DOES THE TYPE OF PROJECT MANAGER LEADERSHIP; TRANSFORMATIONAL / TRANSACTIONAL INFLUENCE THE IMPACT OF TASK COMPLEXITY OR RISK ON TEAM PERFORMANCE IN A HYPER COMPETITIVE ENVIRONMENT?

MASTER THESIS

MASTER OF SCIENCE IN BUSINESS ADMINISTRATION

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Preface

The author declares that the text and work presented in this Master thesis is original and that no sources other than those mentioned in the text and its references have been used in creating the Master thesis.

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Abstract

As project organization environments become more global, dynamic, competitive, and complex, the demands posed on project managers and the variance of project team performance increases. Past research on teams and project management has not considered the interplay of team performance, leadership styles, risk and task complexity in projects exceeding on average € 580 MM with a time horizon of 2 years. In the present study, I investigate both conceptually and empirically the direct impact of project characteristics on team performance. Subsequently, I subject these relationships to the moderating impact of transformational and transactional leadership styles of project managers. The results indicate that risk is a significant factor across all models having a negative impact on team performance, whereas proposed negative impact task complexity is not in all scenarios supported. Strikingly, I find that the risk-team performance link is not only contingent upon transformational leadership, but that the latter turns the negative effect into a (statistically significant) positive one. Managerial and academic implications regarding large-scale project management and the development of a future research agenda in this field are discussed.

Keywords:

Team performance, transformational leadership, transactional leadership, risk, task complexity, project management.

INTRODUCTION TO THE STUDY

Introduction

Over the past decade or so, organizations have begun to use teams to a much greater extent (DeSchon, Kozlowski, Schmidt, Milner, & Wiechmann, 2004). Teams have become the strategy of choice when organizations are confronted with complex and difficult tasks. Teams are used when errors lead to severe consequences: when the task complexity exceeds the capacity of an individual; when the task environment is ill defined, ambiguous, and stressful; when multiple and quick decisions are needed (Salas, Cooke, & Rosen, 2008). Teams are social entities composed of members with high task interdependency and shared and valued common goals (Dyer, 1984). They are usually organized hierarchically and sometimes dispersed geographically; they must integrate, synthesize, and share information; and they need to coordinate and cooperate as tasks demands shift throughout a performance episode to accomplish their mission (Salas, et al, 2008), also previously described by Salas (Salas, Dickinson, Converse, & Tannenbaum, 1992) as two or more people, each with separate responsibilities and /or assignments, working together for a common goal.

The continued popularity of team-based work over a number of decades is reflected in the large volume of research focusing on the determinants of team effectiveness, see Table 1. (Campion, Medsker, & Higgs, 1993; Cohen, & Bailey, 1997; Ilgen, Hollenbeck, Johnson, & Jundt, 2005; Mathieu, Maynard, Rapp, & Gilson, 2008). Researchers have asked themselves what goes on when a team gets together in an organizational framework and which of these variables can predict or enhance performance (Cooke, Kiekel, Salas, Bowers, Stout, & Cannon-Bowers, 2003). As Beal (Beal, Cohen, Burke, & McLendon, 2003) argues that one of the important goals of organizational research, especially as it relates to teams, is to identify the factors and processes that give rise to increased performance. Organizations have placed many of their functions in the hands of teams, therefore it requires explanation of the process to understand what will help produce better, if not optimal, performance.

Team process behaviors such as communication, trust, interdependence, coordination, planning, team cohesion, team competence, knowledge level and team cohesiveness have been linked both theoretically and empirically in literature to team performance (Campion, Medsker, & Higgs, 1993; De Jong, & Elfring, 2010; Palanski, Kahai, & Yammarino, 2010; Stashevsky, & Koslowsky, 2006; Mathieu, Maynard, Rapp, & Gilson, 2008; Williams, 2007 Cohen, & Bailey, 1997; Ilgen, Hollenbeck, Johnson, & Jundt, 2005). Other than behavioral factors also cognitive factors such as; team knowledge, shared cognition as in: teams shared mental models, team situation awareness, and understanding communication have been

subject in several studies as antecedent of team performance (Marks, Zaccaro, & Matthieu, 2000; Mathieu, Heffner, Goodwin, Salas, & Cannon-Bowers, 2000; Salas, & Fiore, 2004; Ployhart, Iddekinge van, & MacKenzie Jr, 2011; Cooke, Kiekel, Salas, Stout, Bowers, & Cannon-Bowers, 2003; Gary, & Wood, 2011). Besides the above mentioned studies on behavioral and cognitive factors also team training studies made valuable contributions to the field of team performance enhancement antecedents by promoting team work and subsequently enhancing team performance (Cannon-Bowers, & Salas, 1998; Morgan, Coates, Kirby, & Alluisi, 1984; Marks, Zaccaro, & Matthieu, 2000; Cooke, Kiekel, Salas, Stout, Bowers, & Cannon-Bowers, 2003). Very little is known about the influence of risk on team performance, different risk dimensions have been identified by Wallace, Keil and Rai in their research on how software project risk affects project performance such as: organizational environmental risk, user risk, requirement risk, project complexity risk, planning and control risk, and team risk (Wallace, Keil, & Rai, 2004) but limited to the context of IT projects and their environments. Also task complexity has been linked to team performance in previous research (Argote, Insko, Yovetich, & Romero, 1995; Reagans, Argote, & Brooks, 2005; Moxnes, 1998; Paich, & Sterman, 1993; Sengupta, & Abdel-Hamid, 1993; Sterman, 1989; Wood, 1986; Gary, & Wood, 2011; Espinosa, Slaughter, Kraut, & Herbsleb, 2007; Higgs, Plewnia, & Ploch, 2005) but never in a similar context as the current study and under the influence of different leadership styles.

Notwithstanding these valuable contributions, much more remains to be understood on how teams can realize superior performance on high risk projects in the context of a hyper competitive environment. Although leadership has been topic of research as direct team performance antecedent, (Wang, Oh, Courtright, & Colbert, 2011; Stashevsky, & Koslowsky, 2006; Mohammed, & Nadkarni, 2011; Marks, Zaccaro, & Matthieu, 2000) however the moderating effect of different leadership styles on the relationship between risk, task complexity, as team performance antecedents, and team performance is still to be investigated. To what degree do different types of leadership influence the impact of risk on team performance? To what extent is task complexity impacted by leadership in the relationship to team performance? A much better understanding can be provided if these questions could be answered.

The project teams which served as unit of analysis in this study varied in size from 10 until 560 members with an average of 100 members per project. Each team consisted of team member representatives for each functional discipline both in management such as: engineering-, project controls-, contracts-, procurement-, and construction managers and lead engineering positions such as: process-, mechanical-, civil structural and architectural-, piping-, electrical and control systems-, environmental, health and safety lead engineers and therefore covered a broad variety of project sizes within the selected business group.

Essence of the study

Prior research suggests there is a need to further examine team performance antecedents such as risk and task complexity, not only as direct factors on team performance but also under the influence of different leadership styles i.e. transformational and transactional leadership, in the context of execution projects in a highly competitive environment. The present study addresses this need by investigating two phenomena and their moderating factors that merit further exploration: (a) the increasing risk which Owners oppose on engineering & contracting companies responsible for executing their projects in a highly competitive market environment. (b) the increasing task complexity where teams are exposed too due to multi office execution strategies for the execution of projects. (c) The influence of leadership behavior, expressed in two different styles: transformational and transactional leadership, on the relationship between risk, task complexity, and team performance.

The study examines the amount of risk and task complexity of which the sample projects are exposed too in an effort to gain insight into the impact of risk and task complexity on the realization of optimal team performance. Also part of this study is the investigation on how leadership behavior is able to influence the above-mentioned factors in their relationship with team performance. Therefore, the essence of the current study is the following: *"The study analyses the possible impact of different team antecedents, whether or not influenced by leadership behaviors, on projects' ability to pursue better, if not optimal, performance"*.

Problem statement

The purpose of this study is to enhance conceptually and empirically validated understanding about how different team antecedents interact with leadership behavior in their relationship with team performance. The present study is guided by the following main research question:

"Does the type of project manager leadership; transformational / transactional influence the impact of task complexity or risk on team performance in a hyper competitive environment?"

Whereby risk refers to the amount of exposure on projects to events, potentially leading to profit losses which projects are faced with during the execution. Task complexity is divided in three different types: component, coordinative, and dynamic. The first deals with the individual, the second with the nature of relationships between task input and task product and the latter with the changes in the environment in which these tasks are executed and potentially impacted by (Wood, 1986). Finally team performance refers to the amount of revenue and profit which is achieved by each project and therefore measures the financial performance of each project. Further details will be provided in the following chapters of the study. The two different leadership behavior styles the study refers to as moderating factors are known in literature as transformational and transactional leadership. The first consists of four dimensions: (1) idealized influence, (2) inspirational motivation, (3) intellectual stimulation, and (4) individual consideration (Avolio, Bass, & Jung, 1999) and the latter consists of two dimensions: (1) contingent reward, and (2) active management by exception (Den Hartog, Van Muijen, & Koopman, 1997). The environment in which the sample projects are executed is considered hyper competitive as a result of Professor H. W. Volberda's Quick Scan Flexibility (QSF) questionnaire (Volberda, 2007). Details of executed QSF are attached in appendix 2 as reference.

In order to provide an answer to the framed problem, the study formulates sub-research questions. These questions guide the conceptual and empirical research of this study.

Sub-research question 1:

„What is the role of transformational leadership behavior on the impact of risk or task complexity on team performance in a hyper competitive environment?"

Sub-research question 2:

„What is the role of transactional leadership behavior on the impact of risk or task complexity on team performance in a hyper competitive environment?"

Sub-research question 3:

„How is risk or task complexity impacting the project team performance in a hyper competitive environment?"

Research method

An analytical survey was conducted to determine whether there was a relationship between the selected pairs of variables (Collis, & Hussey, 2009) as indicated in the conceptual model and subsequent hypotheses in the following chapters. The survey methodology is designed to collect primary or secondary data from a sample, with a view to analyzing them statistically and generalizing the results to a population (Collis & Hussey, 2009). The population which serves this study consists of a significant number of Energy & Chemicals (E&C) business group projects executed by Fluor Haarlem of which a representative number was selected.

The empirical research was conducted at Fluor Haarlem; a Dutch branch of a US based Fortune 500 Company, which is one of the world's largest publicly owned engineering, procurement, construction, and maintenance services companies. Over the past century, Fluor, through its operating subsidiaries, has become a trusted global leader by providing exceptional services and technical knowledge. Clients rely on Fluor to deliver world-class solutions that optimize their assets, improve their competitive position, and increase their long-term success. Consistently rated as one of the world's safest contractors, Fluor's primary objective is to develop, execute, and maintain projects on schedule, within budget, and with excellence. The outstanding dependability, expertise, and safety performance distinguish Fluor as the preeminent global leader in the building services marketplace. Through their individual and collective expertise, Fluor's global workforce of more than 42,000 employees provide cost-effective, intelligent solutions in a timely manner. Fluor maintains a network of offices in more than 25 countries across 6 continents. This workforce provides Fluor with the capability to execute diverse scopes of work on projects, both large and small, and the flexibility to staff projects in accordance with project needs. Today Fluor serves clients in a wide variety of industries, including oil and gas, chemicals and petrochemicals, commercial and institutional, government services, life sciences, manufacturing, microelectronics, mining, power, telecommunications, and transportation. As shown in Figure 1, the business groups are organized to serve clients in these industries.

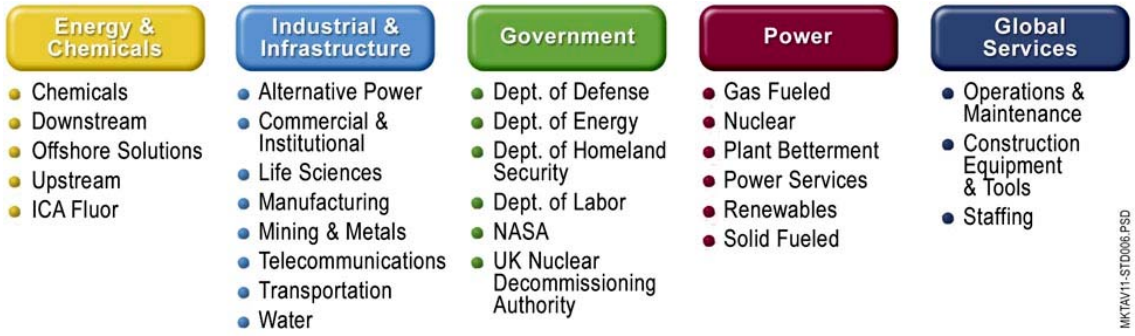


Figure 1. Organization of Fluor's Business Operations.

Out of the above shown business groups Energy & Chemicals is the one which is served by the Fluor Haarlem office meaning that projects executed from the Haarlem office location are part of the responsibility of the E&C Business group management. Fluor Haarlem is predominantly executing projects in the chemicals and downstream segments within the E&C business group for the Europe, Asia, & Middle East (EAME) region due to its specific knowledge of both technology and region. The stratified sample utilized in this study therefore contains chemicals and downstream projects executed from the Fluor Haarlem office in the EAME region. Below pictures provide examples of projects executed within the E&C business group.

Figure 2. Repsol, Cartagena (Spain)

Figure 3. TASNEE, Al-Jubail (KSA)

A quantitative data collection method was used to obtain primary data through questionnaires. Secondary data was obtained from several Fluor internal reporting documents which are regularly reported on each project to management. The questionnaires were submitted to project representatives in lead or management positions on the sample projects to obtain input on the different leadership styles of the associated project manager and the task complexity experienced on the projects. The collected data was examined on outliers and missing data subsequently structured, coded and prepared for uploading in the statistical analysis program SPSS in which several analyses were conducted such as, but not limited to, Pearson correlations, regression analyses, checks on multicollinearity and finally post-hoc analyses were executed with an alternative dependent variable in order to ensure the validity of the research outcome.

Implications of the study

Theoretical implications The intention of this study is to deliver a contribution to both team antecedents and leadership research in a number of ways. Theoretically, the study contributes towards the discussion on the subject of team performance and its drivers. Firstly, it is one of the first empirical attempts to investigate the effect of risk on projects' ability to pursue better, if not optimal, performance. Secondly, whereas current literature pays attention to task complexity and its impact on team performance, there is still scope for the current study to add nuance to this literature by investigating similar relationships in a complete different and highly competitive context. Thirdly, the influence of leadership behavior has been subject of many studies, as mentioned in the introduction, but rarely as moderating factor on the above-mentioned team performance antecedents and never in the context of this study. The present research covers these gaps. Thereby, more detailed insights will be generated with regard to how team performance is affected and the specific role of leadership behavior in this equation.

Managerial implications This study not only contributes theoretically but also is important for management in practice. Practically, a better understanding of the implications of risk and task complexity on team performance would help project managers to assess the impact of these factors on their financial performance. It would also help them to be able to identify which leadership style behavior is most effective in managing the impact of the selected team performance antecedents on team performance. Knowing the impact of leadership style behavior on the relationship between risk, task complexity, and team performance makes it thus possible for companies' human resources (HR) groups to identify which type of leadership behavior is desired for the execution of projects.

Structure of the thesis

The coming chapters will outline the structure of the thesis, beginning in Chapter 2 with a thorough literature review on both team performance antecedents; task complexity and risk, the different leadership behavior styles; transformational and transactional leadership and both their direct or moderating influence on team performance. Chapter 3 justifies the methodology of the study and describes the data collection process followed by chapter 4 in which the empirical part of the study is reported and the results are highlighted. Finally, Chapter 5 highlights the implications, both theoretically and managerial, and discusses how the results have contributed to answering the main research question as raised in this chapter. The chapter rounds off with addressing the limitations of the study and provides an outlook on future research on this topic.

LITERATURE REVIEW AND HYPOTHESES

Defining Team Performance

Team Performance is conceptualized as a multilevel process (and not a product) arising as team members engage in managing their individual- and team-level task work and teamwork processes (Kozlowski, & Klein, 2000). Also described as a non-unitary construct by Guzzo (Guzzo, & Dickson, 1996) and containing multifaceted dimensions by Dunphy (Dunphy, & Bryant, 1996). Hackman describes team performance as "the extent to which the productive output of a team meets or exceeds the performance standards of those who review and/or receive the output" (Hackman, 1987). Team performance has been addressed in the team literature as a generalized framework that includes inputs (i.e. resources), processes (i.e. collective effort) and outcomes (i.e. specific performance indicators) (Guzzo, & Shea, 1992; Hackman, 1992) I represent team performance as process-type performance, existing team performance literature indicates similar approaches (Glickman, Zimmer, Montero, Guerette, Campbell, Morgan, & Salas, 1987; Klimoski, & Mohammed, 1994; Salas, & Fiore, 2004). Team process-based performance may include: levels of collective effort expended or the quality of interpersonal relationships (Klimoski, & Mohammed, 1994; Glickman, et al, 1987). To measure team performance output quantitative measure methods can be used (Stashevsky, & Koslowsky, 2006) in order to compare individual project team's performances.

Team Performance antecedents

As mentioned in the introduction, organizations have begun to use teams to a much greater extent (DeSchon, et al, 2004). The continued popularity of team-based work over a number of decades is reflected in the large volume of research focusing on the determinants of team effectiveness or team performance. Team based research is in literature divided in external team processes reflecting the nature of the team's interactions with parties external to the team itself and internal team processes which reflect the intra-team interactions between team members (Marks, Mathieu, & Zaccaro, 2000). Both internal and external team processes share commonalities in that they represent team-level actions carried out for the purposes of meeting collective performance goals (Marks, et al, 2000; Mathieu, et al, 2008) and originate in the behaviors and actions of individual team members (Kozlowski, & Klein, 2000). Within the above-mentioned team processes, several groups of team performance antecedents are recognized in literature and served as topic of research in previous studies.

First, team process behaviors such as communication, trust, interdependence, coordination, planning, team cohesion, team competence, knowledge level and team cohesiveness have been linked both theoretically and empirically in literature to team performance (Campion, Medsker, & Higgs, 1993; De Jong, & Elfring, 2010; Palanski, Kahai, & Yammarino, 2010; Stashevsky, & Koslowsky, 2006; Mathieu, Maynard, Rapp, & Gilson, 2008; Williams, 2007 Cohen, & Bailey, 1997; Ilgen, Hollenbeck, Johnson, & Jundt, 2005). The findings indicate that team cohesiveness and trust stimulate team interaction and communication that leads to optimization of team processes and subsequent improved team performance. Second, cognitive factors such as; team knowledge, shared cognition as in: teams shared mental models, team situation awareness, and understanding communication have been subject in several studies as antecedent of team performance (Marks, Zaccaro, & Matthieu, 2000; Mathieu, Heffner, Goodwin, Salas, & Cannon-Bowers, 2000; Salas, & Fiore, 2004; Ployhart, Iddekinge van, & MacKenzie Jr, 2011; Cooke, Kiekel, Salas, Stout, Bowers, & Cannon-Bowers, 2003; Gary, & Wood, 2011). The findings indicate that team cognition and shared mental models strenghtens the communication, team knowledge and interconnectedness between team members which leads to optimization of team processes and subsequent improved team performance. Third, team-training studies made valuable contributions to the field of team performance enhancement antecedents by promoting teamwork and subsequently enhancing team performance (Cannon-Bowers, & Salas, 1998; Morgan, Coates, Kirby, & Alluisi, 1984; Marks, Zaccaro, & Matthieu, 2000; Cooke, Kiekel, Salas, Stout, Bowers, & Cannon-Bowers, 2003). The findings indicate that team training not only improves team knowledge but especially under the influence of cross training positively impacts communication between team members which leads to optimization of team processes and subsequent improved team performance. Fourth, leadership studies have been a frequent topic for research in literature considering the amount of (meta-anlytical) studies (Wang, Oh, Courtright, & Colbert, 2011; Stashevsky, & Koslowsky, 2006; Mohammed, & Nadkarni, 2011; Marks, Zaccaro, & Matthieu, 2000). The findings indicate often that transformational leadership has a positive impact on team performance and that mental models can be positively influenced by leadership behavior in order to achieve optimal team performance.

A number of (meta analytical) studies associated with above mentioned groups of team performance antecedents are reflected in Table 1 - Summary of previous findings on outcomes of team performance antecedents on team performance, in order to provide an impression of the magnitude of research conducted on team performance antecedents. The studies are categorized by external and internal team processes whereby the focus has been on internal team processes considering the team performance antecedents relevant for this study. Each study reflects the process variables, the performance indicators, the authors, the year of the study and the key findings. In some cases where meta-analytical studies are performed remarks are added to indicate this.

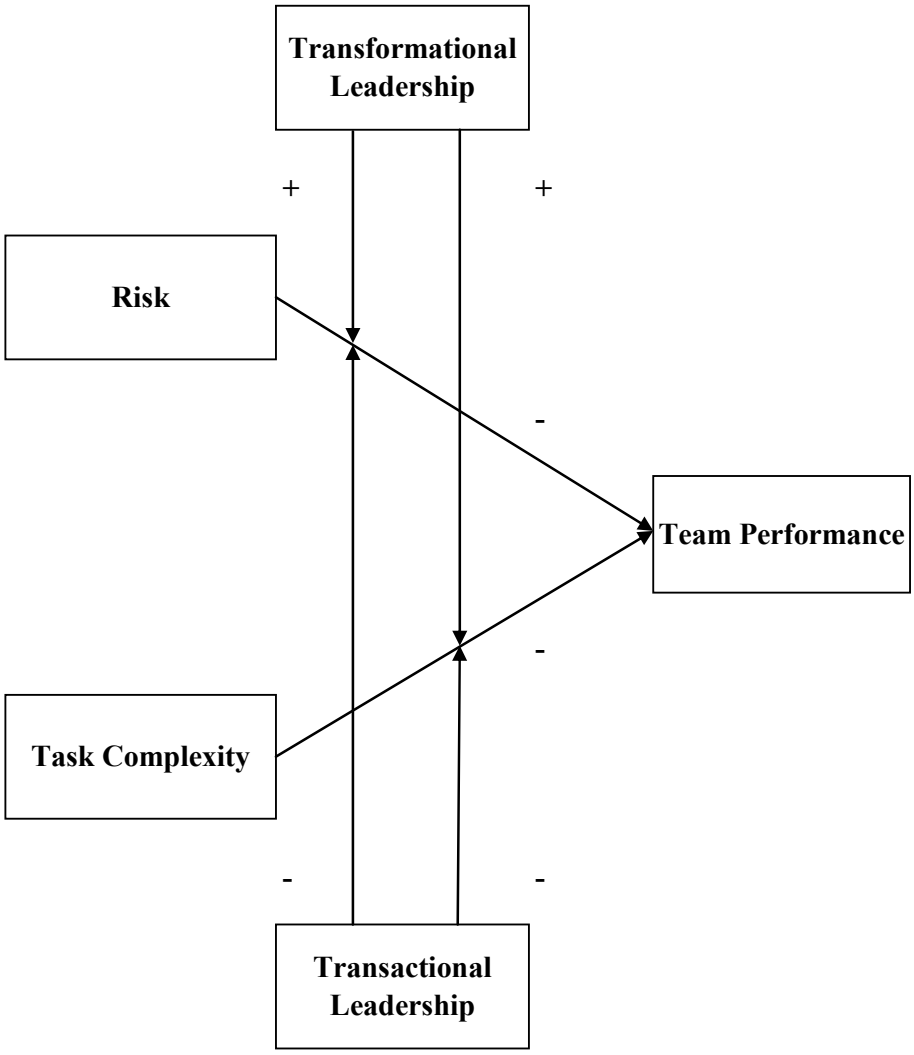
TABLE 1
Summary of previous findings on Outcomes of Team Performance antecedents on Team Performance

Category	Group	Antecedents / Process variables	Team Performance variables studied	Study	Year	Key findings
Internal team processes	Training	Team training	Individual-, and team performance	Morgan, Coates, Kirby, & Alluisi	1984	The study findings illustrate that both individual and team performance effectiveness were reduced in direct proportion to the percentage of un-trained personnel substituted in a trained team.
Internal team processes	Behavioral	Task complexity	Performance	Wood	1986	A definition of task complexity was provided and the study findings illustrate evidence of a negative impact of task complexity on performance.
Internal team processes	Behavioral	Job Design, Interdependence, Composition, Process, and Context.	Productivity, Satisfaction, Manager judgement	Campion, Medsker, & Higgs	1993	The study findings illustrate that productivity is positively correlated with four out of five themes such as: Job design, Interdependence, Composition, & Process.
External / Internal team processes	Several	Task design, internal processes, external processes, group psychosocial traits, environmental factors, group composition, and organizational context.	Team effectiveness / team performance (job satisfaction, behavioral outcomes)	Cohen, & Bailey (Meta-Analytical study)	1997	The authors review and summarize the research on teams and groups in organization settings. The study focuses on various dimensions of team effectivenss and its antecedents.
Internal team processes	Training	Cross training	Team performance	Cannon-Bowers, & Salas	1998	The study findings suggests that the type of cross training necessary to improve team performance may be related to the nature of the task and that cross training may be effective in allowing teams to communicate effectively.
Internal team processes	Cognitive	Team members shared mental models.	Team performance	Mathieu, Heffner, Goodwin, Salas, & Cannon-Bowers	2000	The study findings illustrate that both shared team and task based mental models related positively to subsequent team process and team performance.
Internal team processes	Several	Leader briefings, team interaction training, and team members knowledge structures.	Team performance	Marks, Zaccaro, & Mathieu	2000	The study findings illustrate that both leader briefings and team interaction training affected the development of mental models which in turn positively influenced team communication processes and team performance.
Internal team processes	Cognitive	Team knowledge, task knowledge, and cross training	Team performance	Cooke, Kiekel, Salas, Bowers, Stout, & Cannon-Bowers	2003	The authors illustrate that task and teamwork knowledge under influence of cross training provide team performance advantages.
Internal team processes	Cognitive	Team cognition, team communication, shared mental models, team knowledge	Team performance	Salas, & Fiore	2004	The study findings illustrate that team research has progressed in important ways because constructs coming out of cognitive psychology have been applied and adapted to aid our understanding of team processes and performance.
Internal team processes	Behavioral	Task complexity, and team composition.	Team performance	Higgs, Plewnia, & Ploch	2005	The study findings illustrate evidence that teams in the medium task complexity categories showed greater team performance.

Internal team processes	Several	Team work, coordination	Input-process-output framework	Ilgen, Hollenbeck, Johnson, & Jundt (Meta-Analytical study)	2005	The study findings illustrate that recent team literature is a covergence on common perspective of teams along with theories and methods to address the complexities of the perspective.
Internal team processes	Behavioral, leadership	Knowledge level, team cohesiveness, leadership style, and gender.	Team performance	Stashevsky, & Koslowsky	2006	The study findings illustrate that knowledge level and team cohesiveness significantly positive correlated with team performance.
Internal team processes	Several	Cohesion, psychological safety, team efficacy, team level autonomy, team learning, team shared mental models, relation and task conflict, and task interdependence.	Team performance	Mathieu, Maynard, Rapp, & Gilson (Meta-Analytical study)	2008	The authors provide an overview from 1997-2007 on team research as an extention of Cohen and Bailey's previous work, they discuss the nature of work teams and the antecedents of team performance.
External team processes	Several	Team boundary spanning (coordination, managing key external relationships)	Team performance	Marrone (Meta-Analytical study)	2010	The study findings illustrate that positive impact of team boundary spanning on team innovation, performance and effectiveness has been solidly established by earlier studies of Ancona and confirmed in later studies by others.
Internal team processes	Behavioral	Trust (team monitoring, team effort, and team reflexity)	Team performance	De Jong, & Elfring	2010	The study findings illustrate that trust can and does affect team performance in different and distinct ways, via team monitoring and team effort.
Internal team processes	Behavioral	Team trust (and team behavioral integrity, and team transparancy)	Team performance	Palanski, Kahai, & Yammarino	2010	The study findings illustrate that a positive relationship between team trust and team performance was evident.
Internal team processes	Cognitive	interconnectedness of human capital (personality and cognitive ability)	Unit service performance / effectiveness.	Ployhart, Iddekinge, & Mackenzie	2011	The study findings illustrate that both generic and unit specific human capital positively influence unit effectiveness.
Internal team processes	Cognitive	Task complexity, cognitive ability (GMAT), mental model complexity, mental model accuracy, intercept, and self efficacy.	Performance	Gary, & Wood	2011	The study findings illustrate that decision makers with more accurate mental models of the causal relationships in the business environment achieve higher performance outcomes. Also proof is provided that task complexity is negatively correlated with mental models accuracy and performance.
Internal team processes	Leadership	Transformational leadership	Team performance, overall performance, and organizational performance.	Wang, Oh, Courtright, & Colbert (Meta-Analytical study)	2011	The study findings illustrate that transformational leadership is positively related to team performance.
Internal team processes	Leadership	Team temporal diversity, (i.e. time urgency, pacing style, time perspective) and team temporal leadership.	Team performance	Mohammed, & Nadkarni	2011	The study findings illustrate that team temporal leadership positively moderates the relationship between temporal diversity and team performance and exerted a positive main effect on team performance.

Literature contains a number of studies relevant to the team antecedents in this study which will be addressed in more detail in later sections of this chapter. In the early nighteen twenties Frank Knight (Knight, 1921) already developed a definition for risk to identify the importance of the concept followed by research predominantly conducted in the field of financial markets (Huang, Sialm, & Zhang, 2011; Bollen, & Whaley, 2009; Fung, Hsieh, Naik, & Ramadorai, 2006; Korteweg, & Sorensen, 2010; Phalippou, & Gottschalg, 2008; Massa, & Patgiri, 2008; Chen, & Pennachi, 2009; Grund, & Sliwka, 2010). Later during the further development and research on risk management tools also risk factors were identified for the execution of IT projects. Despite all previous efforts not much is yet known in literature on identification of risk factors for the execution of projects in the industry which serves as topic for this study.

Also task complexity as team performance antecedent has been topic in several studies, as shown in Table 1. Predominantly Wood (Wood, 1986) developed a definition of the concept and commenced with research on the effects of task complexity on team performance. This research on task complexity was expanded later by Higgs, Plewnia, & Ploch (Higgs, Plewnia, & Ploch, 2005) in combination with team composition and more recently by Gary, & Wood (Gary, & Wood, 2011) as part of cognitive factors such as cognitive ability (GMAT), mental model complexity, and mental model accuracy. Studies of both De Jong (DeJong, & Elfring, 2010) and Williams (Williams, 2007) evidence that trust has a positive impact on team performance and therefore supervisory or managerial personnel should actively engage in managing interpersonal relationships and fostering trust among team members. To uncover how project managers by means of their leadership style are able to influence the effects of both risk and task complexity on team performance, I consider how team performance antecedents; risk, task complexity are influenced by transformational-, and transactional leadership on the impact on team performance, as depicted in Figure 4 - Conceptual model.



Dependent variable: Team Performance
Independent variables Risk, Task Complexity
Moderating variables: Transformational-, Transactional Leadership

Figure 4. Conceptual Model

Defining Risk

Risk is defined in literature as future issues that can be avoided or mitigated, rather than present problems that must be immediately addressed. E.g., "Risk is the unwanted subset of a set of uncertain outcomes." (Cornelius Keating). Also worded by Knight as the combination of the likelihood of an occurrence of a hazardous event or exposure(s) and the severity of injury or ill health that can be caused by the event or exposure(s) (Knight, 1921). Figure 5 - Qualitative analysis of Risk indicates that risk is calculated by multiplying the likelihood of occurrence times the potential severity of the outcome in order to arrive at a potential risk exposure for each identified risk. Hereby companies are able to qualify the amount of risk exposure and allocate a sum of money against each risk to count for the consequences if and when a risk would materialize.

Risk = **Likelihood** X **Severity**

LIKELIHOOD OF OCCURANCE		
Rating	**Likelihood**	**Criteria**
5	Almost Certain	91-100%, It is expected to occur in most circumstances
4	Likely	76-90%, Will probably occur in most circumstances
3	Possible	26-75%, Might occur at some time
2	Unlikely	11-25%, Could only occur at some time
1	Rare	0-10%, May occur only in exceptional circumstances

SEVERITY			
Rating	**Severity**	**Financial**	**Schedule**
5	Critical	>$1MM	One Month
4	Major	$1MM	Two Weeks
3	Serious	$500k	One Week
2	Moderate	$250k	Three Days
1	Minor	$10k	One Day

Figure 5. Qualitative analysis of Risk

The sum of money which is allocated to protect the company from unwanted events and subsequent consequences is called contingency, in below figure 6 indicated as risk event contigency which could end up as cost or profit depending on the team capabilities to manage the risks during the execution of the project.

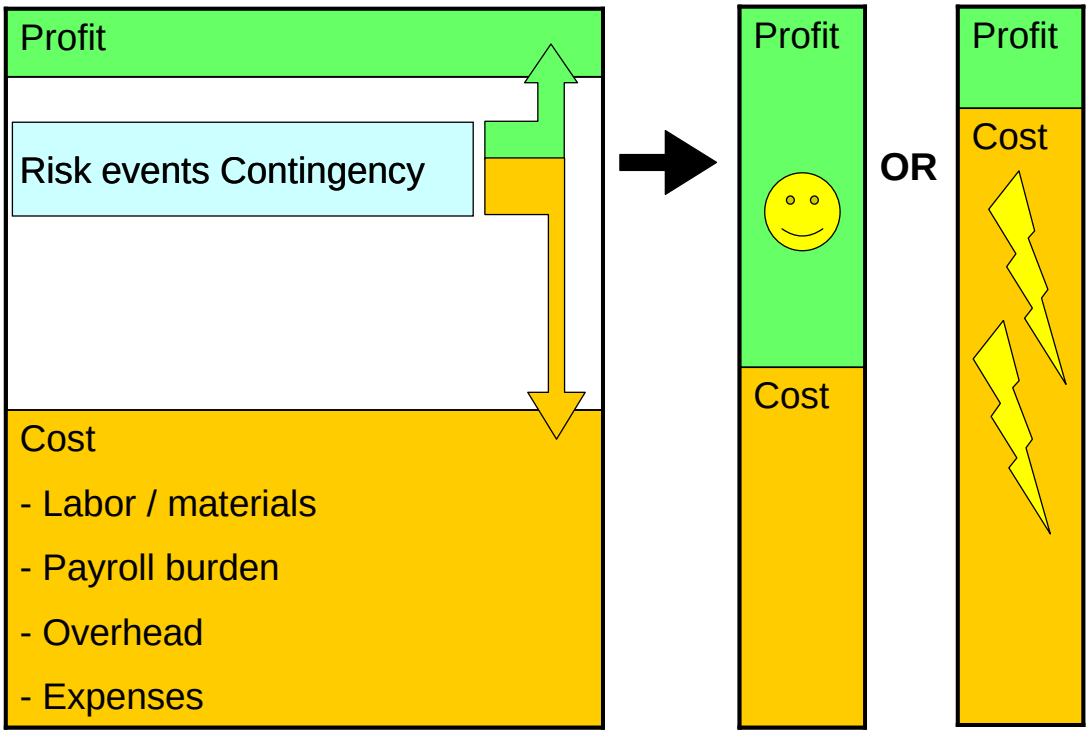


Figure 6. Risk event contingency

Literature defines a number of knowledge areas associated with risk. First, Traders in financial markets associate risk with returns meaning that if risks are high high returns are essential to compensate for the potential exposure. These traders could be operating on behalf of individuals and manage their portfolios or working for hedge funds or large industrial investors essentially doing the same for their clients. The body of literature associated with this topic is extensive and reflected in many studies (Huang, Sialm, & Zhang, 2011; Bollen, & Whaley, 2009; Fung, Hsieh, Naik, & Ramadorai, 2006; Korteweg, & Sorensen, 2010; Phalippou, & Gottschalg, 2008; Massa, & Patgiri, 2008; Chen, & Pennachi, 2009; Grund, & Sliwka, 2010). Evidence on performance pay and risk aversion. Economic letters, 102, 8-11) predominantly in the field of financial markets. The outcome of these studies indicate that managers have the tendency to increase risk exposure for their portfolios in order to improve performance if a personal incentive is directly linked to that performance measure despite the potential negative consequences for their company as noted by Huang, et al „ We found that funds with larger incentives to shift risk levels are more likely to increase risk and perform particularly poorly after increasing risk“. Second, Wallace, Keil and Rai (Wallace, Keil, & Rai, 2004) have identified six dimensions of risk; organizational environmental risk, user risk, requirement risk, project complexity risk, planning and control risk, and team risk in

their study on how software project risk affects project performance. The study results indicate that increased technical risk, driven by enhanced requirements and technological complexity, has a negative impact on project management risk and subsequent project performance whereby planning and control mechanisms can mediate the impact on project performance. Third, Risk management is another knowledge area in literature associated with risk. Project risk management is recognized as one of the key disciplines of project management and defined as the systematic process of identifying, analyzing, and responding to risk as project-related events, or managerial behavior, that is not definitively known in advance, but that has potential for adverse consequences on a project objective (Project Management Institute, 2004). Project Risk management includes the process of risk identification, analysis and handling (response) (Gray, & Larson, 2005). Risk handling/response is the choice of a proper strategy to reduce the likelihood of the occurrence of risk events and /or the magnitude of their negative impact (Fan et al., 2008). There is a well-developed body of knowledge about design and implementation of different risk management processes, such as risk management planning (Lifang, & Jun, 2009), risk identification (Letens, Van, Heene, & Leysen, 2008), risk assessment (Gogin, & Johnson, 2008), risk analysis (Campbell, & Currie, 2006; Vose, 1996) and risk response planning (Lee, & Chun, 2009). The expanded spectrum of new regulations and legal changes has created an increasing need to re-evaluate and better manage risk across the entire organization (Bedell, 2007). Studies show that risk management is gaining international focus (Gjerdum, 2008), and corporations are considering it as one of their main objectives (Rawls, & Smithson, 1990). Risk handling plays an important role in mitigating the negative impact of project risks (Kerzner, 2006; Miller, & Lessard, 2001). Most projects are not deterministic since they are subject to risk and uncertainties. Especially complex engineering projects are susceptible to project-specific risks such as technical complexity, significant changes in scope and quantities, large funding uncertainty, severe acts of nature, and poor management decisions (U.S. Government Accountability Office, 2009; Fan, Lin, & Sheu, 2008; Conrow, 2003; Chapman, & Ward, 1997; Sage, 1992). Therefore, Fluor has developed its own Business Risk Management Framework (BRMF) in which different categories of risks are identified. This tool helps the project manager to identify the project associated risks and to develop mitigation strategies for each of them in order to ensure the ‘as sold’ profitability of the project, as indicated in table 2 - Overview of main project risk management processes, in which an overview is given of available risk management processes in literature.

TABLE 2
Overview of main project risk management processes

Major steps in project risk management	*PMBOK - PMI risk management process (PMI, 2004)*	*OGC - management of risk (Raftery, 1994)*	*PRAM - APM risk management process (Borge, 2001)*	*Fluor - BRMF (Business Risk Management Framework) (Fluor, 2001)*
Planning	Risk management planning	Context	Focus Define	Objectives, goals
Identification	Risk identification	Risk identification	Identify Structure	Identification
Analysis	Risk analysis	Assess - estimate Assess - evaluate	Estimate Evaluate	Mitigation
Response	Risk response planning Risk (monitoring and) control	Plan Implement Communicate	Plan Ownership Manage	Response Manage Continuous improvement

Source: Kutsch, E., Hall, M. 2010. Deliberate ignorance in project risk management. ***International Journal of Project Management*** , 28:245-255.

Risk and Team Performance

International risk management seems to be a crucial indicator of top management team (TMT) performance. The better international risk is managed as expressed by risk diversification the better TMT performance. The teams that score better with respect to their international risk management factor show a better firm performance (Auden, Shackman, & Onken, 2006). Also the lack of and/or inadequate dynamic risk management has been identified as a major cause of project failures (Kujawski, & Angelis, 2010). Risk factors or events form a treat to the performance of teams or companies objectives if not properly mitigated. Wallace, Keil and Rai (Wallace, Keil, & Rai, 2004) found evidence in their study that increased technical risk, driven by enhanced requirements and technological complexity, has a negative impact on project performance and subsequent project success and PMI states that risks potentially endanger the ability of the project manager to meet predefined project objectives of scope, time, and cost. This ultimately means that tasks take longer than planned with a negative consequence on the project manager's fulfillment of the project objectives (Project Management Institute, 2004). These argument hold true for the focal organization in this study, which is active in a hyper competitive international environment. Therefore, I propose the following hypothesis:

Hypothesis #1: Risk negatively impacts the (Project) Team Performance in a Hyper Competitive environment.

Defining Task Complexity

It is necessary for team members to pull together their diverse functional expertise and resources to formulate strategies to deal with highly complex and uncertain tasks (Horwitz, 2005). The literature covers both task uncertainty and task complexity. However in the context of this study task complexity is more relevant since task uncertainty is a property of the immediate task environment, rather then the task itself (Wood, 1986). Task complexity, which describes the relationships between tasks inputs, will be an important determinant of human performance through the demands it places on knowledge, skills, and resources of individual task performers. Three types of task complexity are defined: component, coordinative, and dynamic. Component complexity of a task is a direct function of the number of distinct acts that need to be executed in the performance of the task and the number of distinct information cues that must be processed in the performance of those acts. As the number of acts increases the knowledge and skill requirements for a task also increase, simply because there are more activities and events that an individual needs to be aware of and able to perform. Coordinative complexity refers to the nature of relationships between task input and task product. The form and strength of the relationships between information cues, acts, and products, as well as the sequencing of inputs, are all aspects of coordinative complexity. Dynamic complexity is due to changes in the states of the world which have an effect on the relationships between task inputs and products. Changes in either the set of required acts and information cues or the relationships between inputs and products can create shifts in the knowledge or skills required for a task (Wood, 1986). Also defined by Espinosa as follows: Task complexity not only increases with the task size but also with the interrelationships between task activities and with the amount of information that needs to be processed to carry out these activities (Espinosa, Slaughter, Kraut, & Herbsleb, 2007).

Task Complexity and Team Performance

Variations in task complexity appear to produce changes in the knowledge, skills, and effort requirements for successful task performance (Wood, 1986). Prior research on judgment and decision-making shows that complexity impairs the formation of accurate mental models and undermines performance (Moxnes, 1998; Paich, & Sterman, 1993; Sengupta, & Abdel-Hamid, 1993; Sterman, 1989). At high levels of complexity, the resulting demand on individuals may begin to exceed their capacities to respond, creating a condition of "overload" which leads to lowered performance (Wood, 1986). Gary and Wood provided empirical evidence in their research (Gary, & Wood, 2011) that task complexity has a significant and negative effect on performance, indicating that participants in the high complexity condition achieved significant lower performance outcomes than participants in the low complexity group. In addition, Argote and colleagues (Argote, Insko, Yovetich, & Romero, 1995; Reagans, Argote, & Brooks, 2005) found that team performance increased with task experience and decreased with task complexity in a research setting where student teams were executing origami tasks. In recent studies evidence was found that development of larger structurally more complex software, where task complexity is considered high, was associated with reduced performance (Espinosa et al., 2007). Higgs (Higgs, Plewnia, & Ploch, 2005) evidenced the opposite of our model in being that teams in the medium task complexity category showed greater team performance. These arguments hold true for the focal organization in this study, which is active in a hyper competitive international environment. Therefore, I propose the following hypothesis:

Hypothesis #2: Task Complexity negatively impacts the (Project) Team Performance in a Hyper Competitive environment.

Defining Leadership

Performance as aspect of organizational outcomes has been shown to be impacted by leaders (Haleblian, & Finkelstein, 1993). The role of leadership has also been found to be relevant in employee willingness to voice ideas aimed at improving the organization and the way it functions (Detert, & Burris, 2007). The type of leadership; which will topic of research in this thesis, transformational and transactional has been already a subject in many studies and captures the extent to which leaders engage their subordinates by instilling in them the organization's goals, or clarifying the rewards that will follow from the attainment of such goals (Wang, Oh, Courtright, & Colbert, 2011; Vaccaro, Jansen, Van den Bosch, & Volberda, 2010; Rubin, Munz, & Bommer, 2005; Judge, & Picollo, 2004; De Groot, Kiker,& Cross, 2000; Yammarino, Spangler, & Dubinsky, 1998; Yammarino, Dubinsky, Comer, & Jolson, 1997; Fuller, Patterson, Hester, & Stringer, 1996).

Transformational leadership consists of four dimensions: (1) idealized influence, (2) inspirational motivation, (3) intellectual stimulation, and (4) individual consideration (Avolio, Bass, & Jung, 1999). Idealized influence represents the degree of which leaders are admired, respected, and trusted. This dimension includes charismatic behavior that causes followers to identify with the leader and fosters a sense of intrinsic motivation to achieve goals. Inspirational motivation provides meaning and challenge followers, fostering team spirit, and encouraging them to envision attractive future states. Intellectual stimulation prompts followers to question assumptions and be creative. Transformational leaders ensure that creativity and innovation is part of problem solving processes. Individualized consideration includes the extent of which followers' potential is developed by attending to their individual needs, as well as creating learning opportunities and a supportive environment for growth (Bass, Avolio, Jung, & Berson, 2003). The definition of transformational leadership styles builds on prior classifications, such as relations-oriented versus task-oriented leadership (Fiedler, 1967) and directive versus participative leadership (Heller, & Yukl, 1969). In addition, transactional leadership follows House and Mitchell's (House, & Mitchell, 1974) path-goal theory quite closely. Also models of charismatic, inspirational, or visionary leadership (House, & Shamir, 1993; Westley, & Mintzberg, 1989) present many similarities to transformational leadership.

Transformational leaders help individuals transcend their self-interest for the sake of the larger vision of the firm. They inspire others with their vision, create excitement through their enthusiasm, and puncture time –worn assumptions through their resolve to reframe the future, question the tried-and-true, and have everybody to do the same (Bass, & Avolio, 1990).

Motivation to achieve team level goals is enhanced by the increased levels of social identification that are characteristic of followers of transformational leaders (Kark, Shamir, & chen, 2003). Transformational leaders also express their confidence that teams will achieve their goals, leading to higher levels of team potency (Bass et al., 2003; Schaubroeck, Lam, & Sha, 2007) and encourage higher levels of team cohesion (Bass et al., 2003), which facilitates coordination and cooperation among group members (Wang et al., 2011).

Transactional leadership consists of two dimensions: (1) contingent reward, and (2) active management by exception (Den Hartog, Van Muijen, & Koopman, 1997). Contingent reward entails the clarification and specification of what is expected of organizational members and the assessment of goals and subsequent reward for its accomplishment. Through contingent reward, leaders build commitment to the fulfillment of 'contracts' with followers (Avolio et al., 1999; Bass, & Avolio, 1993). Active management by exception involves the leader's active involvement and intervention to monitor and rectify any divergence from an agreed standard in the followers' work (Vaccaro et al., 2010). Transactional leaders engage in a transaction in order to satisfy their respective wants (Burns, 1978) and provide extrinsic motivation to their subordinates (Vaccaro et al., 2010), they are primarily concerned with gaining compliance from subordinates, which they will do by targeting their self interest, by agreeing upon the conditions and rewards that will follow the fulfillment of certain requirements (Bass, 1990; Yammarino, & Bass, 1990; Bass, & Avolio, 1993; Howell, & Hall-Merenda, 1999).

Risk, Task Complexity and Transformational leadership

Strategic management scholars predict that a strong international presence is essential to the future survival and prosperity of large business organizations (Bartlett, & Ghoshal, 1989; Porter, 1990; Prahalad, & Hamel, 1994). All firms engaged in international business must employ strategies to manage their risks. Experienced managers believe that they can apply their skills to influence the amount of risk to which their firms are exposed (March, & Shapira, 1987). I consider elements of manager's transformational leadership to be on its own moderating the impact of risk or task complexity on team performance. First, as stated earlier idealized influence causes followers to identify with the leader and fosters a sense of intrinsic motivation to achieve goals (Bass, et al, 2003). These goals could be achieved by minimizing risk and subsequent impact on team performance by risk identification and risk mitigation processes. Leaders are able to motivate people to commit themselves to identify risks and as team to identify strategies to reduce or eliminate impact on team performance. Second, increased requirements on personnel knowledge levels, caused by individual task complexity or risks derived from project's technological complexity, could be mitigated by transformational leaders who exert their influence by broadening and elevating team member's goals and providing them with confidence in performing beyond expectations as argued by Dvir, Eden, Avolio, and Shamir (Dvir, Eden, Avolio, & Shamir, 2002). Third, the coordinative complexity, as component of task complexity, in products or deliverables could be impacted by transformational leaders through the use of inspirational motivation causing emphasis on harmonious relationships within teams and encourage shared learning experiences across team members with possible conflicting interests (Chen, Chen, & Meindl, 1998; Vera, & Crossan, 2004). Fourth, transformational leaders provide organizational members with distant support and communicate the need to refine current capabilities in existing domains and apply current knowledge. This type of leadership facilitates the emergence of social networks that effectively combine and diffuse existing sources of knowledge among organizational members (Hanna, & Lester, 2009) allowing new knowledge to be generated more efficiently and quickly in order to cope with increased task complexity.

Since above mentioned arguments illustrate that transformational leadership and therefore the associated project manager can positively influence the effect of risk or task complexity on team performance, I propose the following hypotheses:

Hypothesis #3a: Project Manager Transformational Leadership positively moderates the impact of Risk on Team Performance in a Hyper Competitive environment.

Hypothesis #3b: Project Manager Transformational Leadership positively moderates the impact of Task Complexity on Team Performance in a Hyper Competitive environment.

Risk, Task Complexity and Transactional leadership

I consider elements of manager's transactional leadership to be on its own moderating the impact of risk or task complexity on team performance. First, Burns (Burns, 1978) represents transformational and transactional leadership styles as the opposite ends of a continuum. Therefore I expect that in environments in which interdependencies are high and coordination difficult, as a result of high task complexity, that transactional leadership may be less effective and potentially have a negative effect on task complexity and subsequent team performance since Wang, et al stated that transformational leadership may be less effective in environments with low degrees of interdependence where interpersonal cooperation among employees is less critical (Wang et al., 2011). Second, Leaders with transactional behaviors monitor individual and team performance to anticipate mistakes and take corrective action when needed (Howell, & Avolio, 1993). A focus on preventing mistakes may be counterproductive to the creation of an environment that team members perceive as interpersonally non-threatening and tolerant of, or even supportive of, taking initiative to try new approaches in order to avoid risks and subsequently outperform (Jansen, Vera, & Crossan, 2009). Third, Vera and Crossan stated that transactional leaders emphasize existing values and routines, focus on increasing efficiency in current practices, and usually produce only incremental changes in institutionalized learning (Vera, & Crossan, 2004). Which could be interpretated as staying within the boundaries as opposed by management and not be able to cope with increased task complexity faced on projects, resulting in not meeting deadlines, inferior quality and subsequently re-work and poor team performance. Fourth, transactional leaders are primarily concerned with gaining compliance from subordinates by targeting their

self interest and agreeing upon the conditions and rewards that will follow the fulfillment of certain requirements (Bass, 1990; Bass, & Avolio, 1993; Yammarino, & Bass, 1990). Outside the boundaries of the requirements and subsequent contigent rewards subordinates are not motivated to look for opportunities to identify risks or gain knowledge to cope with the increased task complexity, since no additional incentives or rewards are to be expected because they were not agreed upon. Since above mentioned arguments illustrate that transactional leadership and therefore the associated project manager will negatively influence the effect of risk or task complexity on team performance, I propose the following hypotheses:

Hypothesis #4a: Project Manager Transactional Leadership negatively moderates the impact of Risk on Team Performance in a Hyper Competitive environment.

Hypothesis #4b: Project Manager Transactional Leadership negatively moderates the impact of Task Complexity on Team Performance in a Hyper Competitive environment.

METHODS

Methodological approach

This research follows the mode of deductive reasoning, in which the pattern that is theoretically expected moves to observations that test whether the expected patterns actually occurs (Babbie, 2007). This deductive research study will progress through five sequential stages: First, deducing a hypothesis from the theory; Second, expressing the hypothesis in operational terms, which propose a relationship between the specified variables; Third, testing these operational hypotheses; Fourth, examining the specific outcome and the fifth and final stage, if necessary, modifying the theory in the light of the findings (Robson, 2002). This study is an explorative and subsequent explanatory study as it uses hypotheses derived from theory to investigate causal relationships between the variables used in the conceptual model (Saunders, Lewis, Thornhill, Booij, Verckens, 2010).

Research approach

The hypothesized relationships between the constructs indicated in the conceptual model are tested by the use of quantative data, enabling the author to validate the generalizability of the results (Creswell, 1994). The problem statement and subsequent hypotheses in this study drive the focus on collection and analysis of quantitative data and testing of the hypotheses derived from the conceptual model. As the study aims at what and how factors influence an outcome and aim at generalizing to a population, collecting quantative data by means of a survey and statistically analyzing the data is considered to be the most suited approach (Mom, 2006). The following activities have been conducted to support this research study: First, desk research was conducted to examine existing literature studies on both team performance antecedents and leadership style influence. Second, out of the literature review a problem statement, research goals and a conceptual model were developed. Third, from the conceptual model hypotheses were generated matching the initial problem statement question followed by definition of measurable constructs derived from existing literature. Fourth, quantitative data was collected through a survey and used to perform statistical analyses. Finally, results were validated and hypotheses were tested.

Unit of measurement

The unit of analysis describes the level at which the research is executed and which objects are researched (Blumberg, Cooper, & Schindler, 2005). This study investigates the impact of different team performance antecedents on team performance. For both team performance antecedents; risk and task complexity and the construct of team performance the research will be conducted on the project team level and measured for each project. For the moderating leadership behavior factors; transformational and transactional leadership the research will be conducted for each project manager directly associated with the selected projects in order to assess his or her leadership style. Hence, the research views the influence of leadership behavior style on team performance antecedents as a project level concept.

Data collection

As mentioned in previous sections quantative data for this study was obtained through a survey. This section elaborates on the data collection procedures. The empirical research is conducted in the company where I am currently employed, Fluor. The research broadly consists of two stages.

First research stage

The first stage identifies the selection process of projects which are alegable for the research as set out in this study. The following selection criteria were used to create the sample:

- Projects must be completed or executed no earlier than 2005 out of the Haarlem office.
- Projects must be executed in the E&C Business Group.
- Project scope can only contain the following Fluor type of services:

BDEP (Basic Design Engineering Package) – contains the necessary technical information to prepare a +/-10% estimate and select a contractor for managing the realization of the project. It contains a scope of work description and detailed technical data on the requirements for the new assets. The owner's instructions and procedures are not included in the BDEP, as the managing contractor will develop these. The BDEP provides the basis for obtaining bids for EPCm-contracts to manage the implementation of a project (Fluor intranet, https://knowledge.fdnet.com).

FEED (Front End Engineering Design) – During conceptual design, Fluor establishes the early project definition of the engineering, procurement, and construction (EPC) requirements and a detailed project estimate. Services include feasibility studies, project-development planning, technology evaluation and recommendations, risk-management assessment, global siting, financing planning, constructability reviews, asset and life-cycle optimization over the facility's life-cycle, and front-end engineering (Fluor intranet, https://knowledge.fdnet.com).

E (Engineering Only) – Furnish the services necessary for the preparation of plans, drawings and specifications required for the work in order to provide the owner with all requisite information necessary for the procurement of all materials to be incorporated in the facilities and the erection of same (Fluor intranet, https://knowledge.fdnet.com).

EP (Engineering and Procurement) – Furnish the services necessary for both the preparation of plans, drawings, and specifications and for the procurement of all or some of the equipment, materials, and supplies required for the scope of work, including procurement and expediting services (Fluor intranet, https://knowledge.fdnet.com).

EPC (Engineering, Procurement, and Construction) – Furnish the services and materials necessary for the preparation of plans, drawings and specifications, procurement of all or part of the material requirements, and construction of the scope of facilities. Fluor employees perform a significant portion of the construction (Fluor intranet, https://knowledge.fdnet.com).

EPCM (Engineering, Procurement, and Construction Management) – Furnish the services and materials necessary for the preparation of plans, drawings and specifications, and procurement of all or part of the material requirements. Construction is provided by subcontractors and managed by Fluor (Fluor intranet, https://knowledge.fdnet.com).

PMC (Project Management Contractor) – A professional organization that acts on behalf of the Owner in large complex multi-unit projects or a series of projects (generally called a “program”). Whereby the objective is to assist the Owner in minimizing costs, maximizing return on investment and timely completion and coordination of the interfaces between the different EPC Contractors during all phases of the program (Fluor intranet, https://knowledge.fdnet.com) or combinations of all of the above.

The Above-mentioned selection criteria were chosen for the following reasons: First, to enable the author to make statements on one single business group within Fluor Corporation. Second, project leads were still able to memorize the context in which projects were executed and the role of the associated project manager. Third, to ensure that multi-discipline teams were executing the work in order to avoid functional background bias. Finally, to have access to all data sources and respondents.

Second research stage

The second stage describes the process of data gathering via the different sources of information. As primary data a survey is administered to the project team members in both management and lead positions for the functional disciplines active on each of the 41 sample projects. The E&C project management leadership questionnaire covered a number of topics related to both dependent- and independent variables, ranging from questions related to transformational / transactional leadership styles and task complexity (See Appendix 1 - Questionnaire). Respondents were asked to provide feedback on elements of the different leadership styles for each project manager of the associated project teams besides the questions related to the complexity of their tasks. These key project members were best suitable to assess their project manager's leadership style since, as direct reports, their relationship and interaction with the project manager would be more regular then other team members. I believe these respondents were well suited to be part of this study and sufficiently knowledgeable to provide adequate responses (Vaccaro et al, 2010). The questionnaire was posted on the internet. Separate mails, including an electronic link to the questionnaire, were submitted to the relevant respondents for each project in which an introduction of the research was given and the research goals were explained. Also the interest of sr. executive management in the research topic was indicated to encourage participation and to receive adequate responses. Confidentiality was promised to all respondents and a summary of the results was offered if desired. Respondents were given two weeks to fill-in the electronic questionnaire posted on internet. After two weeks nearly all projects received responses from project leads ranging from 2 up to 8 per project (See Table 6 – Questionnaire results). Managers and project leads were reminded in cases were only one or no response per project was received. Out of all responses per project an average was calculated to arrive at an index for each project based on multiple respondents.

Further secondary data on team performance, risk, team size, TIC, Fluor services was obtained through Fluor internal reports.

Research setting

The empirical research for this study is conducted at Fluor B.V. Nederland a subsidairy of Fluor Corporation which headquarters are located in Dallas, TX in the United States. The Fluor Haarlem office has some specific features which provided an intresting context to conduct this research. First, The Fluor Haarlem office is considered and utilized within the E&C Business group as one of the main execution offices around the world and therefore classified as lead office in the execution of projects. This results in a large number of projects executed from the office for which Fluor Haarlem project managers and associated project teams are responsible for all aspects of the project such as: profit and loss, quality, safety, and schedule. Second, Due to its unique position a wide variety of services are offered by the Fluor Haarlem office to Clients ranging from FEED studies until high risk lump sum EPC projects predominantly executed in the EAME region of the world. Third, more than fifty different nationalities are working together in project teams in the Fluor Haarlem office executing projects. This results in an interesting mix of cultures of both professional and personal backgrounds and provided an opportunity to collect perceptions of all sorts. For the above mentioned reasons the Fluor Haarlem office is considered as an ideal context to examine the moderating impact of different leadership styles on the relationship between risk, task complexity and team performance.

Measurement and Validation of Constructs

This section describes the measurement of the different constructs, indicated in the conceptual model, for the purpose of testing the hypotheses. Each definition specifies for each construct the empirical data used and the method of data collection. Multi-item scales from existing literature were used and verified to measure the required constructs, statistics of all literature scales are reported in table 5 - measurement scales at the end of this section.

Dependent variable

Team Performance was measured with financial performance indicators, such as: project gross margin (PGM) and earnings before income taxes (EBIT) for both hourly rates and absolute numbers. The objective was to establish how well financially the project and associated project manager performed compared with the as-sold target (=1.00) as determined by management at the start of the project, since each project manager carries responsibility for profits and losses on his project.

The required data was obtained from the Fluor backbone system on which each project post their monthly PSR packages for management review purposes. Out of this package the following data was retrieved:

- As-sold (original budget) / Achieved - PGM
- As-sold (original budget) / Achieved - PGM/hr
- As-sold (original budget) / Achieved - EBIT
- As-sold (original budget) / Achieved - EBIT/hr

As shown in table 3 – team performance calculation, for each of the above mentioned categories both as-sold and achieved numbers were derived and a ratio was calculated between the two numbers in order to indicated the achievement compared with the as-sold (target). Individual weighting of respectively 30%, 20%, 30% and 20% was assigned to each category whereby the emphasis was on the importance of absolute achievements in both PGM and EBIT in comparison with PGM/EBIT per hour achievements.

TABLE 3
Team Performance calculation

		Weight factor (%)	Values (€ x 1.000)
As sold PGM			2,000
Achieved PGM			3,000
	Delta PGM (%)	30%	1.5
As sold PGM/hr			10.00
Achieved PGM/hr			11.00
	Delta PGM/hr (%)	20%	1.1
As sold EBIT			1,000
Achieved EBIT			1,500
	Delta EBIT (%)	30%	1.5
As sold EBIT/hr			2.00
Achieved EBIT/hr			2.20
	Delta EBIT/hr (%)	20%	1.1
Results Team Performance		**100%**	**1.34**

Source: Fluor monthly PSR package

For each project a financial performance indicator is hereby calculated which enables the author to compare financial team performances between projects.

Independent variables

Task Complexity was assessed by project lead responses, as part of the E&C project management leadership questionnaire, to items of the multi-item scale developed by Tushman and subsequently Haas. (Haas, 2010; Tushman, 1978) Respondents rated the items on task complexity for the project and associated project manager on a seven-point Likert scale, with 1=’totally disagree’ and 7=’totally agree’.

The higher the average team member score on this variable, the higher the complexity of the task. (Haas, 2010) Based on this 3-item scale. (α=0.82)

Project Risk. was measured by using Fluor's Business Risk Management Framework (BRMF) Exhibit G – Risk Project Assessment form on which different risk categories and associated risk items are listed (See Table 4 – Risk calculation). The BRMF exhibit g form is filled in by the associated project manager at the start of each project by allocating YES or NO answers to each listed risk item in order to determine if the project is classified as a risk project within Fluor since then additional reviews with senior management are required during the course of the project. For the purpose of this research, weight factors are allocated for each risk item in order to arrive at a total risk number for each project. Category C - business criteria risk items are excluded from this research since these risk items are related to acquisitions, mergers, opening new offices, entering new regions and establishing new business lines and not particular to executing projects. By multiplying the weight factor with 1 for YES, and 0 for NO a total is calculated which indicates the total amount of risk exposure for the project, hereby the author is able to compare different projects.

TABLE 4
Business Risk Management Framework, Exhibit G - Risk Project Assessment

	Weight factor (%)	0 (NO) / 1 (YES)
A) PROJECT SIZE CRITERIA		
$US 100MM TIC or over for bid decision	5%	1
$US 50MM TIC or over for bid submittals	5%	1
B) PROJECT RISK CRITERIA		
Contract related criteria		
Fixed Price (Lump sum) etc.	15%	1
Build-Own-operate, build-own-transfer obligations	5%	0
Significant liquidated damages, penalties, incentives	15%	1
Guarantees / Warranties / other commitments in excess of $US 5MM	5%	0
Performance bonds	5%	1
Bid bonds	5%	0
No consequential damages disclaimer	10%	0
Incompatability of legal system with first world	5%	0
Project finance debt, financial guarantees of divestments of debt positions, 3rd party	5%	0
Project finance equity investments or divestments	5%	0
Execution / estimating criteria		
"First of a kind" project for Fluor - country of technology	10%	0
Proposal cost criteria		
$US 2MM or over for bid preparation	5%	0
C) BUSINESS CRITERIA		
Acquisitions, Mergers or Divestures over $US 5MM	N/A	N/A
Opening of new office requiring an investment of more than $US 5MM	N/A	N/A
Entering a new region requiring an investment of more than $US 5MM	N/A	N/A
Entering a new line of business	N/A	N/A
Total	**100%**	**0.45**

Source: Fluor BRMF toolkit

Moderating variables

Transformational Leadership was assessed by project lead responses, as part of the E&C project management leadership questionnaire, to thirteen items of the multi-scale Multifactor Leadership Questionnaire developed by Bass and Avolio. (Multifactor Leadership Questionnaire - MLQ-5X; Bass, & Avolio, 1995) The four items of transformational leadership consists of five items for idealized influence, inspirational motivation, intellectual stimulation, and individualized consideration. I averaged the items to create a composite index for transformational leadership.(α=0.98) (Jansen, George, Van den Bosch, & Volberda, 2008) Respondents rated the items on transformational leadership for the project manager on a seven-point Likert scale, with 1='totally disagree' and 7='totally agree'. The higher the average team member score on this variable, the higher the transformational leadership style of the associated project manager.

Transactional Leadership was assessed by project lead responses, as part of the E&C Project Management Leadership Questionnaire, to eight items of the multi-scale Multifactor Leadership Questionnaire developed by Bass and Avolio. (Multifactor Leadership Questionnaire - MLQ-5X; Bass and Avolio, 1995) Following previous practice (e.g. Vaccaro et al., 2010; Ensley, Hmieleski & Pearce, 2006; Epitropaki, & Martin, 2005; Lowe, Kroeck, & Sivasubramaniam, 1996; Waldman, Ramirez, House, & Puranam, 2001) I used the four-item scale of contingent reward and the four-item scale for active management by exception to measure transactional leadership. I averaged the items to create a composite index for transactional leadership. (α=0.87) (Vaccaro et al., 2010) Respondents rated the items on transactional leadership for the project manager on a seven-point Likert scale, with 1='totally disagree' and 7='totally agree'. The higher the average team member score on this variable, the higher the transactional leadership style of the associated project manager.

Control variables

TIC (Total Installed Cost) value of each project resembles the required investment from the Client to realize the Project, mostly without specific Owners costs such as, but not limited to: cost of feedstock, cost of property. This number is reflected on the profile/introduction page 1 of the PSR package, which is posted by the associated project manager each month on the Fluor backbone system. This number provides insight in the magnitude of the total project and allows the author to compare the selected projects with regards to size.

Fluor services value of each project resembles the total amount of monetary value representing the total cost of all combined types of services Fluor provides to the Client on the associated project. This number is reflected on the profile/introduction page 1 of the PSR package, which is posted by the associated project manager each month on the Fluor backbone system. This number provides insight in the magnitude of Fluor's participation in the project and allows the author to compare the selected projects with regards to importance to Fluor.

Team size of each project resembles the peak home office manpower staffing levels for the associated project. This number is reflected on the lead office staffing page 19 or total office staffing page 22, in case of multiple execution offices, of the PSR package which is posted by the associated project manager each month on the Fluor backbone system. This number provides insight in the magnitude of the total project and allows the author to compare the selected projects with regard to size.

TABLE 5
Measurement Scales

Construct	Cronbach α	Items	Valid N	Mean	S.D.	Skewness	Kurtosis
(4) Transformational Leadership	0.981	13	41	63.99	12.08	-0.729	-0.095
(5) Transactional Leadership	0.873	8	41	34.19	5.72	-1.059	2.228
(2) Task Complexity	0.823	3	41	13.76	2.52	-0.051	-0.381

Data analysis

Response rate

Out of the 41 sample project teams 324 respondents were identified in lead or management positions who where alledgeable for the research in this study. Not all discipline representatives where still available from each project team due to transfers to other companies or deads. The responses received totalled a number of 172 generating a response rate of 53.1% which could be considered high. The response rate per project varied from 28.6% with two respondents up to 85.7% with 8 respondents per project team (See Table 6-Questionnaire results statistics). The reasons for such a high response rate could be explained that this study was executed in the company where I'm curently employed and therefore know a lot of respondents personally. Another could be that respondents indicated to find the research topic intresting in that their personal opinion was requested with regards to leadership capabilities of project managers within the company.

TABLE 6
Questionnaire results Statistics

Project teams	# of projects (n=41)	41
Response rate	Overall	53.1%
	# of e-mail invitations	324
	# of respondents	172
	Lowest response rate per project	28.6%
	Highest response rate per project	85.7%
Respondents	Min. respondents per project	2.0
	Max.respondents per project	8.0
	Avg. respondents per project	4.2

Respondents input was evenly distributed along the different functional disciplines but also properly split between management/business related functions i.e. project controls, procurement, contracts and construction management and lead engineering functions. Therefore an assumption can be made that functional background bias is not an issue in this research (See Table 7 – Respondents details statistics). The associated project managers were purposely not informed of the research in order to avoid contamination of respondents input.

TABLE 7
Respondents details Statistics

Project Lead roles	# of respondents	% per function	% per func. group
Project Manager	0	0%	
Engineering Manager	16	9%	
Project Controls Manager	19	11%	
Contracts Manager	8	5%	
Procurement Manager	4	2%	
Construction Manager	9	5%	33%
Process Lead	17	10%	
Mechanical Lead	15	9%	
CSA Lead	12	7%	
Piping Lead	20	12%	
ECS Lead	17	10%	
HSE Lead	14	8%	55%
Anonymous	21	12%	12%
Totals	**172**	**100%**	**100%**

Data examination

A first step, prior to the quantative data analysis, is the examination of the data received from the questionnaires done to gain more insight in missing data entries or outliers. Missing data results from errors in data entry or from exclusion of answers from respondents (Hair, Anderson, Tatham, & Black, 1998). Outliers are extreme responses that could disproportional influence the outcome of the analyses executed in SPSS (Hair, et al, 1998). First, the missing data entries were examined in the data set received from the questionnaires resulting in no particular impact, where input was missing a neutral entry of 4 was given to avoid impact. Second, also the analysis on outliers did not reveal any observations.

Sample characteristics

The sample covered a broad range of projects executed in the Fluor Corporation - Energy & Chemicals business group, varying from BDEP, FEED, E, EP, EPC, EPCM and PMC scope of work or combinations. Projects with solely study scope of work were excluded from the sample, since these projects are predominantly executed by a team of process engineers with minor interaction with other disciplines therefore the results could be biased by the functional background of the respondents. However when a project commenced as study and developed into a FEED or EPC project then these projects were included in the sample since multi-disciplined teams are then formed to execute the work.

As shown below in table 8 - sample statistics, the sample consisted of projects ranging from 1 Million Euro total installed costs (TIC) to more than 2,000 Million Euros averaging around a TIC of approx. 600 Million Euros. These projects were executed by a large number of project managers with some being responsible for multiple projects in the sample. A broad variety of projects in size, leadership, and scope were making up the sample for this study and therefore could be considered as a proper representation of projects executed from the Fluor Haarlem office.

TABLE 8
Sample Statistics

Population	# of projects*	44	
Stratified Sample	# of projects** (n=41)	41	
Project Managers	# of project managers	31	
Scope	BDEP	4	10%
	FEED	22	54%
	DE	2	5%
	EPC/M	19	46%
	PMC	6	15%
	COMBINATIONS	12	29%
TIC (€ MM)	0-50	5	12%
	50-250	14	34%
	250-500	7	17%
	500-1000	8	20%
	>1000	7	17%
	Totals	**41**	**100%**
Completion dates	2005	6	15%
	2006	7	17%
	2007	1	2%
	2008	11	27%
	2009	6	15%
	2010	4	10%
	2011	2	5%
	2012	2	5%
	2013	1	2%
	2014	1	2%
	Totals	**41**	**100%**

Notes:
* based on selection criteria.
** Not enough data available for three projects.

Reliability and Validity

For an accurate potrayal of the variables of interest, the measurement process must meet the tests of validity and reliability (Blumberg, et al, 2005). The measurement of the independent, moderating, and dependent variables was separated and data was collected through multiple sources and respondents in order to avoid single response and common method bias. A number of analyses were performed to ensure validity and reliability of the data obtained: missing data-, and outlier analyses. The individual variables were mean-centered before calculating the interaction terms in order to reduce the potential for multicollinearity as done by Aiken and West (1991) and Variance inflation factors (VIF) were computed in order to assess whether multicollinearity was a concern in our sample. Scales were tested by calculating the Cronbach Alpha, and determining the skewness and kurtosis for each validated construct from existing literature. Post-hoc analyses were executed with an alternative dependent variable in order to ensure the validity of the outcome. As shown response rates from the questionnaires were sufficient high and evenly distributed on all relevant disciplines, also the sample indicated thorough spread of projects types executed. Consequently, the process of data collection and compiling is considered enough accurate and properly documented.

ANALYSIS AND RESULTS

Table 9 details descriptive statistics and correlations for the variables under study. Table 10 indicates the results of the regression analyses with team performance as the dependent variable. Five models were generated as part of this analysis (See Table 10). The first model (1) in table 10 contains the effects of the control variables on team performance. The control variables include TIC ($MM), Fluor services ($MM) and team size. In the second model (2) the two independent variables i.e. task complexity and risk were introduced. Then in the third model (3) the moderating variables; transformational-, and transactional leadership were added as independent variables on team performance. Subsequently the interaction effects between the moderating variables; transformational-, and transactional leadership and the independent variable: risk, are indicated in the fourth model (4). And lastly the interaction effects between transformational-, and transactional leadership and task complexity are indicated in the fifth model (5).

The individual variables were mean-centered before calculating the interaction terms in order to reduce the potential for multicollinearity as done by Aiken and West (1991). Variance inflation factors (VIF) were computed to further assess whether multicollinearity was a concern in our sample due to the high correlation (.863) between team size and Fluor services. (See Table 9) All values were significant below the cut-off VIF value of 10 and above tolerance value of 0.10 (Hair, et al, 1998; Netter, Wasserman, & Kutner, 1990), indicating no risk of multicollinearity.

TABLE 9
Descriptive Statistics, Standard Deviations, and Pearson Correlations

	Mean	**s.d.**	**Cronbach's α**	(1)		(2)		(3)	(4)		(5)	(6)		(7)	(8)
(1) Team Performance	1.16	2.56	-	1											
(2) Task Complexity	13.76	2.52	.823	.026		1									
(3) Risk	0.15	0.12	-	-.295		.152		1							
(4) Transformational	63.99	12.08	.981	.322	(*)	.197		.018	1						
(5) Transactional Leadership	34.19	5.72	.873	.030		-.188		-.059	.654	(**)	1				
(6) Team Size	100.07	133.22	-	.042		.425	(**)	.050	.216		.161	1			
(7) TIC (€ MM)	578.83	699.39	-	.136		.350	(*)	.289	.182		-.226	.267		1	
(8) Fluor services (€ MM)	25.85	34.89	-	.059		.540	(**)	.170	.053		.020	.863	(**)	.252	1

N=41

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

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

TABLE 10
Effects of Risk and Task Complexity and Their Interaction with Transformational-, Transactional Leadership on Team Performance

Dependent variable: Team Performance	Model (1)		Model (2)			Model (3)			Model (4)			Model (5)		
	Std. β	t-value	Std. β		t-value	Std. β		t-value	Std. β		t-value	Std. β		t-value
Independent variables														
Risk			-.401	*	-2.401	-.401	*	-2.686	-.271	*	-2.235	-.436	**	-2.882
Task Complexity			-.069		-.357	-.340	†	-1.742	-.218		-1.396	-.342		-1.664
Moderating variables														
Transformational Leadership						.756	**	3.247	.679	***	3.746	.632	*	2.539
Transactional Leadership						-.465	†	-1.998	-.478	*	-2.595	-.369		-1.481
Interaction effects														
Interaction Transformational Leadership * Risk									.565	***	4.885			
Interaction Transactional Leadership * Risk									-.166		-1.304			
Interaction Transformational Leadership * Task Complexity												-.260		-1.404
Interaction Transactional Leadership * Task Complexity												.184		.973
Control variables														
TIC ($MM)	.132	.781	.263		1.510	.088		.511	-.035		-.245	.140		.796
Fluor services ($MM)	.079	.245	.313		.916	.690	*	2.114	.635	*	2.497	.668	*	2.041
Team Size	-.061	-.190	-.249		-.780	-.501		-1.645	-.497	*	-2.099	-.458		-1.498
R2	.020		.160			.371			.645			.409		
Adjusted R2	-.059		.040			.237			.542			.238		
Δ Adjusted R2	-		.099			.197			.305			-.304		
F-value	.252		1.34			2.78	*		6.26	***		2.39	*	

† p<0.1; *p<0.05; **p<0.01; ***p<0.001
N=41

The results show that our hypothesized negative relationship between risk and team performance (hypothesis 1) was supported (β=-.436; $p<0.01$) in all models but most significant in the fifth model (5). Indicating that increased risk on projects has a significant negative influence on team performance.

The negative relationship between task complexity and team performance (hypothesis 2) was also supported (β=-.340; $p<0.1$) although only in the third model (3). Indicating that increased task complexity has a significant negative influence on team performance.

In addition to these direct effects on team performance, I also hypothesized that the relationship between risk and team performance would be positively influenced by transformational leadership (hypothesis 3b). Also this hypothesis was supported (β=.565; $p<0.001$) in the fourth model (4). Indicating that a high level of transformational leadership not only positively influences the relationship between risk and team performance but also more importantly transfers the negative influence of risk on team performance into a significant positive impact.

No empirical evidence was found that transformational leadership positively influences the relationship between task complexity and team performance (hypothesis 3a). Therefore, hypothesis 3a was not supported. Also no empirical evidence was found that transactional leadership negatively influences the relationship between both risk and task complexity on team performance (hypothesis 4a/b). Therefore, both hypotheses 4a/b were not supported.

Besides the indirect effect of transformational leadership on the relationship between risk and team performance also the direct effect of transformational leadership on team performance was measured and found significant positive (β=.679; $p<0.001$). Indicating that a high level of transformational leadership positively influences team performance on projects in a hyper competitive environment. Also the direct effect of transactional leadership on team performance was measured and found significant negative (β=-.478; $p<0.05$). Indicating that a high level of transactional leadership negatively influences team performance on projects in a hyper competitive environment. Both relationships were not covered in any of the hypotheses.

Control variable; Fluor services shows a significant positive (β=.635; $p<0.05$) influence on team performance in three out of the five models but most significant in the fourth model

(4). Indicating that increased Fluor services have a significant positive influence on team performance on projects in a hyper competitive environment. Also Control variable; team size indicates a significant influence in the fourth model (4) however, this variable negatively influences team performance. Indicating that increased team size has a significant negative influence on team performance on projects in a hyper competitive environment.

Post-hoc analyses were executed with alternative dependent variables; PGM and EBIT as team performance indicators. Similar significant results were found for both risk (EBIT: β=-.301; $p<0.05$ / PGM: β=-.228; $p<0.1$) and the interaction effect of transformational leadership and risk (EBIT: β=.534; $p<0.001$ / PGM: β=.590; $p<0.001$) on team performance confirming exactly the same hypotheses.

DISCUSSION AND CONCLUSION

Researchers strive to understand the factors that impact performance, both in teams and in organizations as a whole, due to its theoretical importance and practical relevance. Also the importance of leadership is recognized in literature as an important factor of influence on performance (Wang et al., 2011). Not only the hard factors such as: task complexity, task interdependence, task newness and risk but also the soft factors such as: team efficiency, team learning, team reflexity, team efficacy and team identification are increasingly recognized as important factors on performance of teams and organizations. Especially the influence of leadership on these soft factors are evident, Driskell and Salas (Driskell, & Salas, 1992) highlight the importance of having team members with a collective orientation since these members are more likely to attend to the task inputs and needs of fellow team members during performance. This increased attention to fellow team members facilitates the processes of coordination and communication and ultimately improves team performance outcomes. This type of leadership, or attention for team interaction behavior or processes, resembles characteristics of transformational leadership. We posit that the type of leadership style of the project manager for teams active in a hyper competitive environment is essential for the outcome of team performance. Hence, I tested this concept to find that risk, task complexity and on the other hand transformational-, transactional leadership differentially influence a team's ability to achieve superior performance.

Implications

The results confirm that risk negatively impacts team performance. But is it not true that any risk forms a threat to the desired outcome and therefore when mitigated increases the chances of achieving the objectives. As Auden, Shackman and Onken (Auden et al., 2006) stated that teams with a solid international risk mitigation strategy show better performance and that perhaps the Project Management Institute therefore recognizes risk management as one of the nine key knowledge areas in its guide: "Guide to the Project Management Body of Knowledge" (Project Management Institute, 2004). Risk management contributes to project success, because the stakeholders are aware of the fact that there are risks, because of which they adjust their expectations and behavior accordingly (De Bakker, Boonstra, & Wortmann, 2010).

Although less significant than risk also task complexity negatively impacts team performance and therefore confirms our hypothesis derived from the conceptual model. Wood (1986) stated that complexity of tasks should be adjusted or optimized for each particular group of individuals in order to maximize outcomes such as performance and job satisfaction. Since graphs of the relationship between task complexity and performance for experienced and highly skilled samples most probably have steeper slopes and higher turning points, than graphs for less experienced and less skilled samples. Perhaps when team capabilities are adjusted to the task complexity the current negative impact on team performance could become a positive one.

Our study findings on the positive moderating effect of transformational leadership on the relationship between risk and team performance is consistent with key aspects of transformational leadership theories: transformational leaders motivate followers by emphasizing the followers' tie to the collective group, fostering team identity and team potency and efficacy (Gully, Incalcaterra, Joshi, & Beaubien, 2002; Kirkman, Chen, Farh, Chen, & Low, 2009; Shamir, House, & Arthur, 1993). Where Burns (1978) represents transformational and transactional leadership styles as the opposite ends of a continuum. Bass (1985, 1998), however, views them as distinct dimensions, which allows a leader to be transactional, transformational, both, or neither. Transformational leadership theory also suggests that transformational leadership influences performance beyond the effect of transactional leadership (Bass, 1985; Bass, & Avolio, 1993) This augmentation effect refers to the extent to which "transformational leadership styles build on the transactional base in contributing to the extra effort and performance of followers" (Bass, 1998). According to Bass (1985), true transformational leaders display both transformational and transactional leadership in behaviors. The tested sample indicates similar patterns in that project managers with a high level of transformational leadership also showed a relative high level of transactional leadership, in comparison with project managers with lower levels of transformational leadership, which could be explained by the project environment in which project managers operate where meeting deadlines, setting expectations and monitoring progress is part of their daily work.

The study fails to support the hypotheses that both transformational-, and transactional leadership moderate the relationship between task complexity and team performance. This could potentially be explained by the fact that task complexity first is related to capacity, knowledge, experience and skills of the individual (Wood, 1986) and therefore less sensitive of any type of leadership. Especially in cases where the individual feels overloaded by the challenges he or she is faced with one could argue that no type of leader is able to remove that stress by increasing intrinsic motivation, or setting clear targets against monetary rewards. As Wood (1986) described that task complexity should be adjusted for each individual to maximize outcome such as performance.

Interestingly, whereas transformational leadership delivers a positive and significant impact on the relationship between risk and team performance, our study fails to support the hypothesis that transactional leadership negatively impacts the relationship between risk and team performance. This could potentially be explained by the focus of the transactional leader in maintaining the status quo and subsequently limiting and discouraging team members in trying to initiate or develop alternative solutions to resolve issues or address risk items (Jansen et al., 2009). In addition, leaders with transactional behaviors monitor individual and team performance to anticipate mistakes and take corrective actions when needed (Howell, & Avolio, 1993). This type of exchange relationship provides a context that is detrimental to innovative and out of the box thinking processes required in order to mitigate risk on projects. While this study contributes to research it also has its practical relevance and can be used to provide Fluor with better insights in what type of leadership style is most effective for executing their projects, since the findings reveal that transformational leadership has a significant positive impact both directly and moderating on team performance and subsequently on financial results for the Company. Instead of searching for potential leaders with these characteristics outside the company also existing Fluor project managers with less transformational leadership behavior could be trained to obtain these characteristics as prior research indicates. For example, Bass & Riggio (2006) but also specifically the “Full Range of Leadership Program” workshop of Avolio & Bass (1991) could help to build a project management workforce which is able to withstand the future challenges and to outperform our competition.

Limitations and Future Research

Although this study presents better understanding on the role of transformational leadership on team performance, both directly and moderating in teams active in a hyper competitive environment, a number of limitations call for further research. First, a possible shortcoming is that the conceptual model was tested on E&C projects executed from the Fluor Haarlem office meaning that the majority of the lead engineers involved during the execution were originated from the Netherlands and therefore could be culturally biased. The question could be raised about the ability to generalize the findings in other cultural settings. The results demonstrate that transformational leadership in almost all cases positively affects the team's performance. In different settings other leadership styles could be more effective due to cultural background of the team members. Therefore it would be interesting to investigate if natural culture will impact the study results by taking a sample from the Fluor Houston office executed projects. Also enabling Fluor to develop a corporate leadership profile, which provides not only results in all countries but also throughout all business groups. Second, another possible shortcoming is the measurement of the team performance construct which is solely focused on projects financial results and ignores other elements of success on projects such as client satisfaction, project team members' satisfaction or meeting project schedule objectives. Third, although the data collection was carefully separated for the dependent and independent variables and supported by the use of multiple respondents, which provide valuable methodological contributions, future longitudinal research is necessary to empirically establish the causal claim of the conceptual model elements which are confirmed by this study. Fourth, averages were calculated for the items pertaining to dimensions of transactional-, and transformational leadership to obtain a single index, when differential effects of each component of both transactional-, and transformational leadership is measured, a better insight could be obtained on the effects of each individual component of both leadership styles on team performance.

Finally, although the study provides new insights into how transformational-, and transactional leadership contribute to achieving a better team performance, it does not address how transformational leadership characteristics itself could be trained or rolled-out through the E&C organization.

There are several opportunities in which the research findings in this thesis could be extended both theoretical and empirically. First, the current conceptual model focused on the transformational-, and transactional leadership influence of the project manager on relationships between risk, task complexity and team performance. However, I did not examine which influence lower levels of management or lead engineers in the project would have on the investigated relationships or directly on team performance. Team dynamics characteristics, especially interactions between engineers and their direct supervisors, could provide better insights in drivers for overall team performance. Second, the results indicate that transformational leadership in all cases leads to positive impact on team performance both as moderating and direct factor. However, I did not investigate which type of leadership would be most effective and lead to superior results in projects, which are faced with tremendous challenges and eventually end up in a crisis. Therefore, it would be most valuable for Fluor to investigate if a different project management leadership style is required when projects are faced with a crisis. Third, this study provides more insights in the influence of transformational-, and transactional leadership on relationships between aspects related to individuals and team performance. Interesting would be to see how these different leadership styles influence the relationship between team related aspects such as: team learning, team reflexity, team efficacy, team identification, and team performance.

In conclusion, the study responds to requests for research on combining transformational, - and transactional leadership influence as moderating factors with team performance data expressed in financial results in a hyper competitive project execution environment. The study not only examines how team performance could be impacted by both risk and task complexity, but also reveals how transformational leadership transfers the negative implications resulting from risk on team performance into significant positive results. In doing so, this study contributes to the management literature on risk, task complexity and team performance, transformational leadership, risk and team performance.

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Definitions and Acronymes

As Sold Profitability – The expected amount of project profit to be realized by the project. It is established at the time of contract award based upon agreement between sales and operations, and it is the standard of profit performance expected from the project management.

Client – Term used to identify the customer.

Earnings Before Interest and Taxes (EBIT) – A measurement used in company income statement. On Fluor project EBIT is calculated by subtracting Overhead Cost and Cost of Cash from Project Gross Margin.

Forecast cost (ITC) – The current budget plus approved deviations. It is the forecast of project cost (Indicated Total Cost) substantiated with approved deviations. An estimate or prediction of future conditions and events based on information and knowledge available at the time of the forecast.

Fortune 200 - A list compiled and published annually by Fortune magazine of the 500 largest publicly-traded and closely held companies in the United States. The Fortune 500 measures "largeness" by revenue minus excise taxes; that is, a company with larger revenue is listed higher on the Fortune 500, regardless of other measures such as profit margin. To be listed on the Fortune 500 is considered very prestigious. Fluor is listed within the first 200 companies on this list.

Objective – A predetermined result; the end toward which effort is directed. Objectives require conscious intention and commitment. An objective is accomplished by committing the use of people, materials and facilities, but does not represent these things in itself. Establishing objectives is an activity of the function of management planning. Goals and targets are synonyms for objectives.

Owner – The person, group, company, or corporation who has or will have title to the facility or installation under construction.

PGM (Project Gross Margin) – The margin between revenue(less revenue reserves) and direct cost to Fluor (including cost contingency) on projects is the PGM.

Project – A specific objective to be met within prescribed time and dollar limitations.

Risk Management – The art and science of identifying, assessing, and responding to project risk throughout the life of a project, and in the best interests of its objectives. Risk management is more than forecasting project contingency requirements. It involves identification and analysis of the areas of risk that can affect the successful development of a project and a proactive response to the identified risks.

Schedule – The plan for completion of a project based on an ordered set of activities and set to a time scale. It serves as an instrument to assist Fluor Project Management in achieving project goals through efficient use of available resources.

SOW (Scope of Work) – Description of the facilities to be built and the services to be provided.

BRMF	Business Risk Management Framework
E	Engineering Only
EAME	Europe, Asia, & Middle East region
E&C	Energy & Chemicals Business Group
EP	Engineering and Procurement Scope
EPC	Engineering, Procurement, and Construction Scope
EPCM	Engineering, Procurement, and Construction Mgmnt Scope
GEC	Global Execution Center
ITC	Indicated Total Cost
KSA	Kingdom of Saudi Arabia
PGM	Project Gross Margin
PMC	Project Management Contractor
PMI	Project Management Institute
TMT	Top Management Team

Appendices

APPENDIX 1

E&C Project Management Leadership - Questionnaire

Introduction

It is in great interest of Fluor to see what type of Project Management Leadership is required for the future in order to remain competitive on the world market and to provide continuity to our clients and to our employees. With your input not only the financial results of Projects will determine the success of Project Managers but also your personal experience with his leadership style (in your day to day business on projects) will impact the outcome of the results. When you are invited to fill in multiple questionnaires, due to your key role on different projects, it provides you with the opportunity to really assess the leadership style differences of each individual Project Manager and to make a comparison between these Projects. Your input is treated as Confidential and will not be shared on individual basis with others i.e. Fluor Project Managers, Department Managers, Office Management and Business Line Management. For reference purposes the Project Manager and associated Project are included in the invitation e-mail. Your participation is highly appreciated.

General

Q1: What is your name? (Open)

Q2: Reference Project Manager: (Open)

Q3: Reference Project: (Open)

All following items were measured on a seven-point Likert scale, anchored by 1=totally disagree and 7=totally agree.

Q4: Task Complexity (Haas, 2010 – AMJ; cf. Tushman, 1978)

Q4.1 The project requires complex approaches and solutions.

Q4.2 The scope of work differs from the usual work of a routine technical project.

Q4.3 The techniques, skills or information required for the execution of the project changed during the course of the project.

Q5: My project manager: (Transformational Leadership: Bass, & Avolio, 1995)

Q5.1 Instils pride in being associated with him/her.

Q5.2 Goes beyond self-interests for the good of the team.

Q5.3 Acts in ways that build your respect.

Q5.4 Displays a sense of power and confidence.

Q5.5 Specifies the importance of having a strong sense of purpose.

Q5.6 Emphasizes the importance of having a collective sense of mission.

Q5.7 Expresses confidence that goals would be achieved.

Q5.8 Talks enthusiastically about what needed to be accomplished.

Q5.9 Articulates a compelling vision of the future.

Q5.10 Seeks out differing perspectives when solving the problem.

Q5.11 Re-examines critical assumptions to question whether they are appropriate.

Q5.12 Suggests new ways of looking at how to solve a problem.

Q5.13 Gets you to look at the problem from many different angles.

Q6: My project manager: (Transactional Leadership: Bass, & Avolio, 1995)

Q6.1 Makes clear what I can expect to receive if my performance meets certain standards.

Q6.2 Provides his/her assistance in exchange of my effort.

Q6.3 Makes sure that we receive appropriate rewards for achieving targets.

Q6.4 Expresses his/her satisfaction when I do a good job.

Q6.5 Focuses attention on irregularities, mistakes, exceptions, and deviations.

Q6.6 Spends his/her time looking to “put out fires”.

Q6.7 Keeps track of my mistakes.

Q6.8 Directs his/her attention toward failure to meet standards.

Submit questionnaire

Your participation is highly appreciated.

APPENDIX 2

Quick Scan Flexibility (QSF) - Fluor

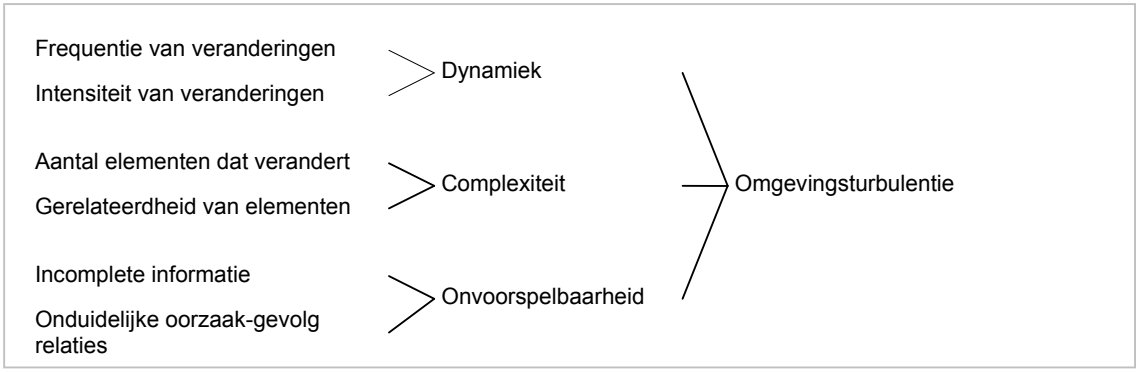
QSF 42E5T FLR

Deze rapportage is opgesteld aan de hand van uw antwoorden op de vragenlijst betreffende de flexibiliteit van uw organisatie. Na een beknopte theoretische inleiding, worden de uitkomsten gepresenteerd en nader toegelicht. Tevens worden, ter vergelijking, de scores van vergelijkbare organisaties getoond.

De Quick Scan Flexibiliteit is gebaseerd op onderzoek bij meer dan 4000 Nederlandse en internationale ondernemingen en non-profit organisaties door Niels van der Weerdt en Henk Volberda, beiden verbonden aan RSM Erasmus University.

Omgevingsturbulentie: bepalend voor de vereiste mate van flexibiliteit

Vrijwel elke organisatie wordt geconfronteerd met veranderingen in de externe omgeving. Deze veranderingen kunnen zeer intens en frequent zijn, betrekkingen hebben op meerdere elementen in de omgeving tegelijk en bovendien in hoge mate onvoorspelbaar zijn. Naarmate de dynamiek, complexiteit en onvoorspelbaarheid van veranderingen toeneemt, dient ook het vermogen van de organisatie om te reageren op deze veranderingen toe te nemen (responsiviteit). In een zeer turbulente omgeving is een flexibele organisatie vereist, een rigide, of niet-flexibele organisatie kan juist ideaal zijn in een niet-turbulente omgeving. Kortom, de benodigde flexibiliteit hangt af van de turbulentie in de omgeving van de organisatie.



Figuur 1 *Dimensies en variabelen van omgevingsturbulentie*

Er worden vier niveau's van omgevingsturbulentie onderscheiden:

Indien de omgeving zowel statisch (lage dynamiek), simpel (beperkte complexiteit) en voorspelbaar is, wordt deze geclassificeerd als 'stabiel' ofwel '**niet-competitief**': Concurrentievoordelen van een onderneming zijn lang houdbaar en bijna niet af te breken.

Indien de omgeving dynamisch en/of complex is, maar niet onvoorspelbaar, dan wordt deze geclassificeerd als '**complex/dynamisch**' ofwel 'matig competitief': Concurrentievoordelen zijn eindig, en de onderneming moet geleidelijk nieuwe concurrentievoordelen ontwikkelen.

Indien de omgeving dynamisch of complex, maar bovenal onvoorspelbaar is, wordt deze geclassificeerd als 'turbulent ' ofwel '**hypercompetitief**'. Concurrentievoordelen zijn zeer beperkt houdbaar door acties van concurrenten, en de onderneming moet continu nieuwe voordelen opbouwen.

In geval van extreme scores op twee of meer variabelen, en met name op de variabele onvoorspelbaarheid, spreken we van 'extreme turbulentie' ofwel '**extreme concurrentie**'. In deze omgevingen is het vrijwel onmogelijk om concurrentievoordelen op te bouwen.

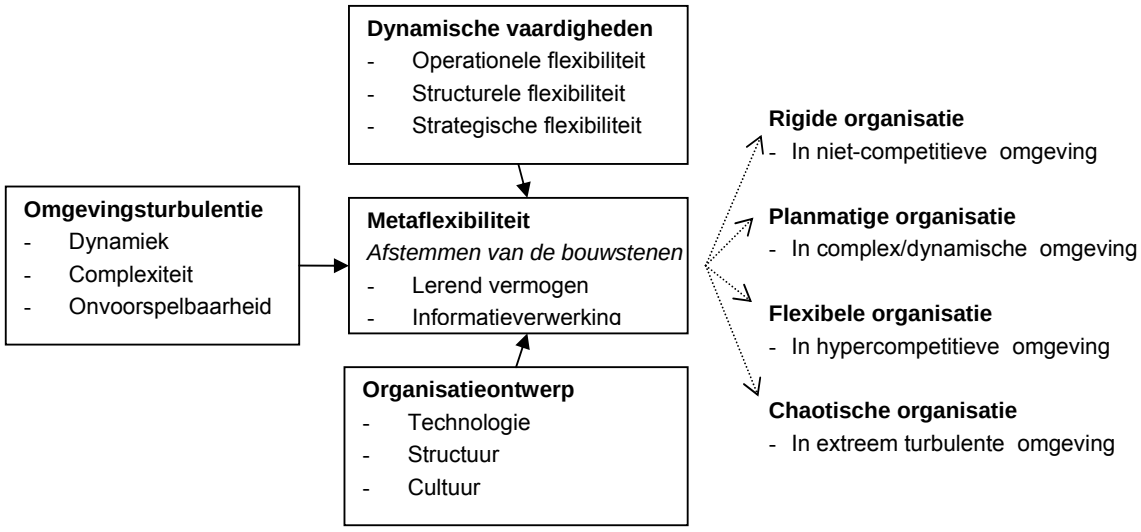
Alvorens in de volgende paragraaf nader in te gaan op de verschillende typen van flexibiliteit en de bijbehorende eisen aan de organisatie, toont tabel 1 de uitkomsten ten aanzien van de turbulentie in de omgeving van uw organisatie.

Tabel 1: Omgevingsturbulentie			
	FLR		Gemiddeld resultaat in de categorie
	Resultaat *	Kwalificatie	'Grote industriële bedrijven'
Dynamiek	**0,7**	**Hoog**	0,0
Complexiteit	**1,1**	**Zeer hoog**	0,1
Onvoorspelbaarheid	**0,7**	**Hoog**	0,3
NIVEAU VAN OMGEVINGSTURBULENTIE	**Hypercompetitief**		

** Scores kunnen variëren van -3 tot +3.*
Scores lager dan 0 of hoger dan +1 worden als laag respectievelijk zeer hoog gekwalificeerd.

De bouwstenen van organisatie flexibiliteit

De flexibiliteit van een organisatie wordt bepaald door twee bouwstenen: de dynamische vaardigheden van het management en de bestuurbaarheid van de organisatie. Beide bouwstenen dienen op elkaar en op de omgevingsturbulentie te zijn afgestemd en een juiste balans tussen flexibiliteit én stabiliteit op te leveren (zie figuur 2). Een voorwaarde voor de samenstelling van een toereikend repertoire aan vaardigheden en een adequaat organisatieontwerp is de metaflexibiliteit; dat wil zeggen: de sensorfunctie ofwel het lerend vermogen van het management. Vooral het herkennen van gebeurtenissen in de omgeving en de vertaling hiervan naar de organisatie is belangrijk; het accent ligt op de informatieverwerkende capaciteit en de voelsprietfunctie van de organisatie. Figuur 2 toont de verschillende bouwstenen en vier ideaal typen van meer en minder flexibele organisaties waarin een juiste afstemming tussen omgeving en flexibiliteit wordt bereikt.



Figuur 2 *Afstemmen van de bouwstenen van organisatie flexibiliteit*