self and peer ratings. However, this twofolded perspective is not consistent across research, in other words self-ratings and peer ratings are not usually studied simultaneously. From Rousseau's (1985) point of view we can affirm that to compare and analyze different predictor- criteria relationship one must analyze different perspectives, namely from the self and peer point of view. This study helps in doing so even if only at the individual level, by studying predictor-criteria relationships from both the individual and peer point of view. Therefore in this empirical section each hypothesis will have two different perspectives: either "rated by self" or "rated by peers". This will allow one to see if there are differences on the perception of oneself, regarding how one perceives himself in a certain teamwork competency and how other group members perceive an individual in the same competency. All of this being predicted on the perception of oneself personality, which comprises the independent variable.

The following sections explain and illustrate the relationship between the different factors and the teamwork competencies that are found in the CATME instrument. Hypotheses are posited.

3.1.1 Extraversion

One personality characteristic that is relevant in team settings is extraversion. Extraverted individuals are more likely to have a desire to work with others, therefore preferring to work in a group (Barrick et al.1998), being more confident in their ability to work within a team structure (Thoms, Moore & Scott, 1996). Since extroverted individuals are described as sociable, assertive, talkative and active (Digman, 1990), having enhanced social skills (McCrae & Costa, 1999), they are more likely to better communicate within the team (Morgenson et al., 2005). They will be less inhibited in speaking and more comfortable and skilled in communicating their thoughts, new suggestions and ideas, that will contribute to team improvement. Indeed, it has been empirically shown/supported by Lepine & Van Dyne (2001) that extraverts are more willing to express opinions, therefore contributing to the team development through new suggestions. Another empirical study confirms that extraverts usually take leading roles in some aspects of the team projects (Rhee et al.,

2013), enacting effective communication in this role. Driskell and colleagues (2006) also argued that extraversion predicts communication and interpersonal teamwork dimensions. Morgenson and colleagues (2005) empirically showed that teamwork knowledge (that in their study encompassed interpersonal elements such as collaborative problem solving, communication and self management KSAs such as task coordination and goal setting) was correlated with social skills, which in turn were related to extraversion. Extraversion contains elements of positive affectivity, which is an overall sense of well-being and tendency to experience positive emotional states (Morgenson et al., 2005), contributing to positive interactions among team members. Additionally, all these extraversion traits promote positive and cooperative interactions with others in the course of reaching team goals (LePine & Van Dyne, 2001). The study on university teams by Rhee and colleagues (2013) has shown that extroverts usually complete their share of work and deliver their work when it is expected, having in mind the self-rating outcomes. The authors have also found a positive correlation between extraversion and team encouragement on project completion, in other words, extraversion as a predictor of the competency keeping the team on track, according to the CATME framework. This is a conclusion provided by Rhee and colleagues (2013), although Driskell and colleagues (2006) mention that this teamwork dimension is weak and empirically unsupported (being predicted by extraversion). All these facets of extraversion are reflected in a high evaluation on the competency of interaction with teammates and contributing to the team, as they are more likely to show cooperative behaviors (LePine & Van Dyne, 2001).

The following list summarizes further empirical evidence regarding the factor of extraversion, corresponding teamwork competencies, the raters and respective authors of the studies:

Teamwork competency	Raters	Source
Sociability (Interaction with the teammates)	Self ratings Peer ratings	Anhalt (1995)
Altruism, helping behaviors, cooperating (Contributing to team)	Self ratings Peer ratings	Organ and Ryan (1995)
Communication, sociability (Interaction with teammates)	Independent raters	Juhász (2010)

Having in account the theoretical and empirical evidence presented, the following hypothesis are posited:

H1: Extraversion is positively correlated with the competence "contributing to the team competency" as evaluated by a) the self and b) peers

H2: Extraversion is positively correlated with the competence "interacting with teammates" as evaluated by a) the self and b) peers

H3: Extraversion is positively correlated with the competence "keeping the team on track" as evaluated by a) the self and b) peers

3.1.2 Agreeableness

In team settings agreeableness reflects traits such as selflessness, cooperativeness, helpfulness and flexibility (Digman, 1990). According to McCrae and Costa, agreeableness represents several personality traits such as: trust (attributing benevolent intentions to others), tendency to be frank and straightforward with people, altruistic, compliancy and tender-mindedness (Neumann and Wright, 1999). Furthermore, Neumann and Wright (1999) found a correlation between individuals' agreeableness and peer interaction with teammates, as evaluated by the peers. It is worth to mention that since peer ratings were aggregated, the authors had to measure the interrater agreement, which was quite homogeneous, as an indicator of perception convergence within the group. In the same research, extraversion was positively correlated with agreeableness. Driskell and colleagues (2006) also argued that agreeableness predicted communication and interpersonal teamwork dimensions.

In team settings, collaboration is required and agreeable individuals are more likely to cooperatively work with others, opposed to competitively work with others (verified by two external coders) (Lepine & Van Dyne, 2001), partially because agreeable individuals are viewed as helpful and non-threatening (Neumann & Wright, 1999). Empirical evidence exists proving that agreeableness predicts job performance and different personality traits within the agreeableness factor are desirable for teamwork (Rose et al., 1994), (e.g. trust, tender-mindedness) (Neumann & Wright, 1999). Not surprisingly, it has been researched that agreeableness was

negatively correlated to efforts to excessively dominate group discussions (Rhee et al., 2013). Additionally the latter authors found out that agreeableness was higher in individuals that encouraged the group to complete the project in a timely basis, when rated by peers and when individuals were rating themselves. Thus, this behavior indicates that agreeable individuals are more likely to have a high score in "Keeping the team on track", although Driskell and colleagues (2006) mention that only one facet of agreeableness, trust, has a positive correlation with team monitoring, the other facet, cooperation has a weak empirical correlation. Nevertheless this should be tested in different setups in order to better understand this relationship.

Agreeable individuals are better able to resolve conflicts, facilitating their resolution when they arise (Barrick et al., 1998; Neumann & Wright, 1999), suggesting that conflict resolution might be a teamwork competency related to agreeableness. Moreover, Rhee and colleagues (2013) found out that agreeableness is negatively correlated with conflict and group domination behaviors, which supports the latter suggestion. Furthermore, agreeable individuals will be more likeable because they are more sympathetic towards others and likely to help (Organ & Ryan, 1995). Summing up, agreeable individuals showing altruism and trust should have required interpersonal skills to relate to others (Neumann & Wright, 1999). As it has been demonstrated empirically, agreeable individuals tend to be involved in more teamwork, are more cooperative, having higher quality interpersonal interactions (Lepine & Van Dyne, 2001). The following list summarizes further empirical evidence regarding the factor of agreeableness, respective teamwork competencies, the raters and respective authors of the studies.

Teamwork competencies	Raters	Source
Altruism cooperation (Contributing to team)	Self ratings Other ratings	Organ and Ryan (1995)
Social cohesion (Interaction with teammates)	Other ratings	Stewart and Barrick (1998)
Social role (Interaction with teammates)	Peer ratings	Stewart, Barrick and Fulmer (2005)
Altruism (Contributing to team)	Self ratings	Kumar, Bakhshi, Ekta Rani (2009)

Interpersonal teamwork behaviors (Interacting with teammates)	Peer ratings	Tasa and colleagues (2010)

Having in account the theoretical and empirical evidence presented, the following hypothesis are formulated:

H4: Agreeableness is positively correlated with the competence "contributing to the team" as evaluated by a) the self and b) peers

H5: Agreeableness is positively correlated with the competence "interacting with teammates" as evaluated by a) the self and b) peers

H6: Agreeableness is positively correlated with the competence "keeping the team on track" as evaluated by a) the self and b) peers

3.1.3 Conscientiousness

Individual contributions are essential for the success of a team. The personality attributes of hardworking and dependability are reflected in individuals high in Conscientiousness (Costa & McCrae, 1988). Additionally, conscientious individuals tend to be dependable and feel responsible being more likely to contribute with constructive suggestions and ideas for improvement of the situation, therefore contributing to the team's success (Lepine & Van Dyne, 2001). Individuals that are hardworking, dependable and perseverant (conscientious individuals) are usually engaged in teamwork, fully participate in discussion meetings, deliver work when needed and make important contributions for the team to succeed (Morgenson et al., 2005, Rhee et al., 2013). These latter behaviors have been empirically demonstrated at the individual level with self ratings (Rhee et al., 2013). Due to all the above mentioned characteristics of conscientious individuals, one can say that they are expecting that the teams perform well since they are more likely to put their best in order to archive a good performance. They are more likely to believe that the team can cope with its responsibilities. Therefore it is coherent to theorize that the competence " expecting quality" will be positively correlated with conscientiousness.

Individuals that have a high score in conscientiousness are willing to perform any role within the team and learn new knowledge in order for the team to be

successful, regardless of their specific assigned role (Barrick et al.1998). In teams that have a high amount of workload sharing, this is an essential personal characteristic (Morgenson et al., 2005), which is reflected in an excellent rating in the competency of expressing relevant KSAs. Thus, individuals have to have the relevant KSAs to positively contribute to the team or have to be willing to learn new ones; this is especially true for disciplinary teams in which individuals are supposed to be specialized in their functional knowledge. This perspective has not been studied empirically but since conscientious individuals are hardworking and dependable, it is most likely that there is a significant correlation between conscientiousness and having KSAs.

When the work is interdependent requiring strong interpersonal relationships, conscientious individuals will engage in greater cooperative behaviors with others than those who have lower conscientiousness (LePine & Van Dyne, 2001), thus scoring high ratings in "*backing up*" behaviors. The authors provided empirical data that supports that conscientiousness is correlated with cooperation with teammembers, in this study the observed cooperative behaviors were coded by external raters. These "backing up" behaviors are reflected both in high contribution to the team, as well as the positive interaction with teammates (Mount et al., 1998), which is not completely supported both empirically and theoretically (Driskell et al., 2006). However, Rhee and colleagues (2013) provide empirical data that Conscientious individuals communicate ideas clearly and effectively, therefore contributing for a better communication (self rates).

Persons that have high values in conscientiousness are task focused and will be concerned with performing their required behaviors and accomplish team goals (Lepine, Hollenbeck, Ilgen & Hedlund, 1997), keeping the team on track in order to reach its goals. This has been empirically demonstrated by Rhee and colleagues (2013) on the following behavior: "Encouraged group to complete the project on a timely basis", regarding self rates. Conscientiousness is then predictive of team members who are concerned with completing task assignments on a scheduled and orderly manner (Neumann & Wright, 1999). The self-discipline, sense of dutifulness (adhere to obligations and duties that are held within the team) and dependability of conscientious individuals working within the team is likely to create a work team climate that fosters personal accountability and norms (Neumann & Wright, 1999; Barry &Stewart, 1997). Moreover, in their peer rated empirical study, Tasa and

colleagues (2010) have made a link between progress monitoring, team coordination and goal definition. These perspectives reinforce the possible correlation with the teamwork competency of keeping the team on track, which has already been supported, both empirically and theoretically by Driskell and colleagues (2006).

The following list summarizes further empirical evidence regarding the factor of conscientiousness, respective teamwork competencies, the raters and respective authors of the studies:

Teamwork competencies	Rating type	Source
Ambition (Contributing to the team)	Self ratings Peer ratings	Anhalt and Rebecca Lynn (1995)
Altruism, helping behaviors cooperating (Contributing to the team)	Self ratings Peer ratings	Organ and Ryan (1995)
Task oriented (Contributing to team)	Peer ratings	Stewart,Barrick and Fulmer (2005)
Altruism (Contributing to the team)	Self ratings	Kumar,Bakhshi, ,Ekta and Rani (2009)
Performance management (Keeping the team on track)	Peer ratings	Tasa and colleagues (2010)

Having in account the theoretical and empirical evidence presented, the following hypothesis are posited:

H7: Conscientiousness is positively correlated with the competency “contributing to the team” as evaluated by a) the self and b) peers

H8: Conscientiousness is positively correlated with the competency “ keeping the team on track” as evaluated by a) the self and b) peers

H9: Conscientiousness is positively correlated with the competency “expecting quality” as evaluated by a) the self and b) peers

H10: Conscientiousness is positively correlated with the competency “having relevant KSAs” as evaluated by a) the self and b) peers

3.1.4 Emotional Stability

In team research that is associated with personality, researchers use emotional stability as an opposite pole of neuroticism. Emotional Stability is the tendency to handle stress, maintain an even temperament and possess composure and self-confidence across most situations (Mount, Barrick, Laffitte & Callans, 1999). Individuals with low emotional stability are likely to experience negative affect (Digman, 1990). Research has shown that teams composed of individuals high in negative affect will develop negative work climates (Morgeson et al., 2005), as unstable individuals are more likely to express negative behaviors in team contexts (Lepine & Van Dyne, 2001), even if there is a single individual with negative affects. People who have low scores in Emotional Stability often express negative attitudes towards coworkers (LePine & Van Dyne, 2001) - this conclusion was empirically tested by these authors and verified by behavioral coding in which the raters where external to the team. All in all, it is reasonable to assume that those scoring low in emotional stability are not cooperative and have lowers quality interactions with others; this issue is translated in poor communication within the team and a negative contagion effect might occur. Lastly, individuals with low Emotional stability are less likely to be cooperative and helping, tending to have low quality interactions with others in the work setting (Lepine & Van Dyne, 2001), which results in less teamwork (Hough, 1992), thus less interaction with teammates. A recent study conducted in university settings found positive correlations between emotional stability and the contribution of useful ideas as well as the delivering of the expected work (Rhee et al., 2013), when individuals are rating themselves. Moreover, in their research, Lepine & Van Dyne (2001) found empirical data that supports that individuals that score high in emotional stability are more likely to be cooperative with teammembers, avoiding conflict. Additionally, individuals that have a low score in emotional stability are likely to be insecure and easily embarrassed, hesitating on suggesting and expressing their ideas, which is also consistent with previous research (Lepine & Van Dyne, 2001). This all suggest that low emotional stability is positively correlated with low levels of interaction with teammates, in other words, emotional stability is positively correlated with high ratings on the teamwork competency of interactions with teammates and contributing to the team's work.

The following list shows further empirical evidence regarding the factor of emotional stability, the raters and respective authors.

Teamwork competency	Rating type	Source
Social cohesion (Interacting with others)	Other ratings	Stewart, Barrick, (1998)

Having in account the theoretical and empirical evidence presented, the following hypothesis are posited:

H11: Emotional stability is positively correlated with the competency "contribution to the team" as evaluated by a) the self and b) peers

H12: Emotional stability is positively correlated with the competency "interacting with teammates" as evaluated by a) the self and b) peers

3.1.5. Openness to experience

Individuals who are open to experience are usually imaginative, curious, broad-minded imaginative, sensitive to aesthetics, independent thinkers, tolerant of ambiguity and intelligent (Barrick & Mount, 1991; Costa & McCrae, 1992). Those who possess this characteristic are usually willing to consider divergent opinions and different perspectives, always seeking to learn new things (Lepine & Van Dyne, 2001). These individuals promote change, challenge the status quo and innovate. According to these authors individuals that score high values in contentiousness are more likely to give their opinion, contributing with creative solutions to the team, engaging in voice behavior.

In research regarding personality factors as predictors of teamwork competencies and performance, openness to experience is not included because of the lack of previous research findings associated with this variable (Kline 1999b). Thus there is a lack of criterion-related validity of openness to experience that appears to be somewhat counter intuitive, after all, these individuals are readily to adapt to change and creatively solve complex problems. Thus, individuals that posses this personal characteristic would be likely the top performers in different settings

(Griffin & Hesket, 2004), since organizations needs individuals that are creative, provide innovative solutions an quickly adapt to the environment. Nevertheless the empirical link between openness to experience and team performance, especially with teamwork competencies is scarse or non-existing. Furthermore, Griffit &Hesket (2004) argue that openness to experience is the most controversial, least understood and least researched of the five factors.

Driskell and colleagues (2006), made a link between this factor and flexibility, mentioning that there are several positive relationships with this trait of openness to experience (flexibility) and all teamwork behaviors presented by these authors. Flexibility is advantageous in terms of interpersonal relations, as well as problem solving; therefore the capacity to adapt, learn new skills, change or adjust to different conditions is a universal effective task requirement (Driskell et al., 2006). One teamwork competency that could match flexibility would be adaptability (from teamwork Big 5 model), but this competency is out of the scope regarding the pool of teamwork competencies rated in the CATME instrument. Individuals that score high in openness to experience are curious and more likely to adapt to the environment even if it means to learn a new skill or perform a different task from what they are used to. Nevertheless this doesn't mean that individuals with this personal trait will have acquired the relevant knowledge to successfully perform a certain task, although it may be a trigger to do so.

Having in account the theoretical argumentation presented, the following hypothesis are posited:

H13: Openness to experience is positively correlated with the competency “having relevant KSA” as evaluated by a) the self and b) peers

H14: Openness to experience is positively correlated with the competency “contributing to the team” as evaluated by a) the self and b) peers

5. Empirical Study

The main goal of this thesis is to explore the relationship between personality factors and several teamwork competencies that were present in the CATME instrument. These teamwork competencies represent lower level constructs of individual performance in team settings. The analysis using both sources of evaluation (self and peer ratings) will certainly be interesting to study in order to see if there are differences between the self and peers perception of a teamwork competency, having in mind the self perceived values of personality. Furthermore, this study might give further relevance to the CATME tool if its competencies are successfully predicted by personality traits, which so far has never been done using this instrument.

5.1. Method

5.1.1 Sample

For the present study the participants were 135 students, 79 female and 56 males (see annex 8.1.1) enrolled in different courses (Marketing, Anthropology, Human Resources, Sociology and Economics) at the university at the master and undergraduate levels. The sample of students is from ISCTE, a university in Lisbon. Fifty-one students (30.5%) were enrolled in undergraduate degrees whilst 84 students (50.3%) in master degrees (see annex 8.1.1). The age ranged from 18 to 61 years old. Only 78 valid entries of the total 135 students, regarding age, were accounted, since a large percentage of students did not provide their age. Nevertheless 82,1% of the sample encompassed ages between 18 and 26 years old (see annex 8.1.2).

Participants were engaged in academic work and the only requirement for answering the questionnaire was that the rater should have completed a recent teamwork assignment. When answering the questionnaires (self and peer ratings) all the teammembers were to evaluate themselves and peers in that specific group assignment.

5.1.2 Procedure

Authorization from each teacher was requested. The data collection took place according to the teachers' availability during the lecture time. Firstly, they were told that a completed teamwork assignment was needed in order for the sample to be collectable. The questionnaires were handed out in the beginning or in the end of the classes and it was explained how to fill them in. The main objects of study (personality and teamwork competencies) were collected at different times for almost half of the sample. The other half answered the questionnaires with both parts combined, in only one time with both personality and teamwork competency evaluation. The students provided their personality ratings, demographic data and the self- and peer appraisal teamwork behaviors of performance, correspondent to a specific group assignment.

5.1.3 Measures

Personality: a ten-item personality test developed by Gosling (Gosling et al., 2003) was administered. This instrument was reported to have a high degree of correlation with other instruments with significantly more items. The focus of this instrument is to measure the Big 5 factors: Extraversion, Agreeableness, Conscientiousness, Emotional Stability and Openness to experience. The response scale varies from 1 to 7. Each dimension is measured by two items, one worded positively and one worded negatively.

Teamwork competencies: The CATME instrument measures 5 teamwork categories (Contributing to team, interacting with teammates, keeping team on track, Expecting Quality, Relevant Knowledge Skills and Abilities). Each of these categories has 5 levels (1-5), in which the five represents a good rating on a certain competence whilst one represents the opposite. Individuals have to choose one of these five levels in each category in order to evaluate themselves (first column) and evaluate peers (in the next columns). Each of these levels is anchored to behaviors that correspond to a good or a poor enactment of the competency being evaluated (BARS scale).

5.1.4 Data analysis

Means (M), standard deviations (SD) were calculated for self, peer ratings and personality factor results, which are the variables of main interest in this study. Descriptive statistics regarding self and peer ratings as well as descriptive statistics for personality factors will be presented, as well as Pearson correlations. Symmetry was accessed through skewness and kurtosis to access the flatness of the distributions, and normality.

Since the focus of the study is to have personality traits as predictors of teamwork competencies, one can affirm that there is a causal relationship between the dependent and the independent variable. Personality traits are an individual concept and they exist before the processes of teamwork. Furthermore personality traits are inputs into the teamwork models and teamwork is a process, therefore one can affirm that there is a relationship of cause and effect. Therefore, the appropriate model for this analysis was the linear regression model. The linear regression model defines an aggregation of statistical analyses used to modulate relationships between variables and predict the value of one dependent variable from one or several independent (predictor) variables. Each of the 10 dependent variables (5 competencies with self-ratings and 5 competencies rated by peers) were inputted into SPSS and the relevant independent variables were entered. Gender values were entered in a first model as a control variable, as it is well known that different genders behave differently (Berenbaum et al.2011). In the second model the variables of main interest were entered. Gender is not the variable of interest in this study therefore it is a control variable in the model of linear regression. In the linear regression the adjusted R^2 was considered because adjusted R^2 is a best estimator of the p value in the population than R^2 (Marôco, 2010). Furthermore, the adjusted R2 only increases if the addition of a new variable to the model leads to a best adjustment of the model to the data. As competences are being predicted, just with personality variables, low R^2 are expected, meaning that there are other explaining the variance of competence being analyzed. Standardized coefficients for the independent variables were took in consideration, because they allow comparison of the effect on the dependent variable in the same measuring unit.

5.2 Results

Means of the personality factors ranged from 4.5 to 5.4 (1 min - 7 max). Standard deviation values ranged from 0.9 to 1.3. The scores revealed a normal distribution according to skewness and kurtosis, which are between -1 and 1 (Table 5).

Table 5-Descriptive statistics of 5 the five personality factors

	N	Range	Minimum	Maximum	Mean	Std. Deviation	Skewness		Kurtosis	
	Statistic	Statistic	Statistic	Statistic	Statistic	Statistic	Statistic	Std. Error	Statistic	Std. Error
Extraversion	124	5,50	1,50	7,00	4,8952	1,24821	-,347	,217	-,314	,431
Agreebleness	124	5,50	1,50	7,00	4,5202	,99470	,328	,217	,490	,431
Conscientiousness	124	4,50	2,50	7,00	5,1653	1,20757	-,241	,217	-,862	,431
Emotionalstability	124	5,50	1,50	7,00	4,4435	1,30541	,142	,217	-,596	,431
Openesstoexperience	124	3,50	3,50	7,00	5,4960	,90728	-,278	,217	-,276	,431
Valid N (listwise)	124									

Table 6 shows the means (M) of the self-rating competencies (Q1_Contribuiting_team_SELF, Q2_Interacting_SELF, Q3_Teamtracking_SELF, Q4_Expqual_SELF, Q5_RelevantKSA_Self) that ranged from 3.95 to 4.01. Each of the self-ratings standard deviation ranged from 0.795 to 0.687. The scores revealed a reasonably normal distribution according to skewness and kurtosis values, which are between -1 and 1. None of the individuals rated themselves with the level 1 for any competence, since the minimum value used is two.

Table 6-Descriptive statistics of the 5 teamwork competencies (SELF)

	N	Range	Minimum	Maximum	Mean	Std. Deviation	Skewness		Kurtosis	
	Statistic	Statistic	Statistic	Statistic	Statistic	Statistic	Statistic	Std. Error	Statistic	Std. Error
Q1_Contribution_team_SELF	127	3	2	5	3,99	,740	-,465	,215	,154	,427
Q2_Interacting_SELF	127	3	2	5	3,95	,795	-,203	,215	-,733	,427
Q3_TeamTracking_SELF	124	3	2	5	3,90	,790	-,026	,217	-,951	,431
Q4_Expqual_SELF	128	3	2	5	4,01	,748	-,242	,214	-,553	,425
Q5_RelevantKSA_SELF	128	3	2	5	4,00	,687	-,148	,214	-,409	,425
Valid N (listwise)	122									

Means (M) of the competencies rated by others (Q1_Contributing_team_otherrating, Q2_interacting_otherrating, Q3_TeamTracking_otherrating, Q4_Expqual_otherrating, and Q5_RelevantKSA_otherrating) ranged from 3.6 to 3.86, which compared to self-ratings is lower, meaning that peer ratings on each competency were lower than self-ratings in the exact same competency (table 7). Each of the peer-ratings standard deviation ranged from 0.69 to 0.82, thus all the values are not distant from the mean. The scores revealed a normal distribution according to skewness and kurtosis values in only three competencies (Q2_Interacting_otherrating, Q3_teamTracking_otherrating and Q4_expqual_otherrating), which are between -1 and 1. For verifying the normality on the other two variables a kolmogorov-smirnov test was run (5% error margin), in which the normality for these two variables was verified (significance = 0.00) (see annex 8.1.3). All possible ranged were attributed (1-5) in exception with Q4_Expqual_other rating (1.5) (table 7).

Table 7-Descriptive statistics of the 5 teamwork competencies (OTHERS)

	N	Range	Minimum	Maximum	Mean	Std. Deviation	Skewness		Kurtosis	
	Statistic	Statistic	Statistic	Statistic	Statistic	Statistic	Statistic	Std. Error	Statistic	Std. Error
Q1_Contribution_team_otherrating	152	4,00	1,00	5,00	3,8170	,74451	-1,015	,197	2,147	,391
Q2_Interacting_otherrating	152	4,00	1,00	5,00	3,7740	,69610	-,791	,197	1,065	,391
Q3_TeamTracking_otherrating	151	4,00	1,00	5,00	3,6312	,82914	-,569	,197	,606	,392
Q4_Expqual_otherrating	152	3,50	1,50	5,00	3,7436	,77545	-,696	,197	,368	,391
Q5_RelevantKSA_otherrating	151	4,00	1,00	5,00	3,8619	,74031	-1,081	,197	1,769	,392
Valid N (listwise)	150									

The following table (8) introduces a correlation matrix between all variables.

Table 8 - Correlations between dependent and independent variables

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
1.Q1_Contribution_team_SELF	1														
2.Q2_Interacting_SELF	.325**	1													
3.Q3_TeamTracking_SELF	.445**	.516**	1												
4.Q4_Expqual_SELF	.360**	.469**	.403**	1											
5.Q5_RelevantKSA_SELF	.373**	.231**	.277**	.383**	1										
6.Extraversion	.202*	,179	,143	,156	.197*	1									
7.Agreebleness	,017	,166	,123	,001	,095	-,054	1								
8.Conscientiousness	,158	,143	.217*	.197*	,008	-,053	,040	1							
9.Emotionalstability	-,096	-,020	,091	-,129	-,104	,041	.325**	,034	1						
10.Openesstoexperience	.196*	,112	,167	,129	,134	,120	,101	,053	,110	1					
11.Q1_Contribution_team_otherrating	.234*	,125	.198*	.266**	.261**	,112	,016	.197*	-,104	.186*	1				
12.Q2_Interacting_otherrating	,134	,155	.236*	.232*	,121	,124	,148	,171	,056	,120	.653**	1			
13.Q3_TeamTracking_otherrating	,160	,112	.276**	.211*	.251**	,044	,085	,091	-,141	,140	.659**	.614**	1		
14.Q4_Expqual_otherrating	.234*	,088	,158	,163	.215*	,009	,111	,126	-,089	,174	.681**	.635**	.685**	1	
15.Q5_RelevantKSA_otherrating	,174	,141	.190*	.188*	.249**	,028	,152	,100	-,088	,081	.713**	.606**	.741**	.705**	1

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

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

In the first model gender statistically significantly predicts the variance on the dependable variable, but the associated adjusted R2 is low (0.028). In this model F(1, 114) = 4.260, β=-0.190, p = 0.041. In the second model the variables of main interest were introduced. Colinearity statistics are within their accepted values (≈1) showing that there are no problems with multicolinearity and the Durbin Watson is approximate to 2 (1.954) showing that there is no autocorrelation within the independent variables. The output shows that the independent variables statistically significantly predict the dependent variable are extraversion and conscientiousness (table 9), F(5, 110) = 3.684, p = 0.004, adjusted R2= 0.105, having in mind that extraversion predicts the dependent variable more strongly than conscientiousness (β=0.231, β=0.196, respectively). Agreeableness and emotional stability do not significantly predict the dependent variable analyzed. To sum up hypothesis H1a and H7a were supported by this evidence whereas H4a and H11a were not.

Table 9-Linear regression coefficients Q1_contibuition_team_self

Model		Standardized Coefficients		Collinearity Statistics	
		Beta	Sig.	Tolerance	VIF
1	(Constant)		,000		
	Gender	-,190	,041	1,000	1,000
2	(Constant)		,000		
	Gender	-,247	,007	,957	1,045
	Agreebleness	,092	,326	,890	1,124
	Extraversion	,231	,010	,988	1,012
	Conscientiousness	,196	,029	,986	1,014
	Emotionalstability	-,180	,060	,869	1,151

a. Dependent Variable: Q1_Contribution_team_SELF

The same statistical procedure from the last model was taken but the only thing that changed was the dependent variable (Q1_Contributing_team_otherrating). In the first model (table 10), gender did not statistically significantly predicted the variance on the dependable variable ($F(1, 108) = 0.573$, $p = 0.415$). Therefore gender does not explain the variance on the contribution to the team from the perspective of others. In the second model (table 10) adjusted $R2=0.055$ and the ANOVA result is expressed as $F (6, 103) = 2.064$, $p = 0.064$, adjusted $R2=0.055$. The significance of the latter test is somewhat close to 0.05 (error margin) but higher than 0.05., meaning that the variables in the model are not adequate to explain the variability of the dependent variable. Nevertheless it is clear from the above table that conscientiousness is a good predictor if the dependent variable being analyzed ($\beta=0.206$) (table 10). Therefore hypothesis H7b was supported by this evidence whereas H1b, H4b and H11b were not.

Table 10- Linear regression coefficients Q1_Contribution_team_otherrating

Model		Standardized Coefficients		Collinearity Statistics	
		Beta	Sig.	Tolerance	VIF
1	(Constant)		,000		
	Gender	-,073	,451	1,000	1,000
2	(Constant)		,000		
	Gender	-,130	,183	,945	1,058
	Agreebleness	,075	,458	,880	1,136
	Extraversion	,136	,155	,981	1,019
	Conscientiousness	,206	,031	,989	1,011
	Emotionalstability	-,142	,158	,890	1,124

a. Dependent Variable: Q1_Contribution_team_otherrating

A multiple regression (table 11) was run to predict self evaluations on interaction with the team, from gender in the first model, as gender is the control variable, in which gender did not statistically significantly predicted the variance on the dependable variable ($F(1, 115) = 0.302$, $p = 0.302$, $R^2=0.006$). In the second model the hypothesized independent variables were added (agreeableness, extraversion and emotional stability). The ANOVA test significance for the model is approximate to 0.05 $F(4, 112) = 0.302$, $p = 0.059$. Colinearity statistics are within their accepted values (≈1) the Durbin Watson is approximate to 2 (2.146). In the second model, the output shows that the independent variables statistically significantly predict the dependent variable are extraversion and agreeableness for an $F = 2.342$ and an adjusted $R^2= 0.044$ (table 11). Agreeableness slightly predicts the dependent variable with more intensity than extraversion ($\beta=0.213$, comparing to $\beta=0.197$). Emotional stability does not significantly predict the dependent variable analyzed. To sum up hypothesis H2a and H5a were supported by this evidence whereas H12a was not.

Table 11- Linear regression coefficients Q2_Interacting_self

Model		Standardized Coefficients		Collinearity Statistics	
		Beta	Sig.	Tolerance	VIF
1	(Constant)		,000		
	Gender	-,051	,584	1,000	1,000
2	(Constant)		,000		
	Gender	-,083	,370	,965	1,036
	Agreebleness	,213	,029	,888	1,127
	Extraversion	,197	,032	,991	1,009
	Emotionalstability	-,109	,265	,867	1,153

a. Dependent Variable: Q2_Interacting_SELF

The linear regression coefficients for Q2_Interacting_otherrating (table 12) were drawn out of the sample. In the first model, gender did not significantly predict the dependent variable being analyzed ($F(1, 108) = 0.670$, $p = 0.415$), the same happened for the second model in which the significance improved ($F(4, 105) = 1.075$, $p = 0.373$, adjusted R^2=), which it is still much bigger than 0.05. Therefore none of the personality traits predicts Q2_Interacting_otherrating, since none of the significances of each independent variable are less than 0.05 (table 12). Therefore hypothesis H2b, H5b and H13b were not supported.

Table 12- Linear regression coefficients Q2_Interacting_otherrating

Model		Standardized Coefficients		Collinearity Statistics	
		Beta	Sig.	Tolerance	VIF
1	(Constant)		,000		
	Gender	,078	,415	1,000	1,000
2	(Constant)		,000		
	Gender	,047	,629	,955	1,047
	Agreebleness	,145	,157	,880	1,136
	Extraversion	,115	,235	,981	1,019
	Emotionalstability	,007	,943	,890	1,123

a. Dependent Variable: Q2_Interacting_otherrating

Having in mind the competency Q3_TeamTracking_Self (table 13) one can affirm that gender was not significant in predicting this variable ($F(1, 111) = 1.002$, $p = 0.319$). However in the second model the significance for the ANOVA test was lower than 0.05 ($F(4, 108) = 3.093$, $p = 0.019$, adjusted R^2=0.07). As it can be observed by table 13, the variable that is a significant predictor of Q3_Teamtracking_Self is conscientiousness (β=0.238, $p = 0.011$). The other variables accounted with higher p values than 0.05; therefore they are not significant predictors of Q3_Teamtracking_Self. Thus hypothesis H8a is supported.

Table 12- Linear regression coefficients Q3_Teamtracking_Self

Model		Standardized Coefficients		Collinearity Statistics	
		Beta	Sig.	Tolerance	VIF
1	(Constant)		,000		
	Gender	-,095	,319	1,000	1,000
2	(Constant)		,000		
	Gender	-,133	,150	,984	1,016
	Agreebleness	,130	,157	,998	1,002
	Extraversion	,158	,088	,995	1,005
	Concientiousness	,238	,011	,987	1,013

a. Dependent Variable: Q3_TeamTracking_SELF

Table 14 shows the linear regression coefficients for Q3_Teamtracking_otherrating. In the first model gender was also not significant on predicting the dependent variable being analyzed ($F(1, 107) = 0.004$, $p = 0.952$, adjusted R^2=-0.009). In the second model the significance for the ANOVA test was much higher than 0.05, ($F(4, 104) = 0.523$, $p = 0.719$, adjusted R^2=-0.018). As it can be observed by table 14, there no variables are significant predictors of Q3_Teamtracking_otherrating, as their p value is bigger than 0.05. Thus hypothesis H8b, H6b and H3b are not supported.

Table 13- Linear regression coefficients Q3_Teamtracking_otherrating

Model		Standardized Coefficients		Collinearity Statistics	
		Beta	Sig.	Tolerance	VIF
1	(Constant)		,000		
	Gender	-,006	,952	1,000	1,000
2	(Constant)		,000		
	Gender	-,032	,743	,962	1,039
	Agreebleness	,085	,388	,982	1,018
	Extraversion	,047	,632	,985	1,015
	Concientiousness	,103	,296	,987	1,013

a. Dependent Variable: Q3_TeamTracking_otherrating

Table 15 shows the linear regression coefficients for Q4_Expqual_self. Gender was not significant in predicting the dependent variable in the first model (F(1, 115) = 0.39, p = 0.845, adjusted R^2=-0.008). In the second model the significance for the ANOVA test is expressed as F (2, 114) = 2.397, p = 0.096), with an adjusted R2=0.024. As it can be observed by table 15, gender is not a significant predictor of Q4_Expqual_self, as their p value is much bigger than 0.05. Nevertheless it is clear from table 15 that conscientiousness is a significant predictor of the dependent variable being analyzed (β=0.201, p=0.031) (table 10). Thus hypothesis H9a is supported.

Table 14- Linear regression coefficients Q4_Expqual_self

Model		Standardized Coefficients		Collinearity Statistics	
		Beta	Sig.	Tolerance	VIF
1	(Constant)		,000		
	Gender	-,018	,845	1,000	1,000
2	(Constant)		,000		
	Gender	-,039	,676	,990	1,010
	Conscientiousness	,201	,031	,990	1,010

a. Dependent Variable: Q4_Expqual_SELF

Table 16 shows the linear regression coefficients for Q4_Expqual_otherrating. In the first model gender was also not significant on predicting the dependent variable being analyzed (F(1, 108) = 0.004, p = 0.801, adjusted R2=-0.009). In the second model the significance for the ANOVA test was higher than 0.05, (F (2, 107) = 0.932, p = 0.397, adjusted R^2=-0.001). As it can be observed by table 16, there no variables are significant predictors of Q3_Expqual_otherrating, as their p value is much bigger than 0.05. Thus hypothesis H9b is not supported.

Table 16- Linear regression coefficients Q4_Expqual_otherrating

Model		Standardized Coefficients		Collinearity Statistics	
		Beta	Sig.	Tolerance	VIF
1	(Constant)		,000		
	Gender	-,024	,801	1,000	1,000
2	(Constant)		,000		
	Gender	-,038	,696	,989	1,011
	Conscientiousness	,129	,183	,989	1,011

a. Dependent Variable: Q4_Expqual_otherrating

Table 17 shows the linear regression coefficients for Q5_RelevantKSA_self. In the first model gender was not significant on predicting the dependent variable in the first model ($F(1, 115) = 0.183$, $p = 0.670$, adjusted $R^2 = -0.007$. In the second model the significance for the ANOVA test is expressed as $F(3, 113) = 0.722$, $p = 0.541$, with an adjusted R2=-0.007. As it can be observed by table 17, gender is not a significant predictor of Q4_RelevantKSA_self, as their p value is much bigger than 0.05. The same goes for Conscientiousness and Openness to experience. Therefore hypothesis H10a and H13a were not supported.

Table 17- Linear regression coefficients Q5_RelevantKSA_self

Model		Standardized Coefficients		Collinearity Statistics	
		Beta	Sig.	Tolerance	VIF
1	(Constant)		,000		
	Gender	-,040	,670	1,000	1,000
2	(Constant)		,000		
	Gender	-,028	,764	,981	1,020
	Conscientiousness	,002	,979	,985	1,015
	Openesstoexperience	,132	,163	,987	1,013

a. Dependent Variable: Q5_RelevantKSA_SELF

Table 18 shows the linear regression coefficients for Q5_RelevantKSA_otherrating. As it can be observed, the p values of each variable are bigger than 0.05. The correspondent ANOVA model test of both models was also not significant F (1, 107) = 0, p = 0.999, F (3, 105) = 0.662, p = 0.577 respectively. Therefore hypothesis H10b and H13b were not supported.

Table 18- Linear regression coefficients Q5_RelevantKSA_otherrating

Model		Standardized Coefficients		Collinearity Statistics	
		Beta	Sig.	Tolerance	VIF
1	(Constant)		,000		
	Gender	,000	,999	1,000	1,000
2	(Constant)		,000		
	Gender	-,004	,970	,977	1,023
	Conscientiousness	,103	,293	,984	1,016
	Openesstoexperience	,084	,387	,988	1,013

a. Dependent Variable: Q5_RelevantKSA_otherrating

6. Discussion

The primary purpose of this study was to predict teamwork competencies ratings having personality factors as predictors. Several researchers made links between team outcomes and personality, whilst this study digs deeper into the constructs by addressing process variables such as teamwork competencies not final team outcomes.

Overall, the values of the adjusted R2 of the linear regression models are very low, both from the self and other ratings, as it was expected. Competencies are very hard concepts to predict, as there are many other variables explaining a certain competence (e.g. the time one has been performing a certain competence, educational background, organizational support on a certain task). Nevertheless the attempt to relate personality to teamwork competencies was successful, as some plausible hypothesis were supported by evidence of this research.

Gender had a significant negative impact on contributing to the team, in self-rating in which woman contributed less than man. Nevertheless, gender was a control variable and was not statistically significant for any other competency from the self and peers point of view. The first teamwork competency (Contribution to the team), in self-rating, had two significant predictors: extraversion (H1a) and conscientiousness (H7a). Extraverts (as perceived by themselves) are indeed more participative, communicating effectively, as they perceived themselves as contributing to the team. Furthermore, in the sample of this study, individuals who are extroverts might also enact altruistic behaviors, as this is one of the fundamental measures describing the dependent variable being analyzed. Conscientious individuals are dependable and hardworking and as expected, this personality trait is a significant predictor of individuals who effectively contribute to the team from the perspective of oneself. Agreeableness and emotional stability were expected to predict team contribution; however they were not significant predictors. Emotional stability and agreeableness are associated with conflict avoidance and more cooperation. Nevertheless, solely because an individual is emotionally stable and agreeable with others, it doesn't mean that he is contributing more to the team. This maybe one of the reasons why these hypotheses were not empirically supported, as theoretically hypothesized in the literature review. Additionally the dependent variable, contributing to the team, does not measure cooperation, one of the lower facets that characterizes agreeableness (Driskell et al., 2006).

Moreover, recent research by Halfhill, Nielson, et al. (2005) demonstrated that predictors such as agreeableness predict relationship-oriented criteria such as team cohesion, but only in a field context where relationships developed over a long period of time, which was not the case of the sample of this study (2-5 month courses, and likely an even shorter time-frame to work on the group task). Regarding Contribution to the team, in other-rating, the only significant predictor found was conscientiousness. This suggests that from the peers' point of view, conscientious individuals had a high score on this competency (as rated by others).

The second teamwork competency Q2_Interacting_Self had two significant predictors: extraversion (H2a) and agreeableness (H5a). As expected individuals who excel in effective communicating with others, are lively and sociable are more likely to have better interactions with teammates, as perceived by oneself. Agreeable individuals are conflict avoiding and perceive themselves as having good teammate interactions. Surprisingly, emotional stability did not predict good communication and interaction with other teammembers, as found by Lepine and Van Dyne (2001). One plausible justification for this regards the measurement scale of personality used (Gosling et.al, 2003). One of the measures in the latter tool developed by Gosling - "Calm, Emotionally stable" - does not specifically focus on a narrower facet of emotional stability, and students might have only associated the calm facet into the larger trait that is emotional stability, as other factors such as self-esteem, confidence and being positive towards others were not measured (Driskell et al., 2006). As it is obvious, just because one has a pattern of being calm, it doesn't necessarily mean that that person will have better interactions with the team members. Regarding the other ratings on this competency, no hypothesis was significant.

Thirdly, Conscientiousness is a significant predictor of Q3_Teamtracking_self, thus hypothesis H8a was supported. Conscientious individuals are task focused and are typically concerned with performing their required behaviors in order to be successful and accomplish team goals, as predicted by Tasa and colleagues (2010) and Rhee and colleagues (2013). Through monitoring and feedback behaviors conscientious individuals tend to have control over the situation, and make sure nothing fails, in order to achieve goals, since the overall success of the team is dependent on each individual contribution. Agreeableness was not significant in predicting this competency (H6a). This is probably due to the fact that the items that were measured in the personality questionnaire, sympathetic, warm, (from the positive pole) and critical and quarrelsome (from the negative pole) do not encompass the main facet of agreeableness related to this competency: trust (Driskell et. al,2006).

According to Driskell and colleagues (2006), "that high-trust team members are more likely to seek and receive feedback from others (performance monitoring and feedback) " (Driskell et al., 2006:262) and communicate more openly. Extraversion was also not significant in predicting this competency. Rhee and colleagues (2013) found that extraversion predicts team encouragement of project completion, in other words, extroverts are natural motivators for the team, but that doesn't mean that they are effective in providing feedback and monitoring team activities. Thus, this correlation was not found.

As far as the team competencies literature is concerned, the competency "keeping the team on track" as it is defined by Loughry and colleagues (2007) is new. This competency might be of extreme importance in team settings, as one of the main requirements for a team to function properly is constructive feedback, and monitoring. In other words team members should effectively communicate and constructively share thoughts on the project they are working. Monitoring itself is very important so that goals and planning are followed. One concept associated to this competency are the shared mental models, according to which there is a transactive, collective memory within each team member. As it had been previously discussed in the literature review, this concept is one of the basic coordinating mechanisms of working in teams. Thus, is it reasonable to think that individuals who work in teams should excel in this competency, which will certainly lead to an improved final result/outcome of the team. As well as the other ratings in interaction with team members' competency, Keeping the team on track, as rated by others, did not have any significant hypothesis supported by evidence.

The fourth competency under study (expecting quality) was significantly predicted at both self and peer ratings, by conscientiousness (H9a, H9b). Conscientious individuals are hardworkers, self-motivators and persistent, which raises the bar of expectations and results. Individuals who excel in the competency expecting quality are always encouraging the team to do excellent work (because these individuals are typically driven by goals), even if there is no additional reward, believing that the team members can fully meet their responsibilities and their goals. These behaviors mirror a high self-efficacy in these individuals, which might positively contaminate the rest of the team members with the same beliefs, therefore generating a high team efficacy, resulting in favorable outcomes for the team. Certainly this competence can be used and linked to others constructs such self-efficacy and team potency, regarding expectations and beliefs.

The last competency Q5_RelevantKSA was not significantly predicted by any personality factor. On the one hand, if one is very conscientious there are no guarantees that that exact person has the relevant skills, knowledge or abilities in order to be successful in a certain task, this is why it is likely that no correlation was found between conscientiousness and this competency. On the other hand it is expected that conscientious individuals might be willing to learn and develop the required knowledge. Having said this, it would be interesting to have a T1 and T2 (time1, time 2) , to measure if there were improvements in the competency of "having relevant knowledge, skills and abilities", both from the self-ratings and peer ratings, assuming conscientiousness would stay constant. This way one could probably find a significant correlation between conscientiousness and Q5_RelevantKSA. Openness to experience was the other predictor variable supposedly associated with this competence. Individuals that possess this personality trait are curious, creative and original which somehow could influence the way individuals creatively solve problems and address situations with their creative personality, which doesn't necessarily mean they will have the required knowledge to address the different requirements of a task in teamwork settings. Furthermore since they are curious, they are likely to engage in learning behavior acquiring new skills in order to properly perform. However the positive correlation between Q5_RelevantKSA and openness to experience was not found, as openness to experience was not statistically significant on the linear regression model.

From the peers' ratings there were only two significant correlations between personality and teamwork competencies (conscientiousness with Q1_Contributingotherratings and Q4_Exp_qual). A study (Consiglio et al., 2013) in which the authors accessed different competencies having the FFM as predictor variables has found that there was convergent validity for the two different informants (self and peer). Hence they concluded that competencies and traits represent different but related constructs at the individual level (Consiglio et al., 2013). This finding supports the relevant interest in studying both self and peer ratings on the same competency. Rhee and colleagues (2013), that focused in teamwork competencies being predicted by personality, found that the ratings a student gives to himself in certain teamwork competencies are not necessarily the same ratings attributed by its team, in several individual behaviors (Rhee et al., 2013). Further on, the authors asked themselves whether peer and self-assessments are correlated. Through statistical analysis they concluded that self and peer assessments are largely, but not entirely correlated. The major tendency identified was that there was a tendency for students to rate themselves more favorably than their peers in some of the rating sections, as

largely documented by the literature on 360-degree feedback. This phenomenon can be observed also in the descriptive statistics of this study. This has to do with the fact that one tends to positively rate himself (social desirability), which doesn't happen when peers are evaluating others, unless there are specific reasons to do so. However, there are also several errors that might occur when evaluating others, such as halo effects, acquiescence (agree with everything), leniency effects (positively rate everything) or even give the same rating to every ratee, in other words, not differentiating. If one does not differentiate in the evaluation of different competencies, the associations between predictors and teamwork competencies are likely obscured; in other words, predictors will not be effective in significantly in predicting teamwork competencies. This leads to the argumentation of not having found several significant correlations between peer ratings and personality factors, in the specific sample of this study.

In this sample, students were together in their teams when evaluating each other, therefore it could be that some students were worried that accurate ratings would damage social relations in the team (Saavedra & Kwun, 1993). Furthermore raters also try to use a relative social framework instead of using independent criteria (Saavedra & Kwun, 1993), which is attenuated by the BARS instrument in the questionnaire. Furthermore, the motivation behind filling in this questionnaire was nonexistent, as it was voluntary and students might not have been worried with providing accurate rates when thinking about others performance. It would be easier for one to rate themselves rather than rating colleagues and thinking about their performances on a certain competency. Furthermore, training might be required for students and peer ratings may be biased by the unskillness on rating others. In support of this interpretation, we have performed an additional test. We can observe that the mean standard deviation for self and peer ratings on the same person, reveals that there was less differentiation across the competencies in the others' ratings (SD=0.3754) that in self-ratings (SD=0.4971) (annex 8.2). Although there is not much of difference between both standard deviations, the paired T-test for both standard deviations (annex 8.2) shows that the difference is statistically significant (t=-3.511, p=0.001 for a confidence interval of 95%). The others' ratings are indeed not that much differentiated for each individual, probably because mean values were computed on the other ratings. Looking at the original questionnaires, the most common error on evaluating others was not differentiating and leniency (rating positively). This might suggest that students require training in order to rate properly, in order for one to find the hypothesized predictions.

6.1 Limitations

Analyzing the data only at the individual level rather than the group level might be a limitation of this study. The sample consisted of a scarse number of teams (35), which would have been inadequate to reveal useful findings. This is also why the peer ratings, (besides self-ratings) were taken in account, in order to embrace different perspectives on studying personality predictors of teamwork competencies. Therefore, the reader should keep this limitation in mind, particularly when comparing the findings of this study to other researchers that analyzed their results at the team level.

An additional potential limitation is the student sample used. Students may not have taken the questionnaires seriously, especially when evaluating others. Other researchers find it to be a problem as well when students represent the participant population (O'Neill, Kline, 2008). The students were not separated from their teams when filling in the questionnaires, which might have placed some pressure amongst peers when evaluating other group members. If truthfully honest and serious about the questionnaires, some inter group relationships could have been endangered, therefore this could be an explanation to why there was no differentiation when one group member was rating the others. In a study conducted by Consiglio and colleagues (2013) workers were separated from each other to avoid possible data manipulations (e.g., impression management, socially desirable responding), thus when conducting this type of research where one is evaluating others all these possible biases should be taken in account.

Another potential issue that could have inflated the results is the common method variance, which refers to "the variance that is attributable to the measurement method rather than to the construct the measures represent" (Podsakoff et al., 2003, p. 879). Method refers to the form of measurement such as the content of specific items, scale type, response format and general context (Podsakoff et al., 2003). Since half of the sample filled in both main sections of the questionnaire in one time, one could have had the tendency to answer everything more positively or negatively. Furthermore, if students' data had been collected during several times in a certain length of time, different interactions and time dynamics among teammembers could have been observed and registered, which would have influenced the final results.

6.2 Implications and Future directions

The findings of this research reinforce the fact that personality is connected and related to several individual competencies (Barrick and Mount,1991), as well as teamwork competencies (e.g. Lepine and Van Dyne in 2001). Conscientiousness is a predictive personality attribute in most teamwork competencies within the CATME framework. This trait has been associated with above average individual performance in several studies and as it is suggested by this study is positively correlated with teamwork competencies. Mainly, agreeableness and extraversion have an impact on the social dynamics of the team. Emotional stability wasn't correlated to any competency; nevertheless, theoretically, this factor is linked to the social component of teamwork. Further empirical studies will probably support this relationship. Openness to experience is without a doubt the hardest personality factor on predicting certain competences, as literature has shown. Furthermore none of the of CATME competencies was predicted by openness to experience, which doesn't mean that a dimension of adaptability or flexibility within a team could not be predicted by this personality factor. In conclusion, contentiousness seems to be a good predictor of several competencies related to teamwork, thus individuals that possess traits in conscientiousness are more likely to successfully perform under a team setting.

Keeping the team on track and Expecting quality might become relevant competencies in the future, as they are probably connected to the success of a team. Thus further relevance should be given to these two competencies. They have been presented in the CATME instrument, which as far as this research is concerned has been proved a solid instrument for measuring teamwork competencies.

There are not many empirical studies of personality predicting teamwork competencies directly, as mentioned before. Competency measurement is more specific then overall team measures of task performance and contextual performance (as these two are more general), consequently it would be interesting to study lower level traits of personality, which may be associated with several teamwork competencies, both from the perspective of oneself and peers, in order to compare the resultant findings. It would be also interesting to use recent developed teamwork frameworks (e.g. IMOI, instead of the dominant IPO) to map competencies in the process between team inputs and outputs in which personality, organizational design, culture and type of task assigned might have significant effects on predicting several levels of performance in teamwork competencies. It would also be interesting to conduct these types of study during large periods of time, because different

team dynamics and interactions might emerge as the members get to know each other, which of course will influence the final results of the research. Furthermore, the tendency of people to rate themselves more favorably than their peers can be used in the interpretation of group conflict descriptions, as this could work as a trigger for a conflict over performance issues among team members.

Moreover, the CATME instrument is a good instrument to evaluate teamwork competencies, which should be used in several institutions in which teamwork is a need. It is a possibility that by using this tool, institutions (e.g. schools, companies, hospitals, NGOs) might increase their organizational performance, using this tool as a learning process regarding teamwork competencies. However when individuals are rating others, for the values to be more representative, one has to train raters to diminish non-differentiation bias among other rating biases that might occur. This is an implication of this thesis on the issue of rating others.

Practical implications in HR systems will be for instance, the reconstruction or the refinement of performance appraisal systems based on competencies, which have a great impact on careers and rewards systems. Furthermore, instead of only focusing on post-entry work training, organizations may also embrace selection procedures based on personality measures to aim for the required teamwork competencies from their employees. Therefore there is an implication on the selection and recruitment process of individuals, which not only would have to have the required competency, as they should also have certain personality traits that support that competency in order to increase recruitment and selection success. Even tough many organizations use teams to perform work, organizations need to hire at the individual level, because organizations hire individuals, not teams, thus the implication of this study for recruitment and selection.

The results also imply that the Big five is a useful framework to predict teamwork competencies, as relevant conclusions were drawn. Further implications refer to the fact that there are different factors that predict competencies besides personality (low adjusted R^2). Thus, on managing competencies other possible relevant factors such as performance appraisal based on team performance (that might motivate employees to better perform in team competencies) and contextual performance (e.g. Individual behavior that supports the social and psychological environment), should be considered when predicted competencies. Moreover, an individual requires certain technical competencies to successfully perform a certain type of work, further it is implicit that an individual requires certain personality traits in order to successfully work in team as well as for certain types of

work (e.g. Public Relations). Thus, a speculated implication is that there should be a consistency between personality traits, teamwork competencies and some job requirement competencies (that could conceptually overlap teamwork competencies' definition), e.g. a worker in PR probably needs to be extravert in order to be successfully interact with both teammembers and clients. Furthermore, there are certain traits, such as conscientiousness, that are able to predict individual performance and competencies, but they are also able to predict certain team competencies that are becoming more and more important in organizational contexts, where, as previously mentioned, teams are core working units of organizational processes.

6. Conclusion

The results of this study have shown that personality has predictive value in several competencies. Since competency-based management has acquired relevance over the past years it is crucial to give importance to competencies. Team literature doesn't focus on competencies but on overall measures of performance. Few researchers such as Rhee and colleagues (2013) and Lepine and Van Dyne (2001) have had the "teamwork competency" way of reasoning while conducting their studies. Thus this study will certainly contribute to the literature of teamwork competencies and personality. Each of the big 5 personality factors had a significant impact on at least one competency, except openness to experience and emotional stability. Expecting Quality and Keeping the team on track are two recently proposed competencies as they are defined, and are predicted (in self-report) by the traits. Certainly more importance should be given to these two competencies, for the way they are defined and for the relevance they might have on predicting the overall team performance.

Five competencies required for teamwork have been investigated, but there are many more worth studying, associated to other predictors, besides personality, both at lower level and higher level constructs, at the team level and at the individual level, so that there are different views of analysis for the same topic. This will provide accurate and incremental information to management teams, which can optimize human resources practices in organizational contexts.

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8. Annexes

8.1. Descriptive statistics

8.1.1 Course and gender

N	Valid	135
	Missing	32
Median		2,00
Mode		2
Minimum		1
Maximum		2

Course

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	1	51	30,5	37,8	37,8
	2	84	50,3	62,2	100,0
	Total	135	80,8	100,0	
Missing	System	32	19,2		
Total		167	100,0		

Gender		
N	Valid	135
	Missing	32
Median		2.00
Mode		2

Gender

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	1	56	33,5	41,5	41,5
	2	79	47,3	58,5	100,0
	Total	135	80,8	100,0	
Missing	System	32	19,2		
Total		167	100,0		

8.1.2 Age

Statistics

Age

N	Valid	78
	Missing	89
Median		22.00
Mode		22
Minimum		18
Maximum		61

Age

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	18	2	1.2	2.6	2.6
	19	2	1.2	2.6	5.1
	20	6	3.6	7.7	12.8
	21	11	6.6	14.1	26.9
	22	20	12.0	25.6	52.6
	23	12	7.2	15.4	67.9
	24	4	2.4	5.1	73.1
	25	4	2.4	5.1	78.2
	26	3	1.8	3.8	82.1
	27	1	.6	1.3	83.3
	29	1	.6	1.3	84.6
	31	1	.6	1.3	85.9
	32	1	.6	1.3	87.2
	33	1	.6	1.3	88.5
	38	2	1.2	2.6	91.0
	41	1	.6	1.3	92.3
	42	1	.6	1.3	93.6
	43	1	.6	1.3	94.9
	45	1	.6	1.3	96.2
	50	1	.6	1.3	97.4
	55	1	.6	1.3	98.7
	61	1	.6	1.3	100.0
	Total	78	46.7	100.0	
Missing	System	89	53.3		
Total		167	100.0		

8.1.3 Normality test for two variables on other ratings

Tests of Normality

	Kolmogorov-Smirnov[a]			Shapiro-Wilk		
	Statistic	df	Sig.	Statistic	df	Sig.
Q1_Contribution_team_otherrating	,168	151	,000	,924	151	,000
Q5_RelevantKSA_otherrating	,190	151	,000	,921	151	,000

a. Lilliefors Significance Correction

8.2. SD means and paired-sample T-test conducted on SD of others ratings and self ratings

	N	Mean
sd_others	152	,3754
sd_self	128	,4971
Valid N (listwise)	116	

	95% Confidence Interval of the Difference		t	df	Sig. (2-tailed)
	Lower	Upper			
Pair 1 sd_others - sd_self	-,19647	-,05475	-3,511	115	,001