



UNIVERSITY  
OF  
JOHANNESBURG

## COPYRIGHT AND CITATION CONSIDERATIONS FOR THIS THESIS/ DISSERTATION

 creative  
commons



- Attribution — You must give appropriate credit, provide a link to the license, and indicate if changes were made. You may do so in any reasonable manner, but not in any way that suggests the licensor endorses you or your use.
- NonCommercial — You may not use the material for commercial purposes.
- ShareAlike — If you remix, transform, or build upon the material, you must distribute your contributions under the same license as the original.

### How to cite this thesis

Surname, Initial(s). (2012) Title of the thesis or dissertation. PhD. (Chemistry)/ M.Sc. (Physics)/ M.A. (Philosophy)/M.Com. (Finance) etc. [Unpublished]: [University of Johannesburg](http://www.universityofjohannesburg.ac.za). Retrieved from: [https://ujcontent.uj.ac.za/vital/access/manager/Index?site\\_name=Research%20Output](https://ujcontent.uj.ac.za/vital/access/manager/Index?site_name=Research%20Output) (Accessed: Date).

**Conflict management in outsourced engineering projects in South Africa**

A Minor Dissertation Submitted in Partial Fulfilment of the Degree of

MAGISTER PHILOSOPHIAE

in

ENGINEERING MANAGEMENT

at the

**FACULTY OF ENGINEERING AND THE BUILT ENVIRONMENT**



**by**

Bulali Mdontsane

23 June 2017

**SUPERVISOR:** Dr H. Nel

**CO-SUPERVISOR:** Dr A Marnewick

## Declaration

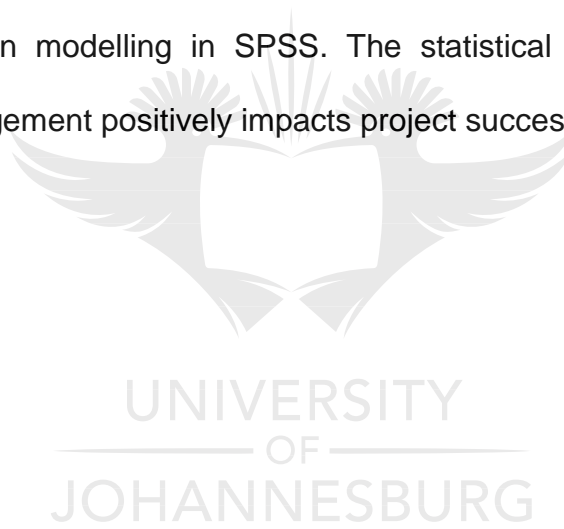
I hereby declare that the minor dissertation submitted for the Magister Philosophiae in Engineering Management degree to the University of Johannesburg, apart from help recognized, is my own work and has not previously been submitted to another university or institution of higher education for a degree.

---



## Abstract

The aim of this study was to investigate conflict management in engineering projects in South Africa. Improved management of project failure is possible if the relationship between conflict management and project success is known. Organizations turn to project management to unlock opportunities and fulfil strategic objectives. This study provides a framework to address and manage conflict in outsourced engineering projects for the benefit of organizations and engineering professionals who are involved in projects. The constructs of Conflict Management and Project Success were delineated and analysed with structural equation modelling in SPSS. The statistical analysis confirmed that effective conflict management positively impacts project success.



## Acknowledgements

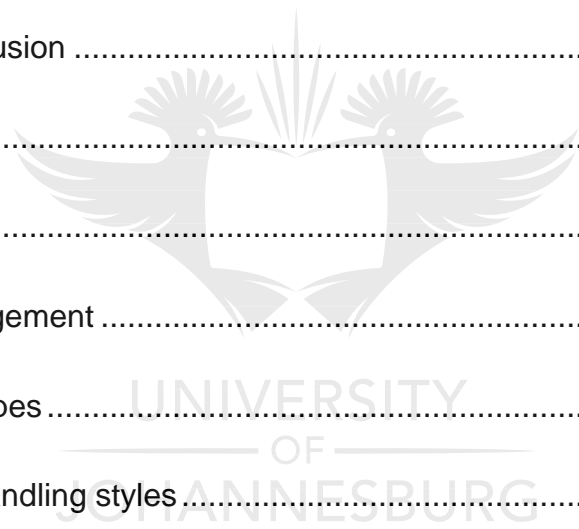
I would like to thank Dr H. Nel and Dr A. Marnewick for the valuable guidance, patience, and support throughout this mini-dissertation. The completion of this work was made possible by your leadership and support.

Furthermore, I would like to thank my family for the motivation, support and sacrifices. Your words of encouragement kept me going. Finally, I dedicate this work to my daughter Sisikelelwe Mdontsane, with your love I am strong.

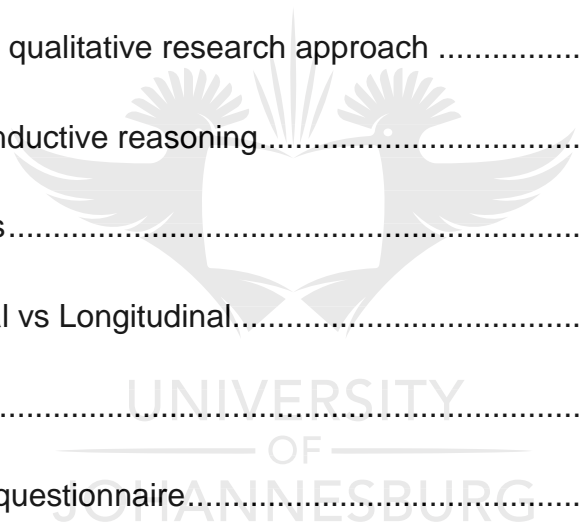


## Contents

1	Introduction.....	12
1.1	Research background.....	12
1.2	Problem statement.....	14
1.3	Research questions.....	14
1.4	Research objectives.....	15
1.5	Research approach and chapter outline.....	15
1.6	Chapter conclusion.....	17
2	Literature review.....	18
2.1	Introduction.....	18
2.2	Conflict management.....	19
2.2.1	Conflict types.....	19
2.2.2	Conflict handling styles.....	21
2.2.3	Delineation of conflict management.....	25
2.3	Project success.....	27
2.3.1	Introduction.....	27
2.3.2	Project success- the various perspectives.....	28
2.3.3	Success criteria and critical success factors.....	29
2.3.4	Delineation of features of project success.....	31



2.4	Research areas.....	34
2.4.1	The research gap .....	34
2.5	Chapter conclusion .....	35
3	Research design and methodology .....	36
3.1	Introduction .....	36
3.2	Research design .....	36
3.3	Research paradigms .....	38
3.4	Quantitative vs qualitative research approach .....	39
3.5	Deductive vs Inductive reasoning.....	40
3.6	Unit of analysis.....	41
3.7	Cross-sectional vs Longitudinal.....	42
3.8	Data collection.....	42
3.8.1	Research questionnaire.....	43
3.8.2	Questionnaire design.....	44
3.8.3	Population and sampling .....	45
3.8.4	Sample design.....	46
3.8.5	Sample size .....	47
3.8.6	Validity .....	47
3.9	Research methods .....	51



3.10	Chapter conclusion .....	52
4	Theoretical framework .....	53
4.1	Introduction .....	53
4.2	Developing the conceptual model .....	53
4.3	Operationalization of conflict management and project success.....	57
4.4	Construct definition and hypothesis development .....	59
4.4.1	Conflict management.....	59
4.4.2	Project success .....	64
4.5	Chapter conclusion .....	70
5	Data analysis theory .....	71
5.1	Introduction .....	71
5.2	Data preparation .....	72
5.2.1	Editing Data.....	72
5.2.2	Handling blank responses .....	73
5.2.3	Coding data .....	73
5.2.4	Data file preparation .....	74
5.3	Descriptive statistics.....	74
5.4	Chapter conclusion .....	74
6	Descriptive analysis of data .....	75





6.1	Introduction .....	75
6.2	Demographic Information .....	75
6.2.1	Nationality .....	75
6.2.2	Level of education .....	76
6.2.3	Work experience .....	77
6.3	Chapter conclusion. ....	79
7	Predictive model framework .....	80
7.1	Predictive modelling process .....	81
7.1.1	Data preparation .....	81
7.1.2	Develop a theoretical model .....	82
7.1.3	Exploratory Factor Analysis .....	82
7.1.4	Confirmatory Factor Analysis .....	83
7.1.5	Hypotheses testing and model discussion .....	84
7.2	Data preparation .....	84
7.3	Exploratory Factor Analysis .....	88
7.3.1	Descriptive .....	88
7.3.2	Extraction .....	88
7.3.3	Rotation .....	89
7.3.4	Scores and Options .....	90

7.3.5	EFA Adequacy.....	91
7.3.6	Validity.....	95
7.3.7	EFA reliability.....	102
7.4	Confirmatory Factor Analysis .....	103
7.4.1	Steps in running CFA .....	104
7.4.2	Estimation.....	107
7.4.3	Evaluating the fitness of a measurement model .....	110
7.4.4	Model fit and modification.....	111
7.4.5	Summary of CFA results.....	113
7.5	Hypotheses testing and final model .....	116
7.6	Final model discussion.....	119
7.6.1	Implication one: predictors of conflict handling styles (CM_CHS).....	119
7.6.2	Implication two: predictors of accentuate substantive conflict (CM_ASC).....	120
7.6.3	Implication three: predictors of triple constraint .....	121
7.6.4	Implication four: predictors of business benefit.....	121
7.6.5	Implication five: emergent themes .....	122
7.6.6	Implication six: comparison to theoretical model .....	122
7.6.7	Implication seven: conclusion .....	123
8	Conclusion.....	126

8.1	Introduction .....	126
8.2	Research questions and objectives.....	126
8.3	Findings .....	127
8.4	Research limitations.....	130
8.5	Future research.....	131
8.6	Final Words.....	131
9	Appendix A .....	132
10	Appendix B: CFA Model Iterations .....	138
11	References.....	156

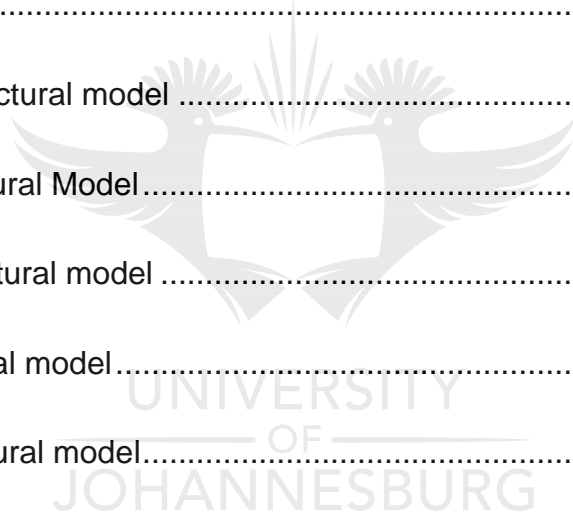


UNIVERSITY  
OF  
JOHANNESBURG

## Table of Figures

Figure 1: Overlay of conflict resolution styles and authors derived from dual concern theory (Holt and DeVore, 2005) .....	24
Figure 2: Conflict management (derived from literature in Table 1) .....	26
Figure 3: Parallel balance (Project success measurement) (Duggal, 2010).....	29
Figure 4 Research design .....	37
Figure 5: Summary of selected research methods.....	51
Figure 6: adapted model of the link between conflict management and project success (Creasy and Anantatmula 2013, p.45).....	55
Figure 7: Proposed causal relationship between conflict management and project success .....	56
Figure 8: Summary of identification of constructs and test items (Sekaran and Bougie 2011, p.177) .....	58
Figure 9: Framework for dimensions of conflict management .....	64
Figure 10: Framework for the dimensions of Project Success .....	67
Figure 11: Flow diagram of data analysis process (Sekaran and Bougie, 2011).....	71
Figure 12: Respondent Nationality .....	76
Figure 13 : Respondent Level of Education .....	77
Figure 14: Respondent Work Experience.....	78
Figure 15: Predictive modelling process (Joseph, 2014).....	81

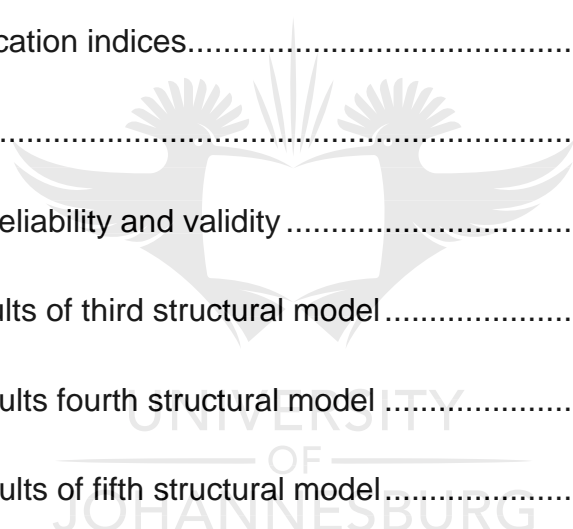
Figure 16: Theoretical conflict management and project success model .....	87
Figure 17: Measurement model .....	106
Figure 18: Initial structural model .....	108
Figure 19: Eleventh structural model.....	115
Figure 20:Final model for the relationship between conflict management and project success .....	118
Figure 21:Final model for the relationship between conflict management and project success .....	130
Figure 21: Second structural model .....	138
Figure 22: Third Structural Model.....	140
Figure 23: Fourth structural model .....	142
Figure 24: fifth structural model.....	144
Figure 25 : Sixth structural model.....	146
Figure 26 seventh structural model .....	149
Figure 27: Eighth structural model .....	150
Figure 28: Ninth structural model .....	152
Figure 29 Tenth structural model .....	154



## List of Tables

Table 1: Characteristics of conflict management found in literature .....	25
Table 2: Previous research of dynamics that impact project success .....	32
Table 3: Research paradigm (adapted from Babbie, 2007; Collis and Hussey, 2013; Blumberg et al. 2014).....	38
Table 4 Summary of Validity Estimates (Blumberg et al.2014, p.257).....	48
Table 5: Elements of construct 1 Minimize Affective Conflict .....	60
Table 6: Elements of construct 2 Accentuate Substantive Conflict .....	61
Table 7: Elements of construct 3 use appropriate Conflict Handling Strategies .....	62
Table 8: Elements of construct 4 triple constraint.....	65
Table 9: Elements of construct 5 Business Benefits .....	66
Table 10: Factor naming codification.....	85
Table 11: Adequacy measures.....	91
Table 12: KMO results.....	91
Table 13: Communalities.....	92
Table 14: Total Variance Explained .....	94
Table 15: Goodness-of-fit Test.....	95
Table 16: Threshold for sufficient factor loadings (Gaskin,2015) .....	96
Table 17: Pattern Matrix .....	96

Table 18: Structure Matrix .....	97
Table 19: Factor correlation matrix.....	101
Table 20: Cronbach's alpha results .....	102
Table 21: Graphical Terminology adapted from (Joseph, 2014, p88) .....	103
Table 22: The three categories of model fit, their level of acceptance and supporting literature .....	110
Table 23 Model fit measures, levels of acceptance and initial results .....	111
Table 24 AMOS modification indices.....	112
Table 25: CFA results.....	113
Table 26: Final model reliability and validity .....	118
Table 26: Model fit results of third structural model .....	139
Table 27: Model Fit results fourth structural model .....	141
Table 28: Model Fit results of fifth structural model.....	143
Table 29: Model Fit results of sixth structural model .....	145
Table 30: Model Fit results of seventh structural model .....	147
Table 31 Model Fit results of eighth structural model.....	149
Table 32: Model Fit results of ninth structural model.....	151
Table 33: Model Fit results of tenth structural model.....	153



## List of Acronyms

CFA	Confirmatory Factor Analysis
ECSA	Engineering Council of South Africa
EFA	Exploratory Factor Analysis
IPMA	International Project Management Association
PMI	Project Management Institute
PLS	Partial Least Square
PMBOK	Project Management Body of Knowledge
ROCI-II	Rahim Organizational Conflict Inventory-II
ROI	Return on Investment
SACPCMP	South African Council for Project and Construction Project Management Professionals
STATS SA	Statistics South Africa
SAMTEF	South African Medium Term Expenditure Framework
SEM	Structural Equation Modelling



## 1 Introduction

### 1.1 Research background

Today's organization when faced with opportunities and challenges, turn to project management to fulfil their strategic goals and enhance their competitiveness (Zhang and He, 2012). The project environment is becoming increasingly complex, more especially when it comes to engineering projects (Miller, Balapurua, and Sesay, 2015). In the context of South Africa, the Treasury through the South African Medium Term Expenditure Framework (SAMTEF), had allocated over R800-billion aimed at infrastructure project for the public sector (Treasury, 2016). South Africa is a developing economy and a bulk of these infrastructure projects will be undertaken by the private sector. Andersen, Dyrhaug, and Jessen (2002) compared projects in China with projects in Norway and observed that the nature of the project work in emerging and developing economies is unpredictable as well as complicated. The work of Belassi and Tukel, (1996) emphasises the importance of project management skills in achieving successful delivery of a project.

The outsourcing of engineering projects has developed into a widespread practice in business. According to Chen (2013), organizations outsource for cost efficiencies as well as due to lack of skills internally and the massive capital layout required to fulfil or complete the project. Outsourcing is primarily, the shift of a function or activity from in-house management to external administration (Nordigården, Rehme, Brege, Chicksand, and Walker, 2014). The projectized nature of business operations currently, means that engineering outsourcing is fulfilled through projects (Engwall, 2003).

In an attempt to guarantee the attainment of the anticipated goals, the suppliers of outsourcing as well as the receivers of the services enter into a contractual agreement which clearly stipulates the parameters of the deliverables or service to be rendered (Chen, 2013). Furthermore, Cahyono and Hartijasti (2012) assert that contract conditions place the contractor in a riskier position with increased liabilities in the event of failure to meet performance objectives. According to Adler (2005) as well as Alderman and Ivory (2007) these contract-based outsourcing business relationships are susceptible to mistrust, which at times leads to uncooperative business relationships.

Ika (2009) posits that organizations fulfil their projects by turning to project management as it provides organizations with the tools to be competitive, efficient and effective in a dynamic, complex and ever changing business environment. Projects by their very nature are time constrained. The work of Turner and Muller (2003) states that the triple constraints of projects are quality, cost, and schedule or time. In cognizance of that, Mueller, Parker, and Ross (2008) noted loss of time as a negative effect resulting in high levels of conflict in projects. Turner and Muller (2003) argue that the attainment of project success is founded on “soft skills” such as conflict management rather than the project management tools or traditional attributes.

Cahyono and Hartijasti (2012) state that project environment inherently has conflict and one of the main duties within managing a project, is to manage the conflict thus ensuring that the achievement of goals and objectives is not compromised.

Ika (2009) advances the view that project success is a crucial subject primarily because careers of project managers, and importantly, success and survival of organizations is dependent on the performance of these projects.

The work of Miller et al. (2015) looks at the amount of expenditure on projects by organizations to attain business success using project management as well as the view that conflict is an inherent part of project management. Authors Miller et al. (2015) further alluded to the increasing complexity of engineering projects.

This work seeks to investigate conflict management strategies that enhance project success for the benefit of engineering professionals that are involved in managing projects.

## 1.2 Problem statement

Previous authors (Clarke, 2010; Creasy and Anantatmula, 2013; Prieto-Remón et al, 2015) have argued that conflict management has an impact on project success. **If the relationship between conflict management and project success is known, it can be better managed to minimise failures in project.**

## 1.3 Research questions

- What is the relationship between conflict management strategies and project success?
- How can conflict be managed to enable project success?

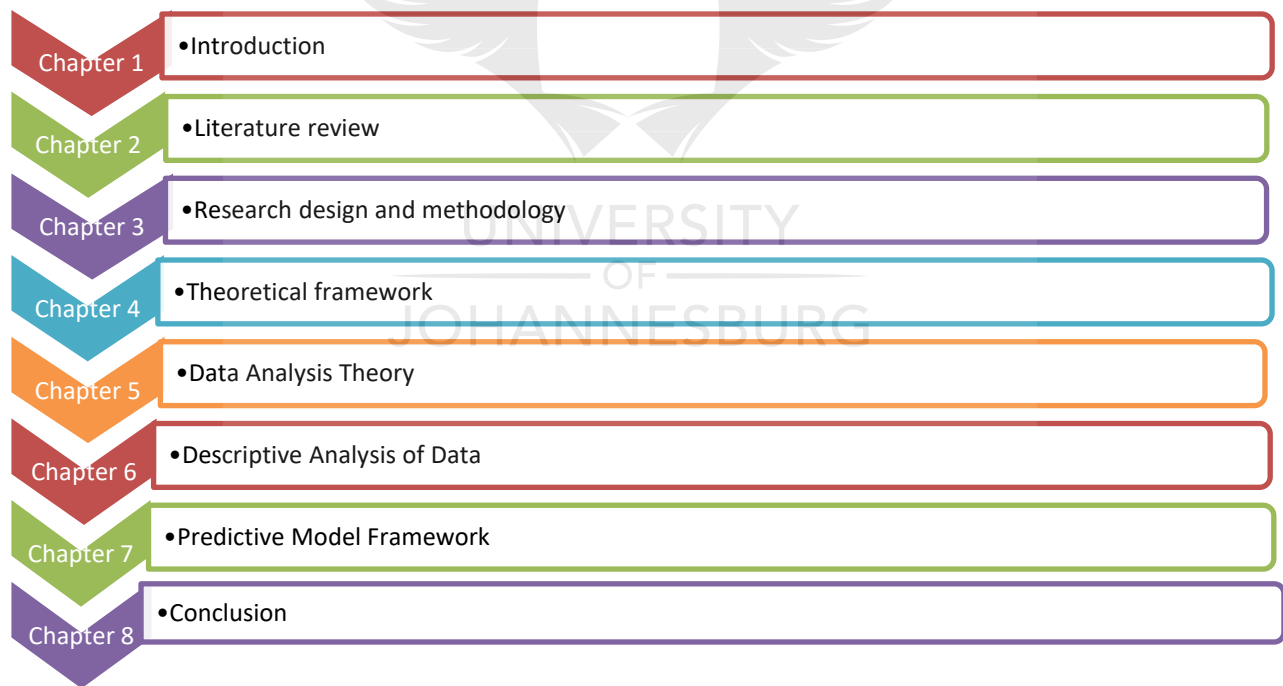
## 1.4 Research objectives

- To assess the relationship between project success and conflict management strategies.
- To provide a framework to address and manage conflict in outsourced engineering projects in South Africa for the benefit of organizations and engineering professionals that are involved in projects.

The research overview, approach and chapter outline is presented in the next section.

## 1.5 Research approach and chapter outline

The research comprises of eight chapters. The layout is illustrated in Figure 1 below.



### Introduction

The research introduction chapter provides a background to the research. Furthermore, the problem statement, research question and objectives are presented.

### literature review

The chapter provides a critical review of the project success and conflict management literature. It addresses the definition of these concepts and identifies that research gap that informs the study.

### Research design and methodology

The research design and methodology chapter discusses the chosen research approach and contrasts quantitative vs qualitative paradigms. It further looks at the unit of analysis, data collection, research questionnaire, population and sampling used in the study.

### Theoretical framework

The theoretical framework chapter's goal was to develop a conceptual model, grounded in theory, that guided the current research. This goal was achieved by formulating and fulfilling the objective of exploring and developing a conceptual model for the study as well as defining constructs and developing hypotheses.

### Data analysis theory

The data analysis theory chapter discusses getting data ready for analysis, getting a feel for data, testing the goodness of data, and testing the hypotheses.

### Descriptive Analysis of Data

This chapter covers the overall data interpretation, analysis and discussion in order to clarify the research problem.

### Predictive Model Framework

This chapter focused on the structural equation modeling, beginning with the exploratory factor analysis and confirmatory factor analysis. The delineated factors of conflict management and project success were modelled and analyzed using SPSS.

### Conclusion

The concluding chapter of the study sought to ascertain whether the research questions were answered and the objectives outlined in the first chapter were fulfilled. Secondly, it provided a summary of finds in relation to the research objectives. Lastly, it gave an outline of the research limitations, suggestions for future research possibilities, and final remarks.

## **1.6 Chapter conclusion**

The opening chapter provides the background to the research and introduces the topic. It alludes to the research objectives and research questions that will be the focus of the study. The scope of the study, research design and the significance of the study are also deliberated. The next chapter explores the existing body of knowledge surrounding conflict management and project success; this is presented as the literature review.

## 2 Literature review

### 2.1 Introduction

Companies are increasingly reliant on project management to fulfil their initiatives (Creasy and Anantatmula, 2013; Engwall, 2003). The work of Davies (2011) reveals that the use of project management, based on economic figures gathered, has been rising considerably. Turning to Creasy and Anantatmula (2013) one finds that this has created a sharp focus on ensuring positive project outcomes and improved organizational performance. In evaluation of key dimensions of a project manager that are associated with successful project outcomes, Clarke (2010) identifies conflict management as fundamental. The goal of this chapter is thus to:

- Obtain and improved understanding of conflict management and project success through critical evaluation of literature relating to these subject areas.

The following objectives were formulated in order to achieve the above goal:

1. To explore conflict management by looking at different conflict types and conflict handling styles.
2. To comprehensively determine the characteristics of conflict management from literature.
3. To explore the various perspectives on project success, contrasting success criteria and critical Success factors.
4. To establish what project success is through delineation of its characteristics.

The rest of the chapter at section 2.4 looks at the research that has been conducted in the domain of project success and conflict management. This culminates in the identification of the research gap at subsection 2.4.1. This is followed up by section 2.5 which presents the chapter conclusion.

The next section addresses the first objective of exploring conflict management.

## **2.2 Conflict management**

Conflict management is broader than the cessation, lessening or circumvention of conflict. It includes approaches that reduce the dysfunctions of conflict and accentuate the beneficial aspects of conflict. These may enhance group or individual performance (Rahim, 2002; Ensari, 2016).

The second aspect of the first objective, viz. looking at different conflict types is discussed next.

### **2.2.1 Conflict types**

It is the view of Rahim (2002) that conflict is an interactive process which is exhibited in disagreement or incompatibility. The opinion of Jehn, Rispens, Sherry and Thatcher (2012) defined conflict as a latent disagreement between members of a team which indicates mismatched goals or interests. Research by Kankanhalli, Tan and Wei (2006) expressing a similar view to Tjosvold (2008) and Chiochio, Forgues, Paradis, and Iordanova (2011) placed conflict into 2 key categories. These are relational (affective) and task (substantive). Kurtzberg and Mueller (2005) point out that there is a third type of conflict that is less distinct which is referred to as process conflict. This is conflict arising



from work processes, the manner in which work is done and the commitment of roles of the team and their duties.

#### Affective conflict

Relational or affective conflict is characterised by emotions and feelings or tension and friction (Jehn and Mannix 2001). It is the view of Rahim (2002), that affective conflict occurs when there is an inconsistency in interpersonal relationships characterised by the awareness of incompatible emotions and feelings regarding issues. The research evidence presented by Rahim (2002) and other scholars (Tjosvold, 2008; De Dreu and Weingart, 2003) indicates that affective conflict hampers project performance.

#### Task conflict

Task conflict reveals dissonance in perspectives concerning tasks (Rahim, 2002; Kankanhalli et al. 2006; Jehn et al, 2012). Turning to the work of Chiochio et al. (2011) expanding on Tjosvold (2008) task conflict is characterised by disagreeing about exact activities that must be performed in aid of the project advancement. What to do is the basis of the problem.

Jehn (1999) suggests that task based conflict can be valuable as it stimulates innovation and creativity. However, Creasy and Anantatmula (2013) argue that the positive impact of task conflict can only be extracted in environments that are considered to have high levels of trust and openness. De Dreu and Weingart (2003) found that task conflict hampers performance on project as the dispute is about the task and therefore progress may be impacted thus ultimately affecting the overall schedule. This is contrary to consensus amongst many scholars (Jehn, 1994; Rahim, 2002; Kankanhalli et al. 2006;

Jehn et al, 2012) on the generally positive benefits of task conflict. Kurtzberg and Mueller, (2005) agree with Jehn (1999) and Creasy and Anantatmula (2013) that task based conflict is beneficial. Tjosvold (2008) found that task-based conflict encourages dialogue and debate which leads to high performance and improved decision making. However, Kurtzberg and Mueller (2005) posit that there is a possibility of a negative effect of task based conflict as it may have psychological impact on the relationships as well as create state of vulnerability. They further assert that it can be challenging for individuals to remain objective in the face of disagreement and opposition to their point of view.

#### Process conflict

Kurtzberg and Mueller (2005) take the scholastic view that presents a third form of conflict. This school of thought essentially builds on the existing categories of relationship and task-based conflict. The third type of conflict which is referred to as process conflict. It looks at conflict arising from work processes, the manner in which work is done and the commitment of roles of the team and their duties. This builds up on studies that were done by Jehn (1997) and Jehn and Mannix (2001). The crucial aspect to note of process conflict is that it refers responsibilities and the delegation of resources in the project (Jehn and Mannix, 2001; Kurtzberg and Mueller, 2005).

The third aspect of the first objective, viz looking at the various conflict handling styles is discussed next.

### **2.2.2 Conflict handling styles**

The work of Holt and DeVore, (2005) gives a comprehensive overview of the evolution of theory on conflict handling. This commences with a look at a ground-breaking study by Blake and Mouton (1964) that was applied to managers and showed that there are two

primary motivations for people when it comes to interpersonal conflict. They proposed a dual concern theory that contrasts the desire to fulfil one's objectives (concern for production) and that of maintaining interpersonal relationships (concern for people). From the seminal work of Blake and Mouton (1964) further crucial work to the field of conflict management has been conducted based on the dual concerns theory. The work of Hall (1969) resulted in the Conflict Management Survey (CMS) followed up by the Management of Differences Exercise (MODE) developed by Thomas and Kilmann (1974) as well as Renwick (1975) Employee Conflict Inventory (ECI). Turning to the work of Rahim (1983) one finds the Rahim Organizational Conflict Inventory I (ROCI-I) and Rahim Organizational Conflict Inventory II (ROCI-II).

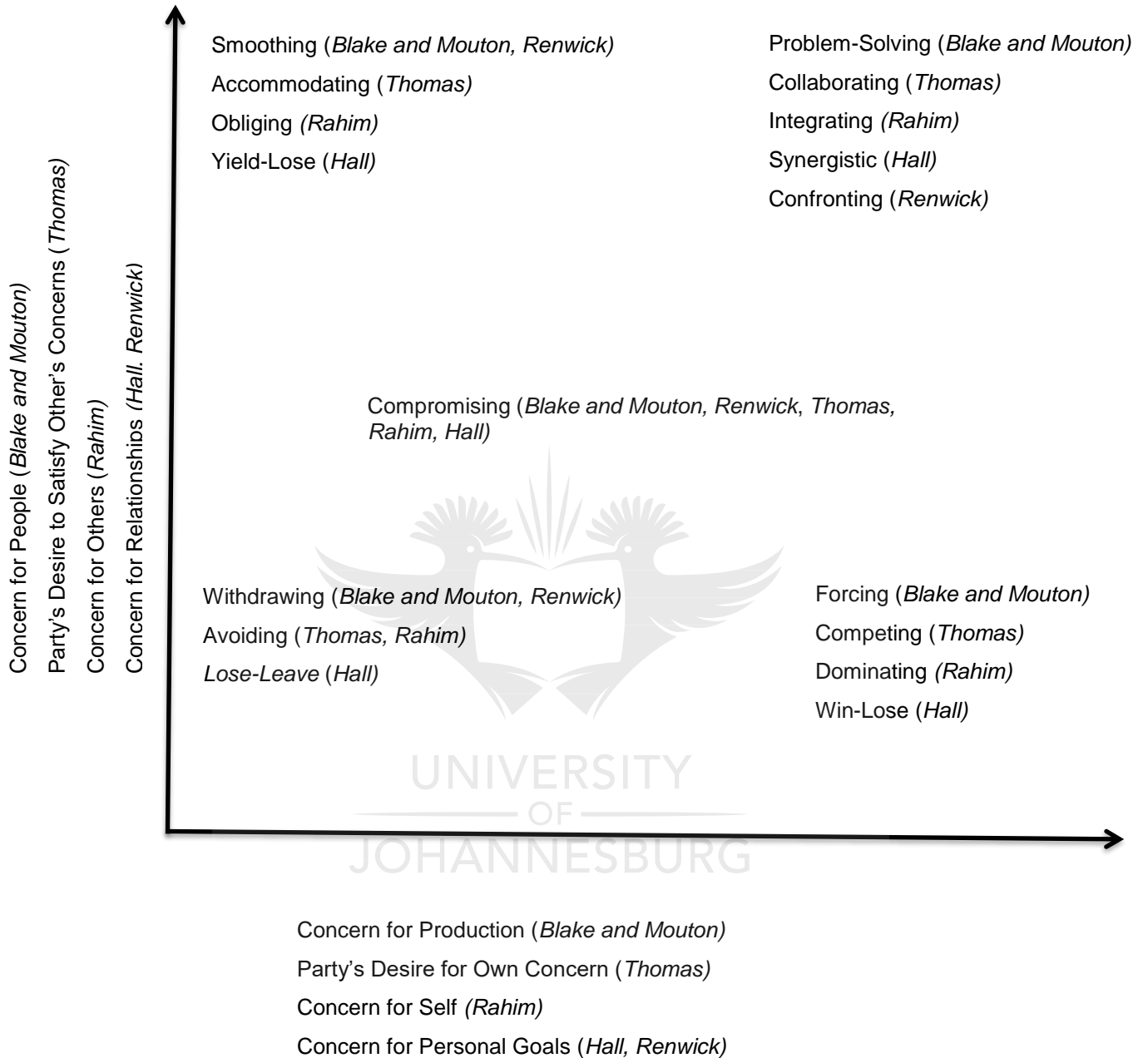
The Thomas-Kilmann model for managing conflict presents five styles of management based on two basic behavioural dimensions i.e. assertiveness or cooperativeness. The Thomas-Kilmann model considers the motives of each of the parties involved in conflict. The model seeks to ascertain when the motive behind the conflict is to be competitive or cooperative. The five modes are competing, collaborating, compromising, avoiding, and accommodating (Holt and DeVore, 2005; Kaushal and Kwantes, 2006). They are defined as follows;

- Competing as assertive and uncooperative mode that is oriented towards power. The individual's concerns are pursued at the expense of the other using all possible means to win a position.

- Collaborating is a mode that is assertive as well as cooperative. The focus from a collaborating individual's is to attain a solution that fulfils the needs and concerns of all parties.
- Compromising is a middle ground between competing and accommodating. This is characterised by a focus on finding an acceptable solution to all parties that may be partially satisfactory.
- Avoiding falls within the spectrum of unassertive and uncooperative. This is the bypassing or postponement of the issue or entirely withdrawing.
- Accommodating is diametrically opposite to competing and is characterised by prioritizing concern of the other party while neglecting one's own.

The literature on conflict handling styles that has a link to the pioneering work of (Blake and Mouton, 1964) on the dual concern theory is summarised in Figure 1: Overlay of conflict resolution styles and authors derived from dual concern theory (Holt and DeVore, 2005) below.

UNIVERSITY  
OF  
JOHANNESBURG



**Figure 1: Overlay of conflict resolution styles and authors derived from dual concern theory (Holt and DeVore, 2005)**

The first aspect of the second objective, viz to comprehensively outline the characteristics of conflict management is discussed in the next section.

### 2.2.3 Delineation of conflict management

Turning to the work of several authors (Amason, 1996; Jehn and Mannix, 2001; Rahim, 2002; De Dreu and Weingart, 2003; Holt and DeVore, 2005, Sportsman and Hamilton, 2007; Tjosvold, 2008; Davis, 2011; and Ensari, 2016), it was found that conflict management involves the recognition of conflict and the type of conflict, taking the required steps to apply the appropriate conflict handling style to successfully manage the conflict. Table 1 gives the conflict management approaches found in literature and this is the basis for developing the conflict management model.

**Table 1: Characteristics of conflict management found in literature**

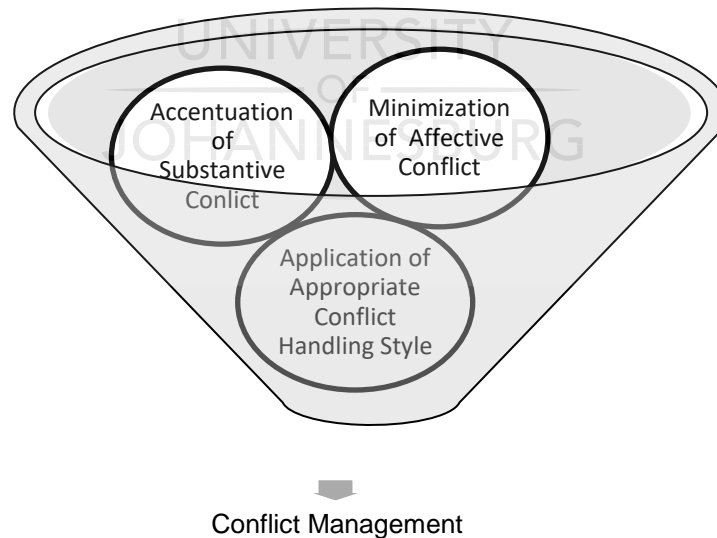
<u>Author</u>	<u>Characteristics of Conflict Management</u>	<u>Occurrences in literature</u>
Rahim, 1983; Posner, 1986; Amason, 1996; Jehn and Mannix, 2001; Rahim, 2002; Thamhain, 2004; Holt and DeVore, 2005; Kaushal and Kwantes, 2006; Ng et al., 2007; Sportsman and Hamilton, 2007; Tjosvold, 2008; Chiochio et al., 2011; Cahyono and Hartijasti, 2012; Creasy and Anantatmula, 2013; Kim et al, 2015; Sudhakar, 2015; Ensari et al, 2016	<ul style="list-style-type: none"> <li>• Conflict identification</li> <li>• Conflict handling styles application.</li> <li>• Minimization of negative effects of conflict</li> <li>• Heightening of constructive conflict</li> </ul>	15
Amason, 1996; Barky, H. and Hartwick, J. 2001	<ul style="list-style-type: none"> <li>• Identification of conflict and its antecedents</li> <li>• Conflict handling styles</li> <li>• Satisfactory resolution of conflict</li> </ul>	2
Amason, 1996; Cahyono and Hartijasti, 2012	<ul style="list-style-type: none"> <li>• Limit dysfunctional conflict</li> <li>• Encourage functional conflict</li> </ul>	2
Holt and DeVore, 2005	<ul style="list-style-type: none"> <li>• Process to arrive at settlement.</li> <li>• conflict handling styles.</li> </ul>	1
Sudhakar, 2015	<ul style="list-style-type: none"> <li>• Identification of conflict</li> <li>• Analysis of conflict</li> <li>• Identification of alternative solution</li> </ul>	1

	<ul style="list-style-type: none"> <li>• Application of conflict resolution technique</li> <li>• Solution implementation and impact review</li> </ul>	
Sudhakar, 2015; Ensari et al, 2016	<ul style="list-style-type: none"> <li>• Identify Conflict antecedents</li> </ul>	

It can be deduced from the most frequent occurrences as displayed in Table 1, that conflict management is comprised of an inherent step of being aware/identifying the type of conflict at all times. Therefore, from the literature the summative observation is that the characteristics of conflict management broadly fall within the following categories;

- Minimization of affective/negative conflict,
- Accentuation of substantive/constructive conflict, and
- Application of the appropriate conflict handling styles.

This is illustrated in figure 3 below.



**Figure 2: Conflict management (derived from literature in Table 1)**

The definition of conflict management is derived from the most occurring characteristics of conflict management from literature as detailed in Table 1.

The next section deals with the third objective, viz to explore the various perspectives of project success.

## 2.3 Project success

### 2.3.1 Introduction

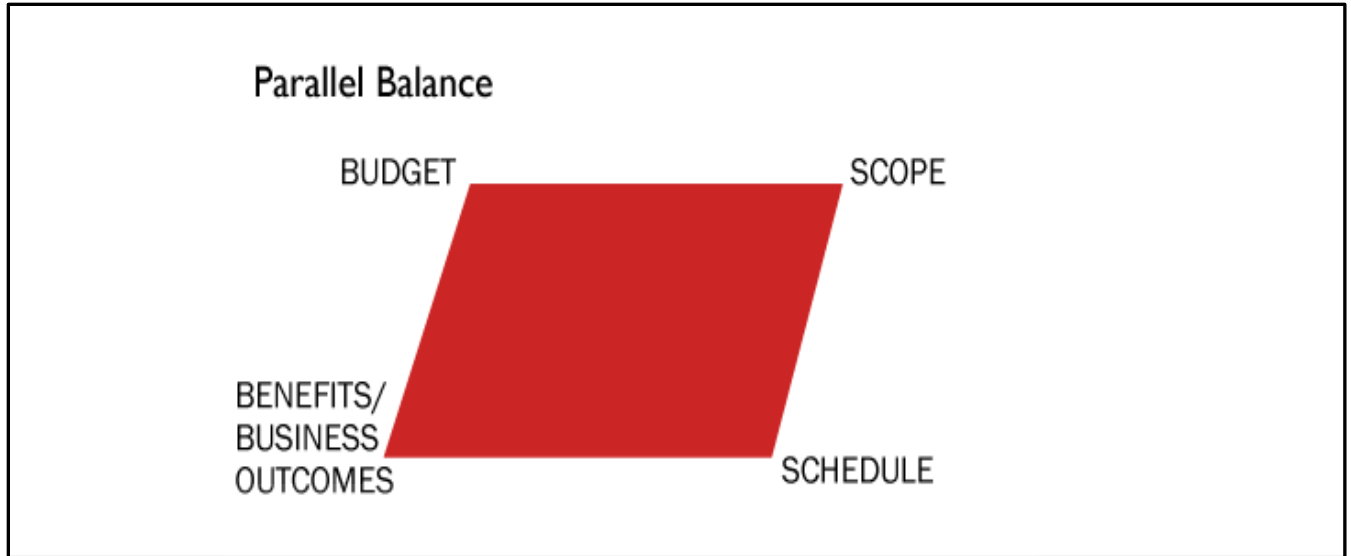
The Oxford English dictionary (1989) defines success as the accomplishment of an aim or goal. The success of project has traditionally been measured according to performance in relation to the triple constraints that are scope, cost and time. The PMI (2013) proposes a model which lays out project performance that incorporates four clusters. These are skills from an interpersonal perspective, how is knowledge applied, comprehension of the project management environment as well management knowledge in general. At this stage, it is key to note Ika (2009) found that authors discuss project *management* success and *project* success in an ambiguous manner. The work of (Ika, 2009; Meredith and Mantel, 2011; Yang, Chen, and Wang, 2015) makes a distinction that project success is a combination of triple constraints and business benefits. Ika (2009) and Westerveld (2003) advance the view that triple constraint is the ability to meet the “cost/time/quality triangle”. Whereas, *business benefits* is delivering a project that fulfils the end user requirements. However, it is the view of Baker, Murphy, and Fisher (2008) that there is no universal definition of project success. The multiple perspectives will be explored further.



### 2.3.2 Project success- the various perspectives

(Ika, 2009) points out the dependency of project success on one's perspective and perception. In a study of factors affecting project success, (Baker, Murphy, and Fisher 2008) found that there was no such thing as "absolute project success" in project management further advancing the notion that there is only the "perceived success of a project". They further state that the criteria to evaluate project success changes over time, Jugdev and Müller (2005) share similar sentiments on the evolution of what project success means. Barker, Tjosvold, and Andrews (1988); Pinto and Mantel (1990); and Belout and Gauvreau (2004) concur in positing the outlook that different people perceive success in different ways. Further stating this to be the case with different interest groups such as management, stakeholders, customers and employees in a project.

Looking at the work of Crawford and Pollack (2004); Ika (2009); Duggal (2010); Labuschagne, Marnewick, Eloff; Steyn, and Tobin (2013) it emerges that the success criteria is evolving. Duggal (2010) concludes that the next level up on how to measure the project success is moving from a triangle of constraints to a diamond of opportunity as summed up in Figure 3. The triple constraint of budget, scope and schedule are balanced with benefits/business outcomes (Duggal 2010, Labuschagne et al. 2013).



**Figure 3: Parallel balance (Project success measurement) (Duggal, 2010)**

The parallel balance perspective looks to incorporate the key aspect of fulfilment of stakeholder requirements. This is the attainment of benefits which can be a mixture of business goals, customer satisfaction, and adoption by end-user or any other criteria such as health, safety, security and environment (Duggal, 2010). Multiple perspectives can be focussed on by the project manager as seen relevant to their business. For the current study the 4<sup>th</sup> dimension of project success is defined as business benefit.

The next section discusses the second part of the third objective, *viz* to explore project success by contrasting success criteria and critical success factors.

### **2.3.3 Success criteria and critical success factors**

Turning to the work of Ika (2009) to further delve into project success the criteria for measuring project success as well as factors contributing to its achievement. Ika (2009) cites work of a various authors (Belassi and Tukel, 1996; Pinto and Slevin 1988; and

Westerveld, 2003) which is similar to that of Marnewick (2012), they all investigate critical factors for project success.

Reference to Dvir and Shenhar (2003), Westerveld (2003), Jugdev and Müller (2005) reveals that there is critical success factor (CSF) frameworks that exist which focus on success and failure narrative of project, portfolio and programme. They are all based on the pioneering definitive of (Pinto and Slevin, 1989). Later work by authors such as (Marnewick, 2012; Labuschagne et al, 2013) focus on critical success factors that are industry specific.

Pinto and Slevin (1989) perceptively suggest the following description for each of the identified factors:

- *Project mission* described as characterized by clearly defined goals and direction;
- *Top management support* which alludes to resources, authority, and power for implementation;
- *Schedule and plans* which refers to the detailed specification of the implementation process;
- *Client consultation* termed as communication with and consultation of all stakeholders;
- *Personnel* deals with recruitment, selection, and training of competent personnel;
- *Technical Tasks* refers to the ability of the required technology and expertise;
- *Client acceptance* entails selling of the final product to the end users;
- *Monitoring and Feedback* is about timely and comprehensive control;

- *Communication* describes provision of timely data to key players; and
- *Trouble shooting* is the ability to handle unexpected problems.

The standards or philosophies utilised to arbitrate overall project success refer to project success criteria. Whereas the situations, events and environments that enable project success are termed critical success factors (Lim and Mohamed, 1999; Westerveld, 2003; Ika, 2009). Lim and Mohamed (1999) makes clear that critical success factors impact success criteria. In turn, success criteria determine project success.

The description of characteristics of project success is the fourth objective of the chapter, it is discussed in the next section.

#### **2.3.4 Delineation of features of project success**

Project success remains ambiguous with no universally accepted definition. It is unlikely that the various stakeholders in projects possess the same definition and interpretation of success and failure (Belassi and Tukel 1996; Ika 2009). In describing the characteristics of project success, the works in Table 2 were consulted. The various authors shed light on the different dynamics and their impact on project success. The role of conflict management strategies, team work, emotional intelligence, human resource management, etc. is emphasized. Barker, Tjosvold, and Andrews(1988); Pinto and Mantel (1990); and Belout and Gauvreau (2004) concur in positing the outlook that different people perceive success in different ways.

**Table 2: Previous research of dynamics that impact project success**

Author	<i>Investigated dynamics that Impact on Project Success</i>
Belassi and Tukel, 1996	Critical success and failure factors
Belout and Gauvreau, 2004	• Human resource management
Chiocchio et al., 2011	• Conflict • Collaboration • Trust
Clarke,2010	• Emotional intelligence • Conflict management style • Attentiveness • Teamwork • Transformational leadership
Creasy and Anantamula, 2013	• Conflict management style • Degree of change orientation • Myers-Briggs personality type • Degree of innovativeness • Level of self-monitoring • Communication apprehension
Ika, 2009	• Project management
Jehn and Mannix, 2001	• Intragroup conflict types (task, process and relationship conflict)
Kankanhalli et al., 2006	Antecedents of conflict
Miller et al., 2015	• Eliminating interpersonal conflict
Mudau and Pretorius, 2009	• Project control • Risk management

Prieto-Remón et al, 2015	<ul style="list-style-type: none"> <li>• Conflict management strategies</li> <li>• Conflict sources</li> </ul>
Westerveld, 2003	<ul style="list-style-type: none"> <li>• Project excellence model</li> <li>• Success criteria</li> </ul>
Yang et al., 2015	<ul style="list-style-type: none"> <li>• Interpersonal conflict</li> <li>• Product advantage</li> <li>• New product development performance</li> <li>• Requirements definition and management</li> </ul>
Yuying, 2012	<ul style="list-style-type: none"> <li>• Cultural intelligence</li> <li>• Relationship quality</li> </ul>

Importantly, Ika (2009) points out that many projects have been delivered within time, cost and quality but are considered a failure from the perspective of the organization as the completed product did not deliver the expected business results. This is project management success through the triple constraint perspective as indicated in Table 2 (Westerveld, 2003; Yang et al., 2015). In the same token when looking to define project success, Ika (2009) points out that some projects exceed cost and schedule however, are considered a success by virtue of meeting or exceeding the expected business outcomes. This is the business benefit aspect of project success (Duggal, 2010).

The next section covers the various research that has been conducted previously in the subjects of conflict management and project success with the build-up towards identifying the research gap.

## 2.4 Research areas

Reference to the work of (Clarke, 2010) reveals a study of the impact of emotional intelligence, conflict management style, attentiveness, teamwork, and Transformational leadership on Project success. Turning to (Creasy and Anantatmula, 2013), one finds a study on the different conflict management styles, degree of change orientation, Myers-Briggs personality type, degree of innovativeness, level of self-monitoring and communication apprehension. Additionally, the work of (Prieto-Remón et al, 2015) investigated the different Conflict management strategies as well as the conflict sources. The large body of literature that was consulted in looking at dynamics that affect the two crucial research areas of project success and conflict management is listed on Table 2 and Table 1 respectively.

The next section identifies and discusses the research gap that emanates from the critical review of literature.

### 2.4.1 The research gap

The prominent work that has investigated the direct link between impact of conflict management on project success such as that of (Clarke, 2010), (Chiocchio et al., 2011), (Creasy and Anantatmula, 2013) and (Prieto-Remón et al, 2015) has placed emphasis on the different modes or styles of handling conflict rather than a holistic view on conflict management. This current work will seek to investigate factors of conflict management, including conflict handling styles that have an impact on project success with a specific focus on engineering projects within South Africa.

## 2.5 Chapter conclusion

The focus of this chapter was to conduct a thorough critique of literature sources relating to the topics of conflict management and project success. This was to enable clear understanding of these topics. The first two objectives to be addressed were; to explore conflict management by looking at different conflict types and conflict handling styles. As well as to comprehensively determine the characteristics of conflict management from literature.

The next two objectives were; to explore the various perspectives on project success and contrasting success criteria and critical success factors. As well as to establish what project success is through delineation of its characteristics.

The various research methods that could be applied in conducting the research are discussed in the next chapter.



UNIVERSITY  
OF  
JOHANNESBURG



### **3 Research design and methodology**

#### **3.1 Introduction**

Research methodology entails providing a detailed description of how the research will be conducted, providing an outline of the data collection process as well as how to go about analyzing the results. Collis and Hussey (2013) cite Vogt (1993) providing a definition for research design which states that it is “the science of planning procedures for conducting studies so as to get the most valid findings”.

The aim of this chapter is to discuss research methods that are used when undertaking a research process. The following objectives have been framed in order to ensure the achievement of the abovementioned aim:

1. To examine the research design;
  2. To evaluate and select a suitable research paradigm for the current research;
  3. To examine data collection techniques and choose the most suitable for the study;
- and
4. Provide a summary of selected research methods.

The first objective of this chapter i.e. to examine the research design is covered in the following section.

#### **3.2 Research design**

The focus of a research design is on the final result and the associated step by step activities in the process towards the attainment of the end goal.

Essentially, research design is a working plan that marries some research methods and procedures in order to obtain valid and reliable set of data for analyses, conclusions and theory formulation that is empirically grounded. The outline of the research design for the current study is contained in Figure 4 below.

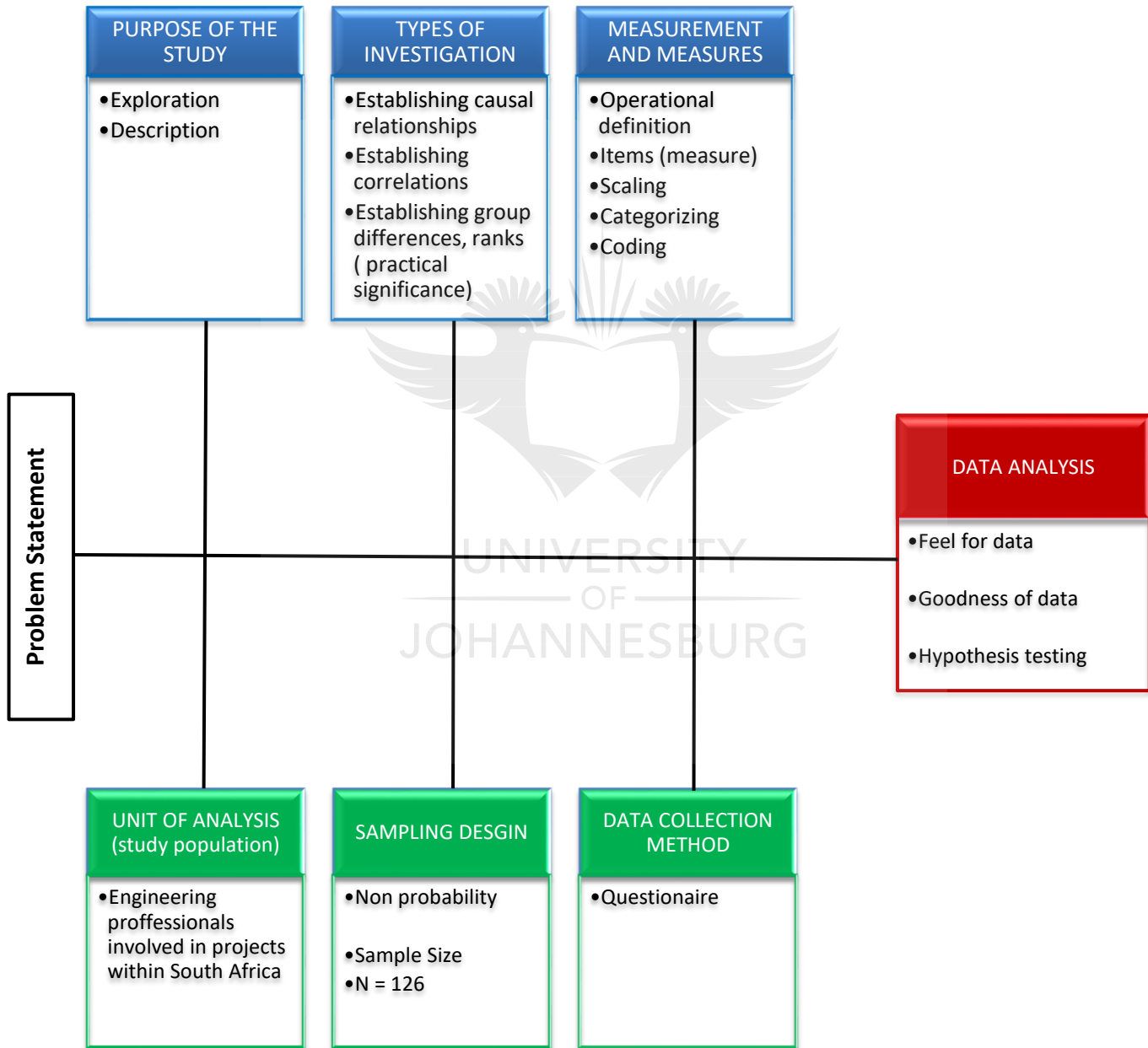


Figure 4 Research design

The next objective of this chapter i.e. to evaluate and select a suitable research paradigm for the current research is covered in the next section.

### 3.3 Research paradigms

Collis and Hussey (2013) concur with Babbie (2007) in positing that a paradigm is a philosophical framework that encompasses accepted theories, frame of reference, models, methodologies and body of research that can be utilized for understanding and observation. Table 3 provides an overview of the various research paradigms that can be adopted when conducting research.

**Table 3: Research paradigm (adapted from Babbie, 2007; Collis and Hussey, 2013; Blumberg et al. 2014)**

Research Paradigm	Features
Positivism	<ul style="list-style-type: none"> <li>Assumes that trends, methods, generalizations, cause-and-effect issues are applicable to natural sciences</li> <li>Human beings are seen as objective</li> <li>Applies natural science model of research for investigations and explanations.</li> <li>Argues that there is objective reality</li> </ul>
Post-positivism	<ul style="list-style-type: none"> <li>Seen as an extension of Positivism.</li> <li>Contends that reality can never be comprehended fully</li> <li>Posits that there are many truths.</li> <li>Subjective (measures it provides to the researcher are subjective).</li> </ul>
Interpretivists	<ul style="list-style-type: none"> <li>People subjectively construct and provide meaning to the social world</li> <li>Researcher is forms part of the observed</li> <li>Interests drive research</li> <li>Suggests looking at the meanings people give to the world and understanding meanings from their perspective</li> </ul>

Realism	<ul style="list-style-type: none"> <li>• Shares ideologies of positivism and interpretivism</li> <li>• Subjective individual understandings of reality are key for complete understanding of phenomena</li> </ul>
---------	---

Babbie (2013) and Blumberg *et al.* (2014) opine that quantitative and qualitative research approaches are an extension of the various philosophical research paradigms such as positivism and post-positivism. The current research will adopt a positivism research philosophy. The contrasting of the qualitative and the quantitative research approach is covered in the next section.

### 3.4 Quantitative vs qualitative research approach

Blumberg, Cooper, and Schindler (2014) posit that in research studies there are two approaches, namely qualitative and quantitative studies. Blumberg *et al.* (2014) further define the two terms as follows; qualitative studies are founded on qualitative information such as narratives, words and sentences whereas quantitative is based on number and figures which is quantitative information.

Reference to Babbie (2007) reveals that design of quantitative research is to ensure objectivity, generalizability and reliability. The quantitative paradigm's strengths lie in its methods producing quantifiable, reliable data that can be generalized to a larger population. As Babbie (2007) points out that the decontextualization of human behavior in a manner that removes the event from its real world setting thus ignoring the effect of variables that have been omitted in the model is the weakness of the quantitative

paradigm. The current body of work will adopt a quantitative research approach. The reasoning perspectives that can be adopted in research i.e. deductive or inductive are discussed in the next section.

### 3.5 Deductive vs Inductive reasoning

In research, there are broadly two methods of reasoning. We refer to deductive and inductive approaches (Blumberg et al., 2014). Inductive reasoning starts off from specific observations to generalities and theories i.e. observation, pattern, tentative hypothesis and theory. Deductive reasoning moves from a wide-ranging to more precise i.e. theory, hypothesis, observation and confirmation.

The current research will adopt a deductive approach. Turning to the work of Sekaran and Bougie (2011, p.29) one finds that deductive reasoning moves from a general to a more specific inquiry. The deductive approach entails formulating hypotheses and subjecting those to testing throughout the research process. Sekaran and Bougie (*ibid.* p.34) state that the process of testing the hypotheses may lead to confirmation or rejection thereof. The deductive method is presented as a process that broadly unfolds summarily as follows.

1. Deduce hypothesis based on theory.
2. Operationalize the hypothesis by formulating it for quantitative measurement of the variables.
3. Test the operational hypothesis by applying an empirical inquiry.
4. Examine the result of the enquiry through the use of statistical techniques so as to confirm or reject a theory.

## 5. Modify the theory in cases where it is required.

The current research deals with the problem that seeks to ascertain the effect of conflict management on project success in engineering projects in South Africa. The inquiry will be based on the theory developed in the literature review chapter. Turning to the work of Wilson (2010, p.7) it is stated that a deductive approach is concerned with developing hypotheses based on existing theory and then designing a research strategy to test those hypotheses. Sekaran and Bougie (*ibid*, p.119) in defining purpose of the study suggested that it can be exploratory, descriptive or hypotheses testing. This study will be hypotheses testing. According to Sekaran and Bougie (*ibid*, p.125) hypotheses testing offers an enhanced understanding of the relationships that exists amongst variables. Therefore, it is suitable to aid the current study in comprehending the relationship between conflict management and project success.

Sekaran and Bougie (*ibid*, p.126) posit that the two types of investigations are either causal or correlational. This research study is a causal investigation. The next section looks at the unit of analysis for this study.

### 3.6 Unit of analysis

Sekaran and Bougie (*ibid*, p.132) state that the unit of analysis essentially refers to the object of study in the research. It can be individuals, dyads, groups, organizations or cultures. The unit of analysis for the current research is the individual engineering professional and practitioner in project management. The sample of individuals will be experienced professionals who have worked in outsourced engineering projects in South

Africa. The time horizon of a research study is crucial. The next section discusses cross-sectional vs longitudinal time horizon.

### **3.7 Cross-sectional vs Longitudinal**

Another crucial aspect of the research design process is the time horizon of the study. Cross-sectional studies gather data once to answer a research question whereas longitudinal studies study a phenomenon at more than one point in time to answer the research question (Sekaran and Bougie 2011, p.136). Due to time and costs that would be associated with conducting a longitudinal study, it is deemed that this study will be a cross-sectional approach. The third objective of this chapter i.e. to examine data collection techniques and choose the most suitable for the study is covered in the next section.

### **3.8 Data collection**

The work of (Sekaran and Bougie 2011, p.220) reveals that data can be attained first hand by the researcher, this is referred to as a primary source, or secondary sources where records or archives are used. The main primary sources of data are panels, focus groups and individuals. Information can be sourced through interviews, administered questionnaires or observation. Sekaran and Bougie (*ibid*, p.236) state that questionnaires are an efficient mechanism for data collection when the researcher knows how to measure variables of interest. The current research will obtain data from individuals as the primary source through a survey.

Xiang, J (2010, p.67) posits that a survey is more than an instrument to collect information. It is a wide-ranging system for amassing information to describe, relate or clarify knowledge, attitudes and behaviours. The associated activities are to:

- i) identify a suitable target population;
- ii) Designing and pretesting of an instrument for the establishment of its validity and reliability;
- iii) Choosing suitable data analysis techniques;
- iv) Sample size requirements calculation and selection of valid sample;
- v) Prediction of acceptable response rate; and
- vi) Development of data collection procedures.

The research questionnaire as a data collection instrument is discussed in the next section.

### **3.8.1 Research questionnaire**

As Sekaran and Bougie (2011) point out, a questionnaire is a preformulated written set of questions to which respondents record their answers. The authors further provide guidelines for sound questionnaire design principles. They state that focus should be on, firstly, the wording of the questions. Secondly, the categorization, scaling and coding of variables after receipt of the responses. Thirdly, the general appearance of the questionnaire. Focus on the combination of all these important issues minimizes bias in research



The current research study will use email and the internet to electronically distribute and return self-administered questionnaires. The researcher opted to use *Google docs* to create and host the survey for online responses. The request to the respondents that includes background of the study and the link to complete the survey were sent via email. The web based survey was used instead of a paper based survey for the following advantages;

1. Automatic recording of data ensures that errors that would occur during transcription are circumvented.
2. It is convenient for respondents as internet and computers are ubiquitous tools in the work place.
3. It enables the researcher to receive responses instantly thus eliminating waiting time associated with postal system. It has no cost implications for the researcher as there is no requirement for resources to print paper, postage fees and envelopes.

The noted disadvantage of a web based tool was that it is possible for the same individual to complete the survey more than once thus introducing survey bias. However, this possibility was prevented through survey design whereby the online tool was set up to prevent participants from completing the survey more than once.

### **3.8.2 Questionnaire design**

The purpose of the questionnaire is to test the hypothesis model. The elements and dimensions of conflict management and project success as provided in the theoretical framework were tapped for the research instrument's test items development. The

research questionnaire contains nine questions that are meant to solicit demographic information about the respondents as well as twenty-eight items that tap into the five constructs' dimensions and elements. The hypothesis model, which is derived from Figure 2: Conflict management (derived from literature in Table 1) have been derived from the elements of the five dimensions of conflict management and project success to link to the hypothesis model. The data collected from the questionnaire will contribute to formulating answers to the research question.

The selection of the study population and sampling techniques are key to ensuring the validity and reliability of the research. These are discussed in the next section.

### **3.8.3 Population and sampling**

Population is the whole group of people, events, or things of interest that the researcher desires to study. A single member of the population is referred to as an element. (Sekaran and Bougie, 2011). The authors state that to establish representativeness of a sample for generalizability, sample design and sample size are significant aspects.

Sekaran and Bougie (2011, p.265) state that the population frame is a listing of all the elements in the population from which the sample is drawn.

The study consisted of individuals involved in projects in the engineering and built environment. The databases that were investigated were the following:

1. The Engineering Council of South Africa(ECSA)

2. South African Council for Project and Construction Management Professionals (SACPCMP)
3. Association for Project Management South Africa (APMSA)

The ECSA database has the most comprehensive listing of professionals across all industries within South Africa, this influenced the researcher's decision to primarily focus on this database.

#### **3.8.4 Sample design**

Sekaran and Bougie (2011, p.265) assert that sampling is the process of choosing a sufficient number of elements from the population, so that a study of the sample and an understanding of its properties makes it probable to generalize such characteristics to the population elements.

Turning to the work of Blumberg, Cooper and Schindler( 2014), it is stated that the compelling reasons for sampling are mainly cost advantage, more accurate results, increased speed of data collection and availability of population elements. The authors further assert that a good sample design is determined by how well the characteristics of the population it purports to represent are represented. The sample must be valid. Accuracy and precision are the two premises upon which validity of a sample is determine. Accuracy measures the degree of absence of bias from the sample whereas precision measures the proximity of representation of the population by the sample (Blumberg et.al, 2014).

The respondents will be accessed using up-to-date data bases of professional registration organisations in the engineering and the built environment. These databases are updated annually as members need to renew their affiliation. The confidence that the appropriately qualified respondents will be reached is high since the prerequisite to be a member of these professional organisations is to possess the relevant qualification and experience.

### **3.8.5 Sample size**

Sekaran and Bougie (2011, p.265) state that “In multivariate research (including multiple regression analyses), the sample size should be several times (preferably 10 times or more) as large as the number of variables in the study.”

Everitt's 1975 study (cited in Xiang 2010) recommended that the proper case to indicator ratio range should be 10. Xiang (2010, p.112) considers the largest construct and multiplies by a factor to determine the sample size. In the current research the largest construct is considered *i.e. use appropriate Conflict Handling Strategies*. Therefore, according to this rule, the minimum sample size requirement is  $10 \times 10$ , or 100. The current study has 126 respondents.

The next section discusses validity of research.

### **3.8.6 Validity**

Blumberg *et.al.* (2014, p.257) state that “validity is the extent to which a test measures what we actually wish to measure.” The authors further state that validity is classified into

three major forms i.e. content validity, criterion-related validity, and construct validity. The various forms of validity estimates are summarised in Table 4.

**Table 4 Summary of Validity Estimates (Blumberg *et al.*2014, p.257)**

Types	What is Measured	Methods
<b>Content</b>	Degree to which the content of the items adequately represents the universe of all relevant items under study.	<ul style="list-style-type: none"> <li>• Judgmental</li> <li>• Panel evaluation with content validity ratio.</li> </ul>
<b>Criterion-Related</b>	Degree to which the predictor is adequate in capturing the relevant aspects of the criterion.	<ul style="list-style-type: none"> <li>• Correlation</li> </ul>
Concurrent	Description of the present; criterion data are available at the same time as predictor scores.	<ul style="list-style-type: none"> <li>• Correlation</li> </ul>
Predictive	Prediction of the future; criterion data are measured after the passage of time.	<ul style="list-style-type: none"> <li>• Correlation</li> </ul>
<b>Construct</b>	Answers the question, "What accounts for the variance in the measure?"; attempts to identify the underlying construct(s) being	<ul style="list-style-type: none"> <li>• Judgmental</li> <li>• Correlation of proposed test with established one</li> </ul>

	measured and how well the test represents it (them).	<ul style="list-style-type: none"> <li>•Convergent-discriminant techniques</li> <li>• Factor analysis</li> <li>•Multitrait-multimethod analysis</li> </ul>
--	--	--

Content and face validity

According to the work of Sekaran and Bougie (2011, p.206), content validity is a function of how well the dimensions and elements of a concept have been delineated. A panel of judges can attest to the content validity of the instrument. The authors state that “face validity indicates that the items that are intended to measure a concept, do on the face of it, look like they measure the concept.” According to the work of Xiang, J (2010, p.99) content validity can be established by ensuring consistency between extant literature and the measurement items. The current research will rely expansively on a literature review and on a panel of judges to attest to content and face validity of the instrument.

Content and face validity limitations

Sekaran and Bougie (2011) posit that strong face validity is not equivalent to strong validity in general since it is based on subjective judgement. Consequent to this position, the researcher notes that reliance on the expert panel is not an adequate tool to prove validity of the research instrument.

### Construct validity

Turning to the work of Blumberg *et.al.* (2014, p.259), it is stated that in evaluation of construct validity there must be consideration for both the theory and the measuring instrument being used. Construct validity comprises of convergent and discriminant validity. Sekaran and Bougie, (2011, p.208) provide the following definitions;

- Convergent validity – do two instruments measuring the concept correlate?
- Discriminant validity – does the measure have a low correlation with a variable that is supposed to be unrelated to this variable?

In the current research, factor analysis will be performed on the sample data to solicit information relating to the structure of the observables associating to a construct. High construct validity can be inferred if the test items that measure the same concept highly correlate. Construct validity will be determined in the results chapter.

UNIVERSITY  
OF  
JOHANNESBURG

### 3.9 Research methods

The research methods section encompasses the overall process that was followed to conduct the study. A quantitative research paradigm was selected as the best approach. A questionnaire was used as the empirical data collection instrument. The study was cross sectional in nature with the survey being conducted on a one-time basis. The unit of analysis in the chosen sample was the engineering professional involved in projects within South Africa. The data analysis framework encompassed the collection, preparation, analysis and interpretation of the data. An exploratory factor analysis was conducted on the data prior to the completion of a confirmatory factor analysis and structural equation modeling using SPSS.

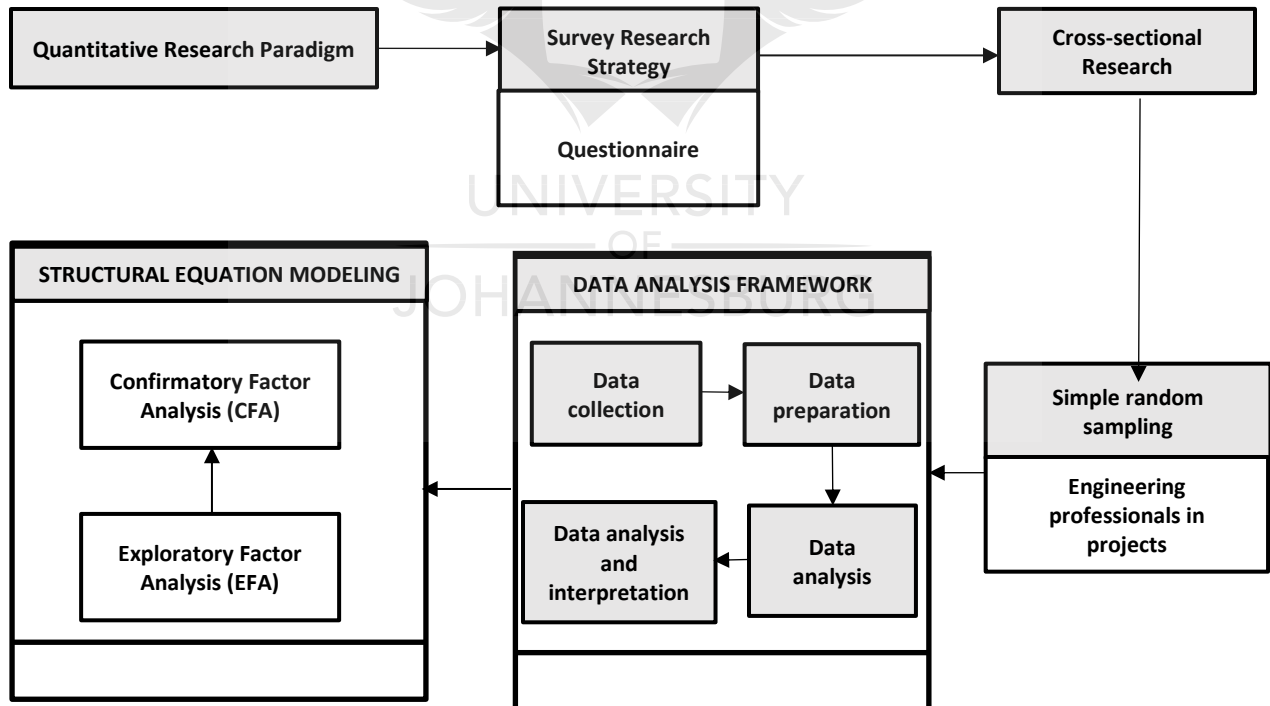


Figure 5: Summary of selected research methods

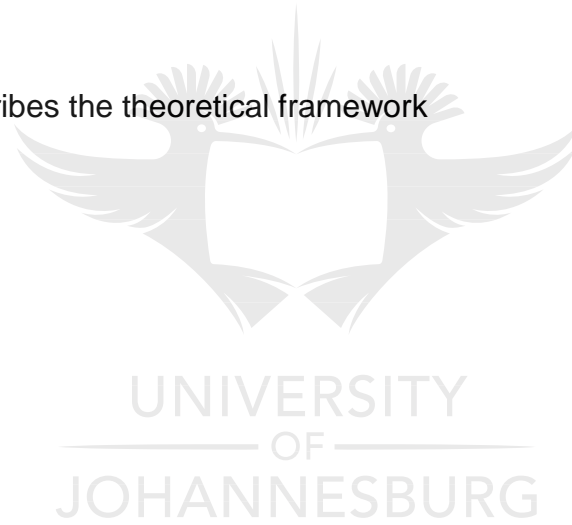


### 3.10 Chapter conclusion

The purpose of this chapter was to set out the research design and methodology for the current research.

The aim of this chapter was to discuss the research methods used during the undertaking of this study. The chapter objective was fulfilled by examining the research design, evaluating and selecting the suitable research paradigm for the current research. This further included a review of data collection techniques and choosing the most suitable for the study.

The next chapter describes the theoretical framework



## 4 Theoretical framework

### 4.1 Introduction

Reference to Clarke (2010), Creasy and Anantatmula (2013) and Prieto-Remón et al, (2015) has drawn attention to the fact that during the life cycle of a project, the contractor and the client experience a number of conflicts relating to the triple constraint of scope, time and quality. As part of an attempt to meet the project objective or ensure successful project performance, the conflict that arises needs to be effectively managed. The aim of this chapter is to:

- Develop a conceptual model, grounded in theory, that will guide the current research.

In order to achieve this goal, the following objectives were formulated:

1. To explore and develop a conceptual model for the study.
2. To define constructs and develop hypotheses

The first objective in this chapter *viz.* to explore and develop a conceptual model for the study is dealt with next.

### 4.2 Developing the conceptual model

According to Sekaran and Bougie (2011), the conceptual model that illustrates the theorization of relationships amongst factors that have been pointed out as critical to the research problem is defined as the theoretical framework. The development of the theoretical framework aids in hypothesizing and testing of certain relationships and

ultimately improving the understanding of the study. Sekaran and Bougie (2011) further state that, the theoretical framework is the basis upon which testable hypotheses can be developed to facilitate the observation and determining whether the formulated theory is valid or not.

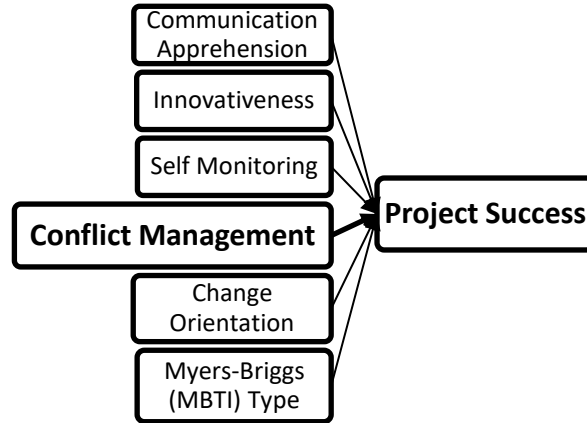
In evaluation of key dimensions of a project manager that are associated with successful project outcomes, Clarke (2010) identifies conflict management as fundamental.

Citing research from construction industry projects, Ng, Peña-Mora and Tamaki (2007) point out the generally adversarial relationships and the excessive costs incurred in resolving arising conflict through lawsuits. It is further stated that the claim resulting from failure to manage conflict effectively is usually a request for compensation over and above the initially agreed amount at the contracting phase (Ng et.al, 2007).

Various authors (Turner and Muller, 2003; Mueller et al., 2008; Cahyono and Hartijasti, 2012) allude to the point that conflict is an inherent aspect of projects. The challenge towards project success lies in how it is managed as it arises on an ongoing basis.

Figure 6: adapted model of the link between conflict management and project success (Creasy and Anantatmula 2013, p.45) below shows a link between various characteristics and traits i.e. communication apprehension, innovativeness, self-monitoring, conflict management, change orientation, Myers-Briggs type and project success.

This research will focus on the link between the characteristic of conflict management and project success. The summarised theory in Table 2 supports the model in Figure 6.



**Figure 6: adapted model of the link between conflict management and project success (Creasy and Anantatmula 2013, p.45)**

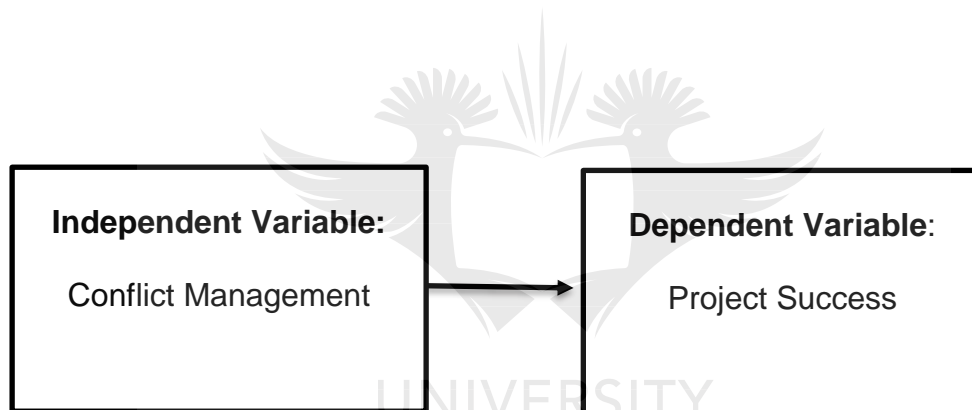
According to Creasy and Anantatmula (2013, p.45), each of the variables in the model namely; communication apprehension, innovativeness, self-monitoring, conflict management, change orientation, and Myers-Briggs type affect the outcomes of the project. The researchers posit that conflict management, as a trait of a project manager's personality, affects project success. They measured project success in terms of time, cost, quality, scope and team.

Turning to the work of Creasy and Anantatmula (*ibid*, p.45) as a point of departure for developing this study's proposed research model it was found deficient in the definition of the concept of project success. The literature review that has been presented, powerfully supports a definition of project success that goes beyond the triple constraints, to a broader description that includes business benefits as a key component of project success. This study will not adopt the defining dimensions of project success, which Creasy and Anantatmula (2013, p.45) give as time, cost, scope, quality (triple constraint)

and team, instead it will use triple constraint and business benefits as components that define project success.

The current research is investigating the link between conflict management and project success.

In the current research, it is theorised that conflict management is the independent variable and project success is the dependent variable. The proposed relationship shows a positive, causal relationship between conflict management and project success.



**Figure 7: Proposed causal relationship between conflict management and project success**

Figure 7: Proposed causal relationship between conflict management and project success seeks to visually depict the problem statement. In this study the problem statement is to investigate the impact of conflict management on project success in outsourced engineering projects in South Africa. (Sekaran and Bougie, 2011) posit that the dependent variable is the variable of primary interest to the researcher. This is the variable which the researcher seeks to predict. They further state that the variable that

influences the dependent variable either positively or negatively is the independent variable.

The literature review suggests that conflict management impacts projects success. There was no empirical research found that confirms this to be true in engineering projects in south Africa. This lead the researcher to asking the following questions in the context of outsourced engineering projects in South Africa.

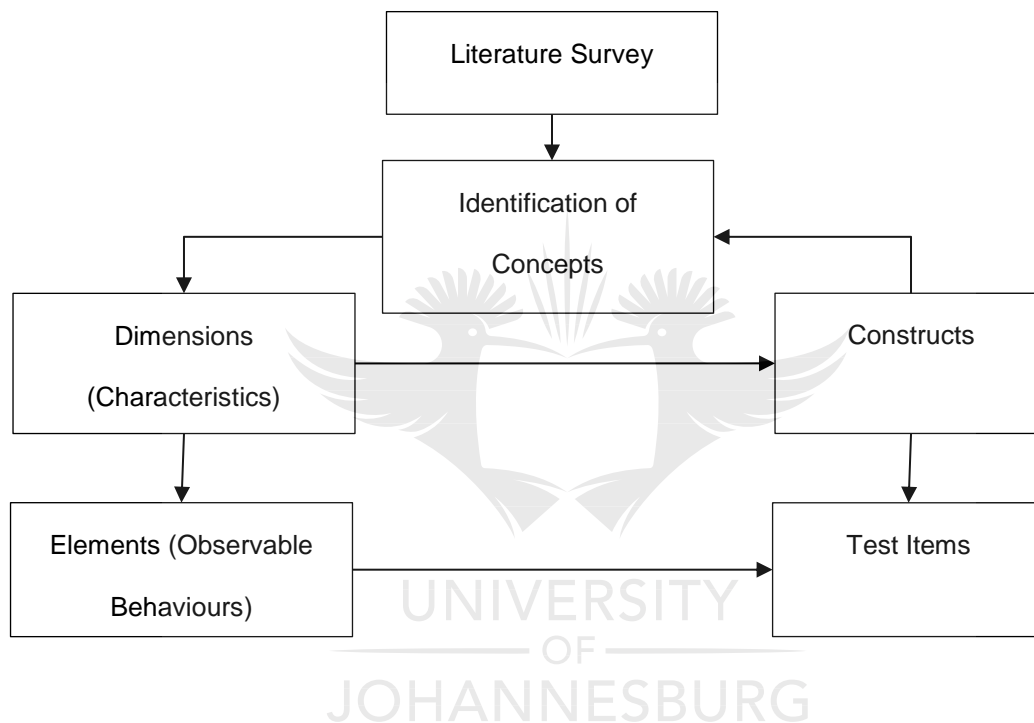
- What is the relationship between conflict management strategies and project success?
- How can conflict management be applied to enable project success?

The concepts of conflict management and project success will, consequently, be delineated in the next section. This will enable quantitative measurement of the concepts subsequent to obtaining their dimensions and elements.

#### **4.3 Operationalization of conflict management and project success**

The researcher starts off by developing a set of measures for the concepts of conflict management and project success. Turning to the work of (Sekaran and Bougie 2011, p.177), one finds a method to operationally define concepts. Crucial to the method, founded on literature, is the defining of characteristics (dimensions) and observable behaviours (element). Sekaran and Bougie (*ibid* p.176) draw attention to the fact that

operationally defining a concept is the description of the observable characteristics in order to make the concept measurable. The procedure that is demonstrated in Figure 8: Summary of identification of constructs and test items (Sekaran and Bougie 2011, p.177) lays out the process whereby the variables that constitute the constructs of the concept and observable behaviours are developed into items that quantitatively test the concept.



**Figure 8: Summary of identification of constructs and test items (Sekaran and Bougie 2011, p.177)**

The second objective in this chapter viz. to define the constructs and develop the hypotheses is dealt with next.

## 4.4 Construct definition and hypothesis development

### 4.4.1 Conflict management

The constructs will be defined in reference to Figure 2 and literature found in Table 1. The definitions, as found in literature, were utilised as a basis for extracting three dimensions of the concept of conflict management (CM). Construct 1 is to Minimise Affective Conflict (MAC), construct 2 is Accentuate Substantive Conflict (ASC), and construct 3 is to use appropriate Conflict Handling Styles (CHS). The literature found in Table 1 was further consulted to delineate the elements of each of the constructs. The definitions found in literature were used to extract the features that constitute each of the constructs. According to the literature reviewed construct 1, Minimize Affective Conflict, quantifies inconsistency in interpersonal relationships amongst group members (Rahim, 2010). (Rahim, 2002) and (Davis, 2011) suggest that this is the extent of incompatibility brought about by feelings and emotions concerning issues. (Jehn and Mannix, 2001; Holt and DeVore, 2005) states that affective conflict interferes with task related work by shifting members' focus which may bring about irritability, resentment and negativity. Therefore, the model proposes first research hypothesis to be;

#### **H1: Minimize Affective conflict is positively related to Conflict Management**

The elements of the first construct are provided in Table 5: Elements of construct 1 Minimize Affective Conflict.



**Table 5: Elements of construct 1 Minimize Affective Conflict**

<b>Construct 1: Minimize Affective Conflict (CM_MAC)</b>	
Source(s): Jehn and Mannix, 2001; Rahim, 2002; Thamhain, 2004; Holt and DeVore, 2005; Kaushal and Kwantes, 2006; Sportsman and Hamilton, 2007; Tjosvold, 2008; Rahim, 2010; Chiochio et al., 2011; Creasy and Anantatmula, 2013; Kim et al, 2015; Sudhakar, 2015; Ensari et al, 2016	
CM_MAC1	Discourage prejudice and interpersonal biases.
CM_MAC2	Concentrate on performing project tasks.
CM_MAC3	Encourage increased communication.
CM_MAC4	Lessen contradictions stemming from feelings of dislikes between individuals in a team.
CM_MAC5	Reduce disagreements brought about by difference in emotions

Turning to literature one finds that construct 2, Accentuate Substantive Conflict, quantifies the extent to which disagreements are based on content or task issues. (Kurtzberg and Mueller, 2005; Holt and DeVore, 2005; Ensari, 2016) have expressed a similar view on substantive conflict. They state that it brings about benefits such as improving understanding of multiple viewpoints, availing alternate solutions and ultimately leading to improved decision making.

## H2: Accentuate Substantive Conflict is positively related to Conflict Management

The elements of the second construct are indicated in Table 6: Elements of construct 2 Accentuate Substantive Conflict.

**Table 6: Elements of construct 2 Accentuate Substantive Conflict**

<b>Construct 2: Accentuate Substantive Conflict (CM_ASC)</b>	
Source(s): Amason, 1996; Jehn and Mannix, 2001; Rahim, 2002; Thamhain, 2004; Kurtzberg and Mueller, 2005; Holt and DeVore, 2005; Tjosvold, 2008; Chiochio et al., 2011; Cahyono and Hartijasti, 2012; Creasy and Anantatmula, 2013; Kim et al, 2015; Sudhakar, 2015; Ensari et al, 2016	
CM_ASC1	Deferment of consensus by emphasizing alternatives and expanding main concepts.
CM_ASC2	Identification and recognition of the opposing viewpoints by all parties involved.
CM_ASC3	Culture of debate and contestation of ideas is encouraged.
CM_ASC4	Not losing sight of the common goal.

Various authors (Rahim, 2002; Holt and DeVore, 2005; and Tjosvold, 2008) use the dual concern model developed by (Blake and Mouton, 1964), and later improved by (Kilmann and Thomas, 1978) to present the five conflict handling styles as competing, collaborating, compromising, accommodating and avoiding. Construct 3 use appropriate

Conflict Management Style measures suitability of choice of conflict handling style in relation to the conflict situation.

**H3: use of appropriate Conflict Handling Style is positively related to Conflict Management.**

The elements of the third construct as derived from literature are listed in Table 7:

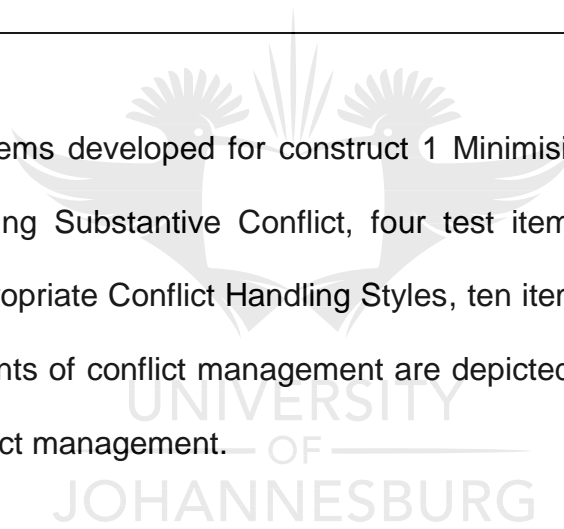
Elements of construct 3 use appropriate Conflict Handling Strategies

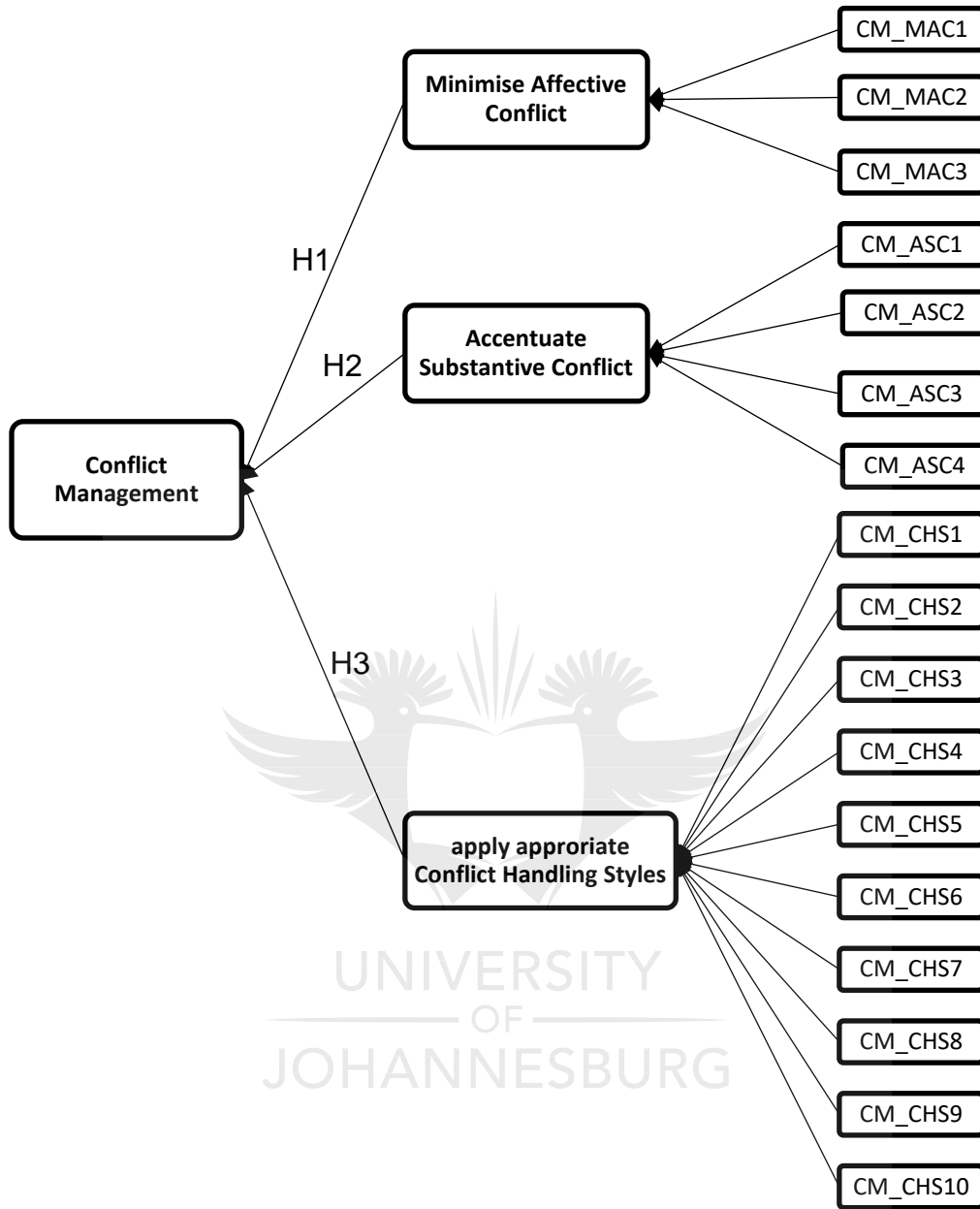
**Table 7: Elements of construct 3 use appropriate Conflict Handling Strategies**

<b>Construct 3: use appropriate Conflict Handling Strategies (CM_CHS)</b>	
Source(s): Jehn and Mannix, 2001; Rahim, 2002; Thamhain, 2004; Holt and DeVore, 2005; Kaushal and Kwantes, 2006; Sportsman and Hamilton, 2007; Tjosvold, 2008; Chiochio et al., 2011; Cahyono and Hartijasti, 2012; Creasy and Anantatmula, 2013	
CM_CHS1	Competing on important issues where unpopular action may be required and need implementing.
CM_CHS2	Competing against those that take advantage of non-competitive behaviour.
CM_CHS3	Accommodating when issues are more important to others than yourself
CM_CHS4	Accommodating when you are wrong.
CM_CHS5	Compromising to arrive at pragmatic solutions under pressure in terms of time.

CM_CHS6	Compromising when rivals with equivalent power are committed to mutually exclusive aims.
CM_CHS7	Collaborating when the differing views are too crucial to be compromised.
CM_CHS8	Collaborating to combine insights from persons with dissimilar outlook.
CM_CHS9	Avoiding when possible disturbance dwarfs the value of resolution.
CM_CHS10	Avoiding in order to enable opponents to simmer down and regain perspective.

There were five test items developed for construct 1 Minimising Affective Conflict; for construct 2 Accentuating Substantive Conflict, four test items were developed; and construct 3 use of appropriate Conflict Handling Styles, ten items were developed. The dimensions and elements of conflict management are depicted in Figure 9: Framework for dimensions of conflict management.





**Figure 9: Framework for dimensions of conflict management**

#### 4.4.2 Project success

A similar methodology to that which was used to develop dimensions for the concept of conflict management was used in the development of the dimensions for the concept of project success. The theory in Table 2 supported by Figure 3 is the basis of delineation

of project success. Based on theory, the dimensions of Project Success (PS) that were derived are; construct 4 Triple Constraint (TC) and construct 5 Business benefits(BB).

The work of (Westerveld, 2003; Ika, 2009; Meredith and Mantel, 2011 and Yang et al. 2015), advances the view that triple constraint is the ability to meet cost, time and scope triangle within the desired quality parameters. Construct 4 is triple constraint.

**H4: Triple constraint is positively related to project success.**

**Table 8: Elements of construct 4 triple constraint**

<b>Project Success: Triple Constraint (PS_TC)</b>	
Source(s): Westerveld, 2003; Ika, 2009; Meredith and Mantel, 2011; PMI,2013; Yang et al. 2015	
PS_TC1	Measure and monitor cost overspending or underspending relative to original budget.
PS_TC2	Measure and monitor schedule overrun or underrun relative to original schedule.
PS_TC3	Project meets technical performance.
PS_TC4	specification requirements as originally set out during project definition are fulfilled.

Construct 5 business benefits essentially looks at the objectives of embarking on the project from a business perspective and whether the envisaged benefits have been attained. Based on the work of (Jugdev and Müller, 2005; Ika,2009; Duggal, 2010) in delineating business benefits it is stated that it incorporates a mixture of business goals, customer satisfaction, and adoption by end-user or customer.

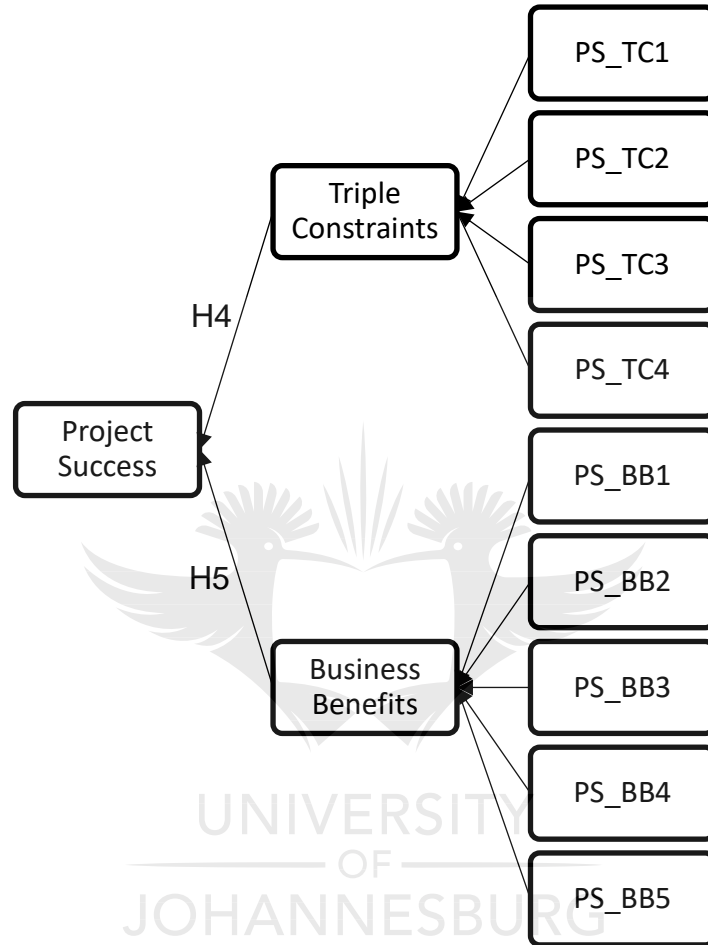
**H5: Business benefits is positively related to project success.**

**Table 9: Elements of construct 5 Business Benefits**

<b>Project Success: Business Benefits (PS_BB)</b>	
Source(s): Dvir and Shenhar, 2003; Jugdev and Müller, 2005 Ika,2009; Duggal, 2010	
PS_BB1	Satisfaction of stakeholder and customer.
PS_BB2	Embracing by the end-user/customer.
PS_BB3	Fulfilling objectives of the business case for the project.
PS_BB4	Benefits realization by the business such as return on investment (ROI).
PS_BB5	Faster delivery time to market

Table 8: Elements of construct 4 triple constraint and Table 9: Elements of construct 5 Business Benefits depict the dimensions and elements for project success. There were

four test items developed for construct 4 Triple Constraint and there were five items developed for construct 5 Business benefits.



**Figure 10: Framework for the dimensions of Project Success**

The concept of projects success including its dimension and elements is illustrated above in Figure 10: Framework for the dimensions of Project Success

Holistically, the proposed model has three dimensions for conflict management and two dimensions for project success. The constructs that define conflict management as laid out on the model are; Minimize Affective Conflict, Accentuate Substantive Conflict, and



use of appropriate Conflict Handling Styles. On defining the project success, there are two constructs namely; Triple Constraint and Business benefits. A positive causal relationship between the variable of Conflict Management and Project Success is proposed based on the model. The current research investigates the position that Conflict management positively impacts project success.

**H6: Conflict management has a positive effect on project success**



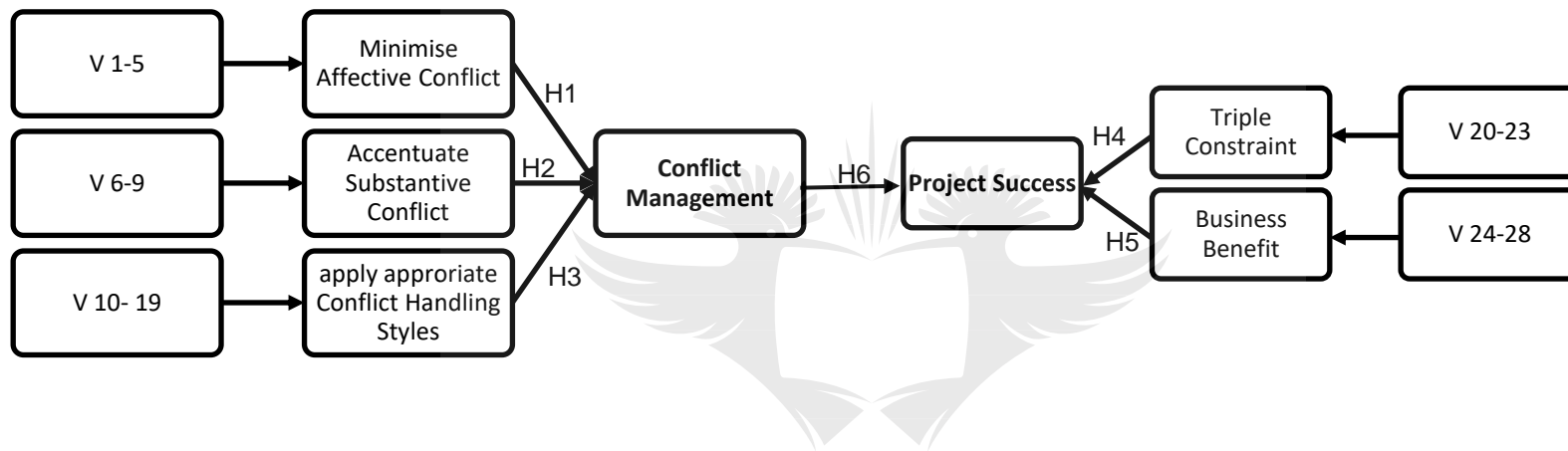


Figure 11: Proposed Model for the link between Conflict Management and Project Success

#### 4.5 Chapter conclusion

The primary aim of the chapter was to develop a conceptual model, grounded in theory, that will guide the current research. The extensive literature review conducted was the basis for theorising that conflict management is the independent variable that impacts the dependent variable project success. The constructs were defined and elements were delineated to develop the model for the current research. There were 6 hypotheses developed to underpin the current study.



## 5 Data analysis theory

### 5.1 Introduction

The objective of this chapter is to detail the theory behind the data analysis process and stipulate how the data will be prepared, analyzed, interpreted and discussed.

Sekaran and Bougie (2011, p.301) state that subsequent to data collection from a representative sample of the population, the follow up step is to analyze them to test the research hypothesis.

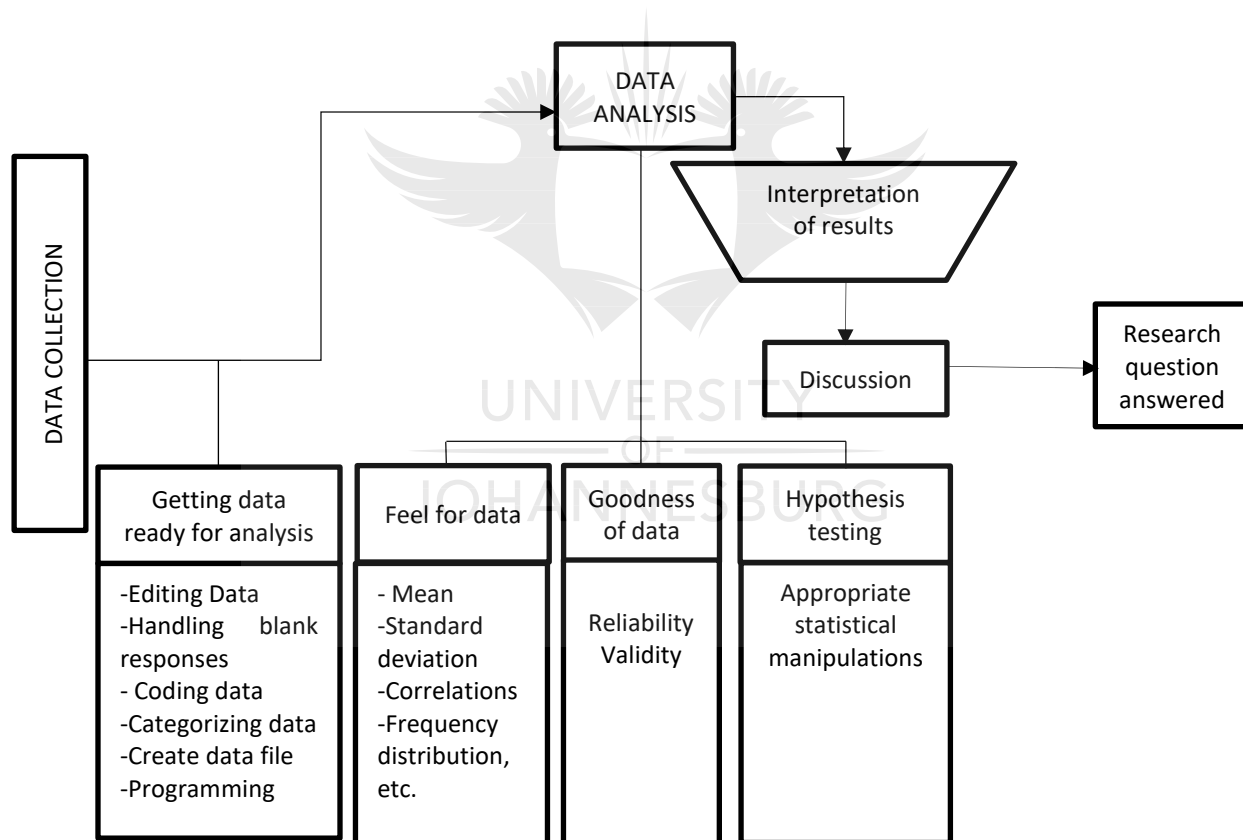


Figure 11: Flow diagram of data analysis process (Sekaran and Bougie, 2011)

As part of the data analysis process, the authors suggested some preliminary steps that require to be done. In figure 12 the four steps are identified as: i) getting data ready for analysis, ii) getting a feel for data, iii) testing the goodness of data, and iv) testing the hypotheses.

According to Sekaran and Bougie (*ibid.* p.306) the feel for the data provides a preliminary impression of areas such as how good the scales, the quality of the coding and entering of data. Submitting the data for factor analysis, obtaining Cronbach's alpha or the split-half reliability of the measures can be used to fulfill the objective of testing the goodness of data. Hypotheses testing is accomplished by using the statistical test from SPSS software program.

## **5.2 Data preparation**

Blumberg et al.(2014, p.376) has drawn attention to the fact that data preparation ensures the correctness of the data and their translation from raw form to condensed and classified forms that are suitable for analysis. The activity includes editing, coding, and data entry. Another preliminary step that supports comprehension of the collected data is the preparation of a descriptive statistical summary.

### **5.2.1 Editing Data**

The work of Blumberg et al. (2014, p.377) reveals that editing detects mistakes and oversights, amends them where possible, and endorses that maximum data quality standards are attained. Turning to Sekaran and Bougie, (2011, p.302) one finds that

biases may be introduced during editing, this could impact the goodness of data. The authors further suggest that the validity and replicability of the research could be compromised. No editing will be done to the data in the current research unless the respondent has been contacted to clarify the discrepancies.

### **5.2.2 Handling blank responses**

As Sekaran and Bougie,(2011 p.302) point out, respondents are likely to omit items in the questionnaire. This could be due to a variety of reasons such as not understanding the question, not knowing the answer, unwillingness to answer, or indifference to the need to responding to the full questionnaire (Sekaran and Bougie,2011, p.303). If a significant number(25%) of questions have been left blank in a questionnaire, Sekaran and Bougie,(*ibid*,p.302) argue that it must be discarded from the data set for analysis in order to prevent compromise of the data set. However, if there are only a few items missing, the researcher must decide on how to handle these responses. Instead of assigning a mean or midpoint value as suggested by Sekaran and Bougie,(*ibid*,p.303), the researcher will apply the method of leaving out survey responses with missing items during analysis. It is the view of Sekaran and Bougie,(*ibid*,p.303) that the overall sample size of the specific variable will be reduced by this method however, the overall research validity will be improved.

### **5.2.3 Coding data**

As Blumberg, et al. (2014, p.377) has indicated, coding entails allocating numbers or other symbols to replies so that the responses can be clustered into a limited number of

categories. The systematic method to selected for the current research is the use of numbers to signify responses, no other symbols or alphabetical characters to be utilized when capturing data. The coding was as follows: 1 = Strongly disagree; 2 = disagree; 3 Neutral; 4 agree; and 5 strongly agree.

#### **5.2.4 Data file preparation**

Sekaran and Bougie,(2011, p.305) point out that data has to be categorised and collated in preparation for use with a software for statistical analysis.

#### **5.3 Descriptive statistics**

Reference to Blumberg, et al. (2014, p.400) reveals that descriptive statistical measures are used to describe the characteristics of central tendency, shape and variability. Turning to the work of Sekaran and Bougie, (2011, p.306), one finds that to establish the degree of understanding of the questions by the respondents and presence of bias, the mean, range, standard deviation and variance in data must be analysed to determine the response range over the scale. The demographic characteristics of the respondents will be analysed using frequency distributions and bar charts.

#### **5.4 Chapter conclusion**

The data analysis theory chapter discussed how the collected data is prepared, analyzed, interpreted and discussed in the context of the current research.

The next chapter discusses the descriptive analysis of data.

## **6 Descriptive analysis of data**

### **6.1 Introduction**

The descriptive results chapter presents the analyzed data from the survey in the form of charts, tables and graphs.

The goal of this chapter is to conduct an analysis, interpretation and discussion of the collected data to clarify the relationship between conflict management and project success.

In order to attain the abovementioned aim, the following objective was formulated:

- To analyze the demographic information pertaining to the nationality of the respondents, the level of education and work experience.

### **6.2 Demographic Information**

The sample size for the data analysis is N=126 which is 28% of the initial target. This section presents the nature of the profile of the respondents. The information entails nationality, level of education, years of experience, professional registration and organisational category.

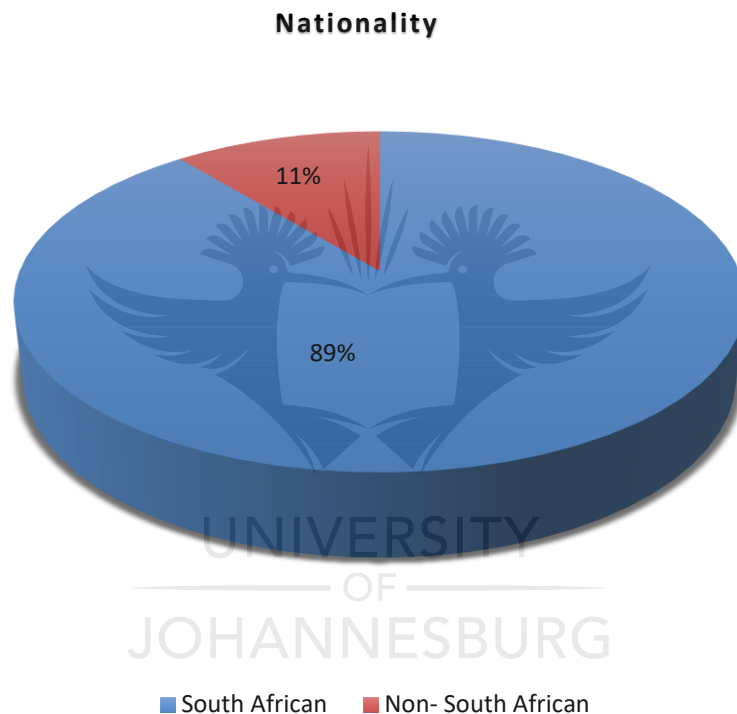
#### **6.2.1 Nationality**

The researcher requested the respondents to indicate whether their nationality status is South African or Non-South African. This was on the basis that the Department of Home Affairs(DHA) released a list of scarce skills in 2014. On the list, the bulk of the skills the



country sought to import are in the engineering and the built environment. Therefore, the expectation is that there are several non-South African professionals within the population. The results of the survey as depicted in Figure 12 show that 89% of the respondents were South African and 11% were non-South African Nationals.

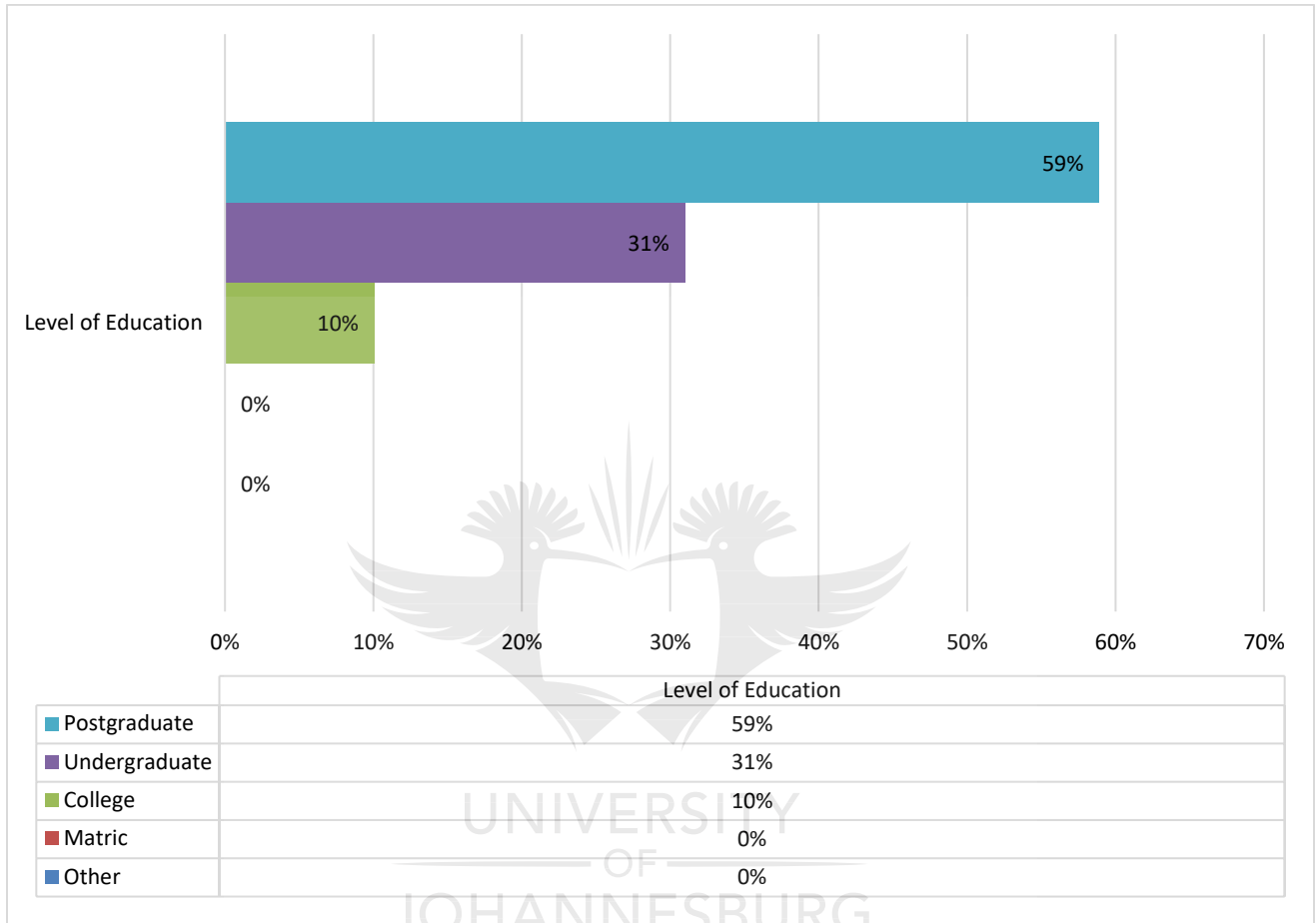
**Figure 12: Respondent Nationality**



### 6.2.2 Level of education

Turning to the education profile of the respondents, the results illustrated in Figure 13 showed approximately 59% possessed a postgraduate qualification, while 31% undergraduate qualification and 10% of the respondents were college educated. The widely varying education and qualification background of the respondents contributes

positively towards the reliability of the current research. This further supports the assertion that the appropriately qualified individuals were surveyed.

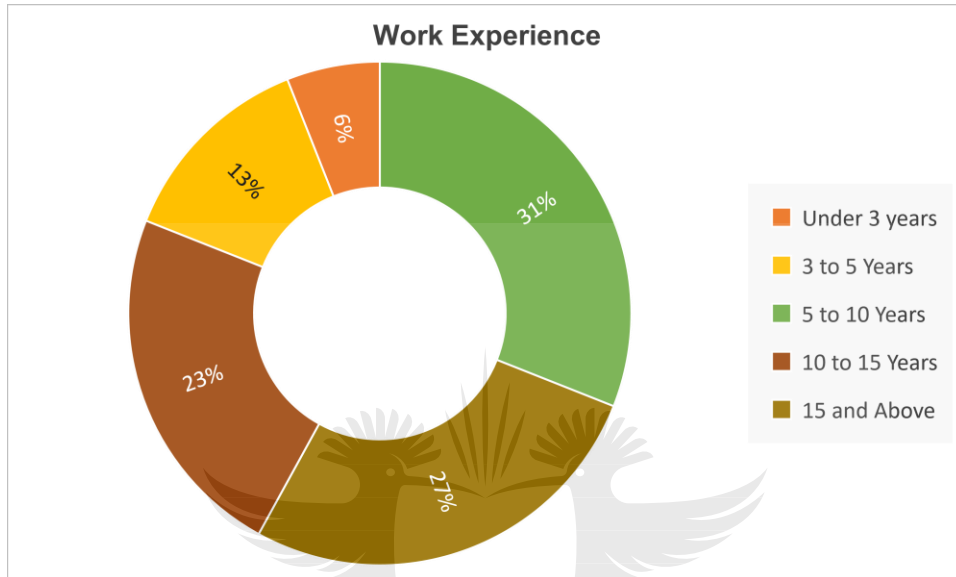


**Figure 13 : Respondent Level of Education**

### 6.2.3 Work experience

The results of the survey that are outlined in Figure 14 relating to work experience show that the largest category of respondents was the 5 to 10-year range where 31% of the responses emanated from. The lowest number of responses of 6% was received from

the under 3-year category followed by 13% of 3 to 5-year range. There is approximately 23% that falls within the 10 to 15-year category and a significant 27% has 15 years or above of appropriate work experience in engineering projects.



**Figure 14: Respondent Work Experience**

It can be argued that the low percentage (6%) of respondents from the category of work experience under 3 years is due to the requirement for professional registration as a prerequisite to participate in the survey. It can also be argued that the trend is in line with the notion that few individuals are given outright project management responsibility within this time period in their working career. Lastly, the mix in experience enables a wide perspective and diversity of views which is backed up by appropriately experience and qualified individuals.

### 6.3 Chapter conclusion.

The goal of this chapter was to conduct an analysis, interpretation and discussion of the collected data to clarify the relationship between conflict management and project success. The profile and demographic information of the respondents was analysed and discussed. It was found that the individuals surveyed were appropriately qualified and experienced therefore possess the requisite set of expertise required to assist in clarifying the relationship between conflict management and project success



## 7 Predictive model framework

The aim of this chapter is to develop a predictive model for relationship between conflict management and project success in outsourced engineering projects in South Africa. This will be fulfilled by utilizing structural equation modelling.

The following objectives were developed in order to fulfill the aim mentioned above:

1. Define the predictive modeling process used to enable the construction of the structural equation model;
2. Preparation of collected data for structural equation model construction process;
3. Develop a theoretical model based literature survey;
4. Perform an exploratory factor analysis on the data;
5. Perform a confirmatory factor analysis on the data and test the hypotheses; and
6. Discuss the final structural equation model.

UNIVERSITY  
OF  
JOHANNESBURG

## 7.1 Predictive modelling process

The first objective of the chapter is to give an overview of the predictive modelling process as outlined in Figure 15 below.

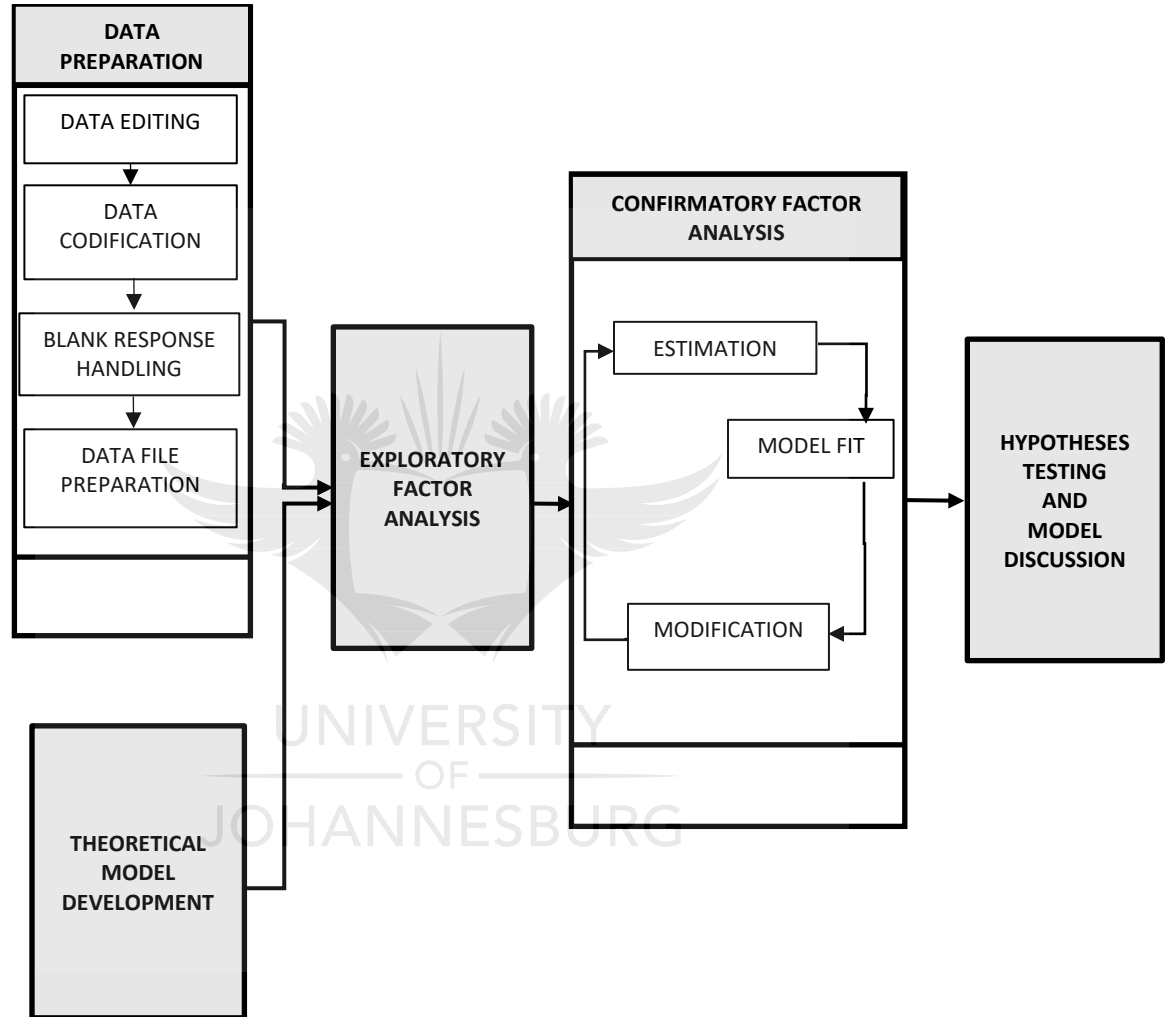


Figure 15: Predictive modelling process (Joseph, 2014)

### 7.1.1 Data preparation

The data gathered during the survey and utilised in the data analysis chapter will be prepared differently for use with the predictive modelling process.

### Data editing, data codification, blank response handling and data file preparation

The non-essential data for the SEM construction was removed during the data editing phase. Data codification entails a systematic method that safeguards reliability and validity of the data. It is crucial to have no missing values for the estimation, this is achieved by eliminating surveys with blank responses during the blank response handling phase. Data file preparation phase focusses on organizing all the responses in a single document for the statistical analysis.

#### **7.1.2 Develop a theoretical model**

Literature review is used to develop a theoretical model. The final model and the theoretical model can be compared by the researcher to determine whether there are any corroborating or contradictory viewpoints.

#### **7.1.3 Exploratory Factor Analysis**

Factor analysis is a multivariate technique that assists to lessen many variables under study to a meaningful, manageable, interpretable set of factors. (Sekaran and Bougie, 2011, p.308). The view held by Gaskin (2016) is that exploratory factor analysis (EFA) constitutes the building blocks of any structural equation model and thus it is crucial that factor analysis is conducted accordingly. This segment incorporates performance of an EFA utilising the prepared data through a statistical software. The validity of the EFA was safeguarded through the valuation of adequacy measures together with convergent validity measures. Reliability was established using Cronbach's alpha.

#### 7.1.4 Confirmatory Factor Analysis

Confirmatory factor analysis(CFA) as part of structural equation modelling(SEM) is used to check and validate the results of the exploratory factor analysis(EFA). The CFA essentially comprises of three aspects, i.e. estimation, model fit and modification (Harrington, 2009; Gaskin, 2016). To arrive at the validity and reliability of the model, the three aspects of CFA were repeated as required.

##### Estimation

According to various authors (Arbuckle,2014; Awang, 2014; Gaskin, 2016), the estimation phases entails performance of calculations such as regression, path analysis and correlation. These calculations are performed on the EFA data results using the chosen SEM software. Estimation is a process to compare and minimise the difference between the observed covariance matrix and implied covariance matrix.

##### Model fit

The capacity of a model to reproduce the data is referred to as fit. According to (Kenny,2015) a model that is reasonably consistent with the data is considered to be good-fitting. However, a good-fitting model is not necessarily a valid model.

The model fit section essentially assesses a number of model fit measures in line with levels of acceptance as stipulated in literature. Consequently, this tests validity and reliability of the model (Arbuckle,2014; Awang, 2014).



### Modification

Modification improves the model fit measures through modifying the observed and latent variables therefore improving the validity and reliability of the model.

#### **7.1.5 Hypotheses testing and model discussion**

The completed and accepted model is discussed as well as contrasted and compared to the theoretical model that was derived from the literature survey. The theorized hypotheses are tested.

The second objective of preparing the data collected for the SEM model construction process is covered in the next section.

#### **7.2 Data preparation**

The data preparation phase entailed the removal of data that is insignificant for factor analysis in the dataset. The responses that were retained were relating the factors influencing conflict management and project success. The naming codification adopted in chapter 3 was retained as indicated in Table 10. The chosen codification labelled the observed variable according to the latent variable and factor it identified.

**Table 10: Factor naming codification**

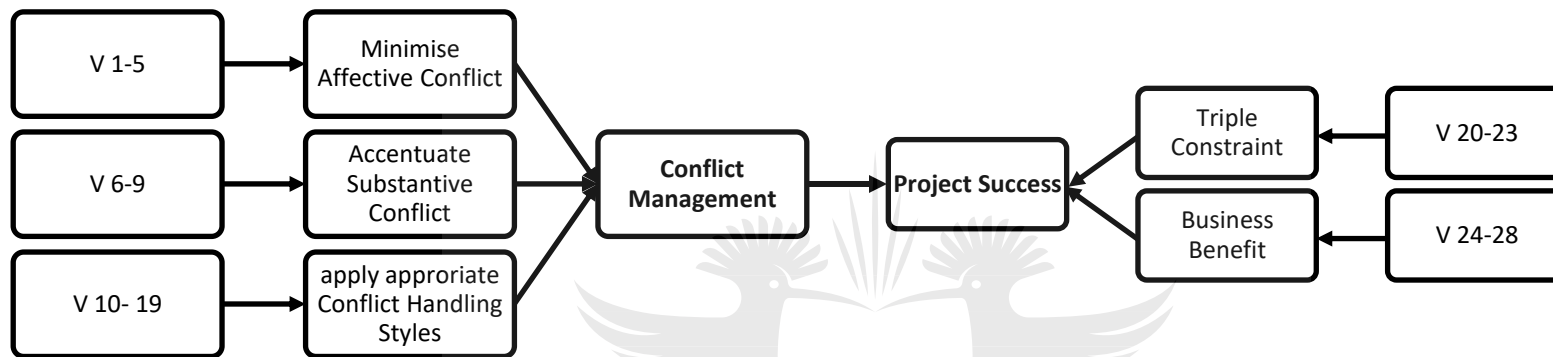
<b>Variable</b>	<b>Codification Name</b>	<b>Observed Variable</b>
<b>Construct 1: Minimize Affective Conflict (CM_MAC)</b>		
V1	CM_MAC1	Were interpersonal biases discouraged?
V2	CM_MAC2	Was focus placed on the task whilst it is performed?
V3	CM_MAC3	Was increased communication encouraged amongst stakeholders?
V4	CM_MAC4	Were contradictions stemming from individuals disliking each other in a team lessened?
V5	CM_MAC5	Were disagreements brought about by difference in emotions reduced?
<b>Construct 2: Accentuate Substantive Conflict (CM_ASC)</b>		
V6	CM_ASC1	Was consensus deferred by emphasising alternative views?
V7	CM_ASC2	Were opposing viewpoints recognised by all parties involved?
V8	CM_ASC3	Was a culture of debate encouraged?
V9	CM_ASC4	Was there a focus on not losing sight of the common goal?
<b>Construct 3: use appropriate Conflict Handling Strategies (CM_CHS)</b>		
V10	CM_CHS1	Was competing used to deal with important issues where unpopular actions were required?
V11	CM_CHS2	Was competing used against those that take advantage of non-competitive behaviour in the project?
V12	CM_CHS3	Were others accommodated where issues were more important to them?
V13	CM_CHS4	Were individuals accommodating when they are wrong?
V14	CM_CHS5	Did individuals compromise in order to arrive at rational solutions during time pressured situations?
V15	CM_CHS6	Did individuals of equal power compromise when committed to different aims but only one can adopted?
V16	CM_CHS7	Did individuals compromise when differing views were too crucial to be conceded?
V17	CM_CHS8	Did individuals with dissimilar outlooks combine their insights by collaborating?
V18	CM_CHS9	Did individuals adopt an avoiding position where the value of the difference in views was more than that of resolving it?

V19	CM_CHS10	Did opposing individuals use avoiding to regain perspective?
<b>Project Success: Triple Constraint (PS_TC)</b>		
V20	PS_TC1	Were costs measured relative to budget?
V21	PS_TC2	Was the schedule monitored in relation to set deadlines?
V22	PS_TC3	Did the project meet technical performance requirements?
V23	PS_TC4	Was the specification fulfilled as set out during project definition?
<b>Project Success: Business Benefits (PS_BB)</b>		
V24	PS_BB1	Were stakeholders satisfied?
V25	PS_BB2	Did the end-user/customer embrace the final product/project outcome?
V26	PS_BB3	Were the objectives of the business case fulfilled by the project?
V27	PS_BB4	Were benefits such as return on investment(ROI) realized by the business?
V28	PS_BB5	Did the project result in enhancement of delivery time to market?

The responses to the questions in the research instrument were codified in line with the selected Likert scale as follows: (1) strongly disagree, (2) disagree, (3) neutral, (4) agree, and (5) strongly agree. There were two responses that were deleted for containing missing values in line with codification protocol as SPSS does not accept data with any missing values. The final dataset was inputted into SPSS in preparation for the EFA.

The next phase alludes to the third objective of developing the theoretical framework in line with the literature survey.

The theoretical framework presented in Figure 16 has been derived from the critical literature review conducted during the study.



**Figure 16: Theoretical conflict management and project success model**

The next section fulfils the 4<sup>th</sup> objective i.e. to conduct an exploratory factor analysis (EFA).



### 7.3 Exploratory Factor Analysis

The correlation among the variables in a dataset is determined using the statistical approach called exploratory factor analysis(EFA)(Gaskin,2015). The EFA was conducted using SPSS. There are five calibration setting for an EFA in SPSS i.e. Descriptive, Extraction, Rotation, Scores and Options. These are adjusted accordingly based on the requirements for the EFA output.

#### 7.3.1 Descriptive

The options selected in the descriptive setting were premised on getting output data that will be utilized to for assessment of the reliability and validity of the EFA. All available options were selected, the “KMO and Bartlett’s test of sphericity” output is uniquely important as it is a key in assessing validity. According to Gaskin, 2015, the KMO statistics  $<0.5$  is unacceptable.

#### 7.3.2 Extraction

There are primarily three main methods for factor extraction, *viz.* principal component analysis(PCA), principal axis factoring(PAF) and maximum likelihood(ML). Gaskin(2015) recommends the use of the maximum likelihood method when AMOS will be used for CFA and structural modeling. The “maximum likelihood” method was the selected extraction method.

The default Kaiser criterion in SPSS which is set at an Eigenvalue value of 1 was not retained for this study. The Kaiser-Guttman or Kaiser criterion advocates that only

factors/latent variables that have an Eigenvalue of 1 or above should be retained. Eigenvalue threshold of 1.4 was set for the current study.

The “scree plot” is a graphical representation of factors on the horizontal axis and Eigenvalues on the vertical axis. It was selected in the extraction settings together with maintaining the remaining default options.

### 7.3.3 Rotation

Turning to the work of Gaskin (2016), it is stated that rotation causes factor loadings to be more clearly differentiated. This is necessitated by the need to facilitate interpretation. The several types of rotation available for use are as follows:

- Orthogonal
  - a) Varimax(most commonly used)
    - i) The number of variables that display extremely high or extremely low loadings on a factor are minimized.
    - ii) Enables identification of a variable with a factor
  - b) Quartimax
    - i) The number of factors required to explain each variable are minimized
    - ii) It results in generation of a general factor with medium to high value loading of most variables
    - iii) Not very useful for research
  - c) Equimax
    - i) Blend of varimax and Quartimax

- Oblique
  - a) Direct oblimin(DO)
    - i) Correlation of factors is permitted
    - ii) Interpretability is diminished
  - b) Promax
    - i) Computationally quicker than “direct oblimin”
    - ii) Mostly used for relatively large datasets.

The oblique rotation of Promax is selected for the research. The key output of a Promax rotation is a pattern matrix which will be used for assessment of the EFA convergent validity as well as the CFA. The Promax “Kappa” was maintained at default value of 4 as per SPSS. The “rotated solution” and the “loading plot(s)” were selected and the “maximum iterations for convergence” default setting of 25 retained.

#### **7.3.4 Scores and Options**

In the “scores” setting, the default settings were maintained. However, in the “options” setting to “exclude cases listwise” was selected for Missing values and on the Coefficient display format “sorted by size” and “suppress small coefficients” were selected with “absolute value below” set at 0.20.

### 7.3.5 EFA Adequacy

The EFA is executed once the abovementioned output settings have been selected. There are a variety of measures in place to compute the adequacy of the EFA (Gaskin, 2016). These are summarized in Table 11.

**Table 11: Adequacy measures**

Adequacy Measure	Threshold
Kaiser-Meyer-Olkin(KMO)	Marvellous>0.9 Unacceptable<0.5
Communalities	Extraction values> 0.3
Total variance explained	Cumulative percentage of factors explaining variance> 50%
Goodness-of-fit	Significance value<0.05
Non redundant residuals	<5%

#### KMO and Bartlett's Test

The KMO varies between 0 and 1. The closer the value to 1 the better. Bartlett's Test of Sphericity must be significant,  $p < .001$  is deemed highly significant. The KMO and Bartlett's Test results are given in Table 12 below.

**Table 12: KMO results**

KMO and Bartlett's Test		
Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		.532
Bartlett's Test of Sphericity	Approx. Chi-Square	6230.034
	df	378
	Sig.	.000

In assessing the first EFA measure of adequacy it is found that the KMO value of 0.532 is higher than the minimum threshold of 0.5 and Bartlett's Test is quite significant therefore



EFA adequacy was considered acceptable. The output is displayed in Table 12. The extraction values are all above the minimum threshold of 0.3 and thus by implication the EFA is valid.

The next measure of adequacy entails the assessment of the values from the communalities table.

### Communalities

The Communalities measures the proportion of each variable's variance that can be measured by the factor. The Communalities are depicted in Table 13

**Table 13: Communalities**

Communalities					
	Initial	Extraction		Initial	Extraction
CM_MAC1	.991	.936	CM_CHS6	.990	.920
CM_MAC2	.986	.954	CM_CHS7	.984	.813
CM_MAC3	.913	.741	CM_CHS8	.944	.833
CM_MAC4	.976	.748	CM_CHS9	.944	.940
CM_MAC5	.980	.903	CM_CHS10	.966	.771
CM_ASC1	.997	.978	PS_TC1	.961	.912
CM_ASC2	.889	.770	PS_TC2	.976	.893
CM_ASC3	.988	.956	PS_TC3	.979	.945
CM_ASC4	.973	.889	PS_TC4	.920	.867
CM_CHS1	.948	.924	PS_BB1	.938	.829
CM_CHS2	.973	.747	PS_BB2	.931	.807

<b>CM_CHS3</b>	.958	.933	<b>PS_BB3</b>	.954	.922
<b>CM_CHS4</b>	.967	.914	<b>PS_BB4</b>	.921	.835
<b>CM_CHS5</b>	.988	.799	<b>PS_BB5</b>	.957	.869
Extraction Method: Maximum Likelihood.					

Values closer to 1 indicate that the model explains most of the variation for the variables. Looking at Table 13 variable CM\_ASC1 (0.978) is better explained by the model than CM\_ASC2 (0.770)

The next test for adequacy entails the assessment of the total variance explained by the factors the EFA identifies. The EFA identified six factors and the total variance explained outcomes are depicted in Table 14.

#### Mapping the observed variables to factors

Looking at the grouping of the variables on each of the factors, the original observed variables were not retained in their entirety on the hypothesized factors. Only on factor 4 *Triple constraint* and factor 3 *Business Benefit* where the variables loaded on the originally theorized factors. The variables loaded on factor 3 and factor 4 in line with the PMBOK knowledge areas of project scope management, project time management and project cost management. The other factors were classified in line with the groupings of variables in the EFA output. The most frequently occurring themes were used as guidance to name factors 1,2,5, and 6. Factor 1 was named *Individuality* (variables explain conflict handling styles) primarily because variables in the grouping related to the how the individual responds to various project management situations. The variables also show elements of PMBOK knowledge areas of stakeholder management and human

resource management, Factor 2 was named *Debate and Consensus* (variables explain accentuate substantive conflict), Factor 5 was named *Competition and Avoidance*(variables explain conflict handling styles) and Factor 6 was named *Dealing with Difference*(variables explain conflict handling styles).

**Table 14: Total Variance Explained**

Factor	Total	% of variance	Cumulative%
1 (individuality)	5.307	18.955	18.955
2 (debate and consensus)	5.887	21.024	39.979
3 (business benefit)	4.113	14.688	54.667
4 (triple constraint)	3.800	13.570	68.237
5 (competition and avoidance)	3.107	11.095	79.332
6 (Dealing with difference)	2.132	7.613	86.945
Extraction Method: Maximum Likelihood			

The cumulative percentage of the total variance explained is 86.945% meaning that within the dataset the six factors explain 86.945% of the total variance. The results of this EFA adequacy test are acceptable implying that the EFA is deemed valid.

The next test for adequacy is the Goodness-of-fit. The validity of results is acceptable when the significance value is less than 0.05. This requirement has been fulfilled as shown in Table 15 therefore the EFA is deemed valid and adequate.

**Table 15: Goodness-of-fit Test**

Goodness-of-fit Test		
Chi-Square	df	Sig.
1627.547	225	.000

The final test of adequacy is the assessment of the non-redundant residuals of the reproduced correlations table. The output from the Reproduced Correlations table states “Residuals are computed between observed and reproduced correlations.” There are 16(4%) nonredundant residuals with absolute values greater than 0.05. The non-redundant residuals for this research are 4% which fall below the upper limit of 5% therefore the EFA results are deemed adequate and valid. the various tests for validity are discussed next.

### **7.3.6 Validity**

#### Convergent validity

According to Gaskin (2016), convergent validity is attained when the variables within a single factor correlate highly. The threshold for sufficient factor loadings depending on the sample size in dataset are given in Table 16.

**Table 16: Threshold for sufficient factor loadings (Gaskin,2015)**

Significant Factor Loadings based on Sample Size										
Sample Size	50	60	70	85	100	120	150	200	250	350
Sufficient Factor Loading	0.75	0.70	0.65	0.60	0.55	0.50	0.45	0.40	0.35	0.30

However, Gaskin (2015) states that despite sample size, it is recommended that the loading should be greater than 0.5 and the average per factor should be greater than 0.7. The results shown in the pattern matrix in Table 17 implied that convergent validity has been achieved since all values fulfill the required threshold limits.

**Table 17: Pattern Matrix**

Pattern Matrix <sup>a</sup>						
	Factor					
	1	2	3	4	5	6
CM_CHS6	.959					
CM_CHS4	.957					
CM_MAC5	.950					
CM_CHS7	.909					
CM_CHS5	.884					
CM_MAC4	.847					
CM_ASC1		.981				
CM_ASC3		.976				
CM_MAC2		.968				
CM_MAC1		.968				
CM_ASC4		.948				
PS_BB3			.955			
PS_BB5			.936			
PS_BB4			.919			
PS_BB1			.895			
PS_BB2			.878			

PS_TC3					.991		
PS_TC1					.937		
PS_TC2					.936		
PS_TC4					.920		
CM_CHS9						.966	
CM_CHS1						.964	
CM_CHS10						.873	
CM_CHS2						.858	
CM_CHS3							.964
CM_CHS8							.908
CM_ASC2							.901
CM_MAC3							.809
<b>Average Loadings</b>	<b>0.918</b>	<b>0.968</b>	<b>0.917</b>	<b>0.946</b>	<b>0.915</b>		<b>0.896</b>
Extraction Method: Maximum Likelihood. Rotation Method: Promax with Kaiser Normalization.							
a. Rotation converged in 6 iterations.							

Turning to the EFA structure matrix displayed in Table 18 in order to cross check the pattern matrix and validate its results, it can be seen that the factor loadings are also well above the 0.7 and therefore the EFA convergent validity is confirmed.

**Table 18: Structure Matrix**

Structure Matrix						
	Factor					
	1	2	3	4	5	6
CM_CHS6	.958					
CM_CHS4	.955					
CM_MAC5	.946					
CM_CHS7	.898					
CM_CHS5	.892					
CM_MAC4	.860		.214			
CM_ASC1		.988		.251		
CM_ASC3		.977		.221		
CM_MAC2		.975		.256		

CM_MAC1		<b>.966</b>		.216		
CM_ASC4		<b>.941</b>		.216		
PS_BB3			<b>.958</b>			.261
PS_BB5			<b>.929</b>			.209
PS_BB1			<b>.907</b>			.218
PS_BB4			<b>.901</b>			.218
PS_BB2			<b>.892</b>			.227
PS_TC3		.217		<b>.970</b>		.231
PS_TC1		.221		<b>.952</b>		.323
PS_TC2		.222		<b>.944</b>		.298
PS_TC4		.259		<b>.928</b>		.266
CM_CHS9					<b>.968</b>	
CM_CHS1					<b>.960</b>	
CM_CHS10					<b>.875</b>	
CM_CHS2					<b>.862</b>	
CM_CHS3			.227	.320		<b>.963</b>
CM_CHS8				.273		<b>.910</b>
CM_ASC2			.202			<b>.872</b>
CM_MAC3			.283	.300		<b>.852</b>
Extraction Method: Maximum Likelihood. Rotation Method: Promax with Kaiser Normalization.						

The next section discusses content validity.

#### Content validity

According to the work of Sekaran and Bougie (2011, p.206), content validity is a function of how well the dimensions and elements of a concept have been delineated. A panel of judges can attest to the content validity of the instrument.

#### Pilot study

To promote the content validity of the research questionnaire a panel of experts was selected as recommended by Sekaran and Bougie (*ibid*, p.206). The population of the

study was grouped into three main categories of how stakeholders feature in projects.

To ensure representativeness the categories were broadly defined;

- Client – where the respondent was representing the client organisation in the project;
- Contractor – Respondents represented the contracted organisation during the project
- Consultant – the respondent represented an organisation that provided consulting services on the project

In terms of the composition of the panel of experts, there were fifteen participants (five from each of the three categories). The criterion for the representatives of client organization and consulting firm included registration with a professional body, project experience and a having managed a minimum of twenty-six projects. The respondents representing contractor organisation were all owners of the business who had to be affiliated with a professional body, operating for more than ten years and a having completed work on a minimum of twenty-six projects.

The participants were telephonically contacted to obtain permission. Subsequently, an email with a summary containing background and aim of study as well as research objectives was sent out to the participants. The cover letter to the participants also contained contact information of the researcher and the research supervisor. There were 8 responses received on the first week. Follow up phone calls were made to the other 7 participants on the second week, only a further 4 responses were received thus giving an



eighty percent response rate by the end of the prescribed period and this was accepted by the researcher. The researcher thanked the respondents via email.

### Summary of results

Several panel members commented that the non-separation between “candidate” and “professional” registration with the Engineering Council of South Africa (ECSA) created the assumption that there was no difference in registration categories, this was subsequently corrected for the main survey.

Another respondent commented that the survey was based on the Project Management Institute (PMI) standard whereas they are affiliated to the International Project Management Association (IPMA) standard and suggested that the section of project success should be broadened to incorporate the IPMA definition. The comments were noted however, no changes were made since the PMI is the most widely used standard for project management.

One participant stated that the introductory page was too long and contained too much information suggesting that the content should be revised and reduced. The suggestion was heeded and the introduction was reviewed. The author opted to highlight key information to accommodate participants that may choose to scheme through the introduction while retaining the bulk of the content to provide a comprehensive overview of the research study for all participants.

Another three participants provided positive feedback regarding the “ease of use” of the website and the duration of the survey.

No comments were made regarding the proposed research model.

The next section discusses discriminant validity.

#### Discriminant validity

The extent to which factors are uncorrelated and distinct is termed discriminant validity. Discriminant validity is determined primarily by two methods. First method is that variables should load significantly only on one factor and if any “cross-loading” exists, it should differ by more than 0.2 (this can be verified in the pattern matrix). The second method is that the factor correlation matrix figures should not exceed 0.7.

Looking at the pattern matrix on Table 17, the discriminant validity is confirmed since related variables strongly loading on the same factor with no cross loading. Further inspection of the factor correlation matrix in Table 19 it can be concluded that the discriminant validity is validated

**Table 19: Factor correlation matrix**

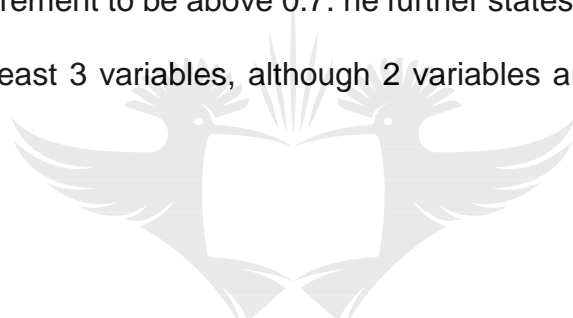
Factor Correlation Matrix						
Factor	1	2	3	4	5	6
1	1.000	.036	.163	.153	-.026	.089
2	.036	1.000	-.136	.231	.002	-.011
3	.163	-.136	1.000	.066	.089	.245

4	.153	.231	.066	1.000	-.069	.294
5	-.026	.002	.089	-.069	1.000	-.166
6	.089	-.011	.245	.294	-.166	1.000
Extraction Method: Maximum Likelihood.						
Rotation Method: Promax with Kaiser Normalization.						

The next section discusses EFA reliability.

### 7.3.7 EFA reliability

Gaskin(2015) states that EFA reliability is tested by computing the Cronbach's alpha for each factor with a requirement to be above 0.7. he further states that the aim is that each factor should have at least 3 variables, although 2 variables are permissible in certain circumstances.



**Table 20: Cronbach's alpha results**

Factor groupings	Cronbach's alpha (Threshold >0.7)
Factor 1 (CM_CHS6, CM_CHS4, CM_MAC5, CM_CHS7, CM_CHS5, CM_MAC4)	0.970
Factor 2 (CM_ASC1, CM_ASC3, CM_MAC2, CM_MAC1, CM_ASC4)	0,988
Factor 3 (PS_BB3, PS_BB5, PS_BB4, PS_BB1, PS_BB2)	0.963
Factor 4 (PS_TC3, PS_TC1, PS_TC2, PS_TC4)	0.972
Factor 5 (CM_CHS9, CM_CHS1, CM_CHS10, CM_CHS2)	0.958

Factor 6 (CM_CHS3, CM_CHS8, CM_ASC2, CM_MAC3)	0.942
---	-------


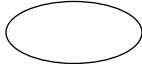

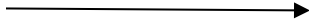

The Cronbach's alpha for all six factor groupings were well above the 0.7 threshold. This confirms and validates the reliability of the EFA.

The choice of oblique rotation during EFA was justified since it makes the assumption that the observed variables have a degree of correlation or interrelation and this condition was confirmed. The EFA was deemed successful. The EFA results will be employed during the CFA phase. The following section discusses the confirmatory factor analysis (CFA).

#### 7.4 Confirmatory Factor Analysis

The confirmatory factor analysis (CFA) confirms the factor structure extracted during the exploratory factor analysis (EFA). A CFA is the next step after the EFA to determine the factor structure of the dataset (Gaskin, 2016). The pattern matrix generated during the EFA phase was imported into the structural equation modelling software AMOS using a plugin "pattern matrix model builder". The creation of the measurement model is autogenerated based on the pattern matrix using the plugin. An overview of the structural equation modelling graphical terminology is provided in Table 21. This is to enable an easier interpretation of the measurement model throughout the research.

**Table 21: Graphical Terminology adapted from (Joseph, 2014, p88)**

	Observed Variable
	Latent variable
	Error term
	Predictive relationship
	Covariance/Correlation/ Association

#### 7.4.1 Steps in running CFA

According to Awang (2014, p.54) the steps to running a CFA are as follows;

- a) Run the CFA for measurement model;
- b) Assess the Fitness Indexes found for the measurement model;  
Compare with the thresholds given in Table 22. If indexes are below the specified limits, factor loading is examined for every item. Items with low factor loadings are identified as problematic;
- c) Problematic items with factor loading of less than 0.6 must be deleted.
- d) Deletion must be done with one item at a time, item with lowest factor loading is first to be deleted;
- e) The new measurement model is to be run after each item deletion;
- f) The fitness indexes are to be examined and steps c-e are to be repeated until the achievement of the desired fitness indexes;
- g) If the Fitness Index thresholds are not reached subsequent to the removal of low factor loading items then a look at the Modification Indices(MI);
- h) Redundant items in the model are reflected by a high value MI (above 15)

Solution of redundant items can be achieved through the following:

- 1) The pair of the redundant item to be set as “free parameter estimate”
  - 2) Running the measurement model and repeating step 1;
- i) Cronbach’s Alpha, CR, and AVE of every construct in the study must be obtained;
- and
- j) Report the normality assessment for remaining items of a construct in the study.

#### Measurement model

The measurement model generated by AMOS from the pattern matrix derived from the EFA phase is depicted in Figure 17. A closer look at the measurement model reveals that the latent variables have a degree of correlation. The latent variables are *individuality*, *debate and consensus*, *business benefit*, *triple constraint*, *competition and avoidance*, and *dealing with difference*. The observed variables CM\_CHS6, CM\_CHS4, CM\_MAC5, CM\_CHS7, CM\_CHS5 and CM\_MAC4 are predictors of the latent variable *individuality*. Furthermore predictors of latent variable *debate and consensus* are observed variable CM\_ASC1, CM\_ASC3, CM\_MAC2, CM\_MAC1 and CM\_ASC4 while latent variable *business benefit* is predicted by observed variables PS\_BB1, PS\_BB2, PS\_BB3, PS\_BB4, and PS\_BB5. The predictors for latent variables *triple constraint* and *competition and avoidance* are PS\_TC1, PS\_TC2, PS\_TC3, PS\_TC4 and CM\_CHS9, CM\_CHS1, CM\_CHS10, CM\_CHS2 respectively. Lastly the observable variables CM\_CHS3, CM\_CHS8, CM\_ASC2, CM\_MAC3 are predictors of the latent variable *Dealing with difference*. The error terms e1-e28 are included to not compromise model fit.

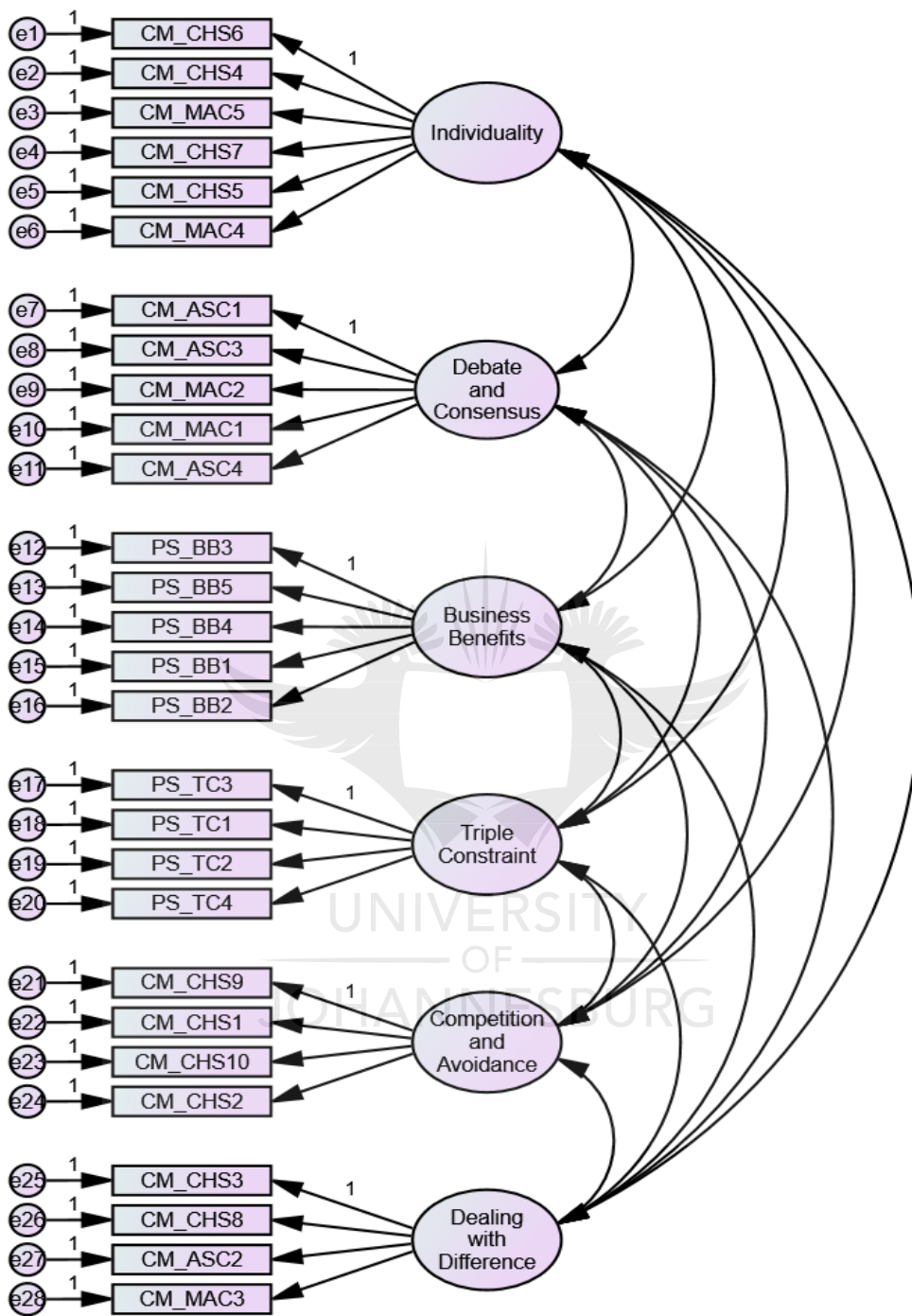


Figure 17: Measurement model

A discussion of each sub-phase of the confirmatory factor analysis will follow.

#### **7.4.2 Estimation**

During the estimation phase AMOS performs a number of calculations in order to provide the required output data. Prior to the execution of the estimation calculations, a configuration of the output options within AMOS is required. The “analysis properties” option in the “output” tab was configured such that the “standardized estimates” was included in order to give interpretable results for model discussion. “Modification indices” selection was premised on enabling the highlighting of elements of the model that can be modified for improvement of the model fit. The “Threshold for modification indices” setting was at 15 as recommended by Awang (2014).

The other “output” default options were retained and the initial structural model generated in AMOS subsequent to the execution of the estimation calculation is depicted in Figure 17. The current dissertation illustrates diagrams with standardized estimates only.



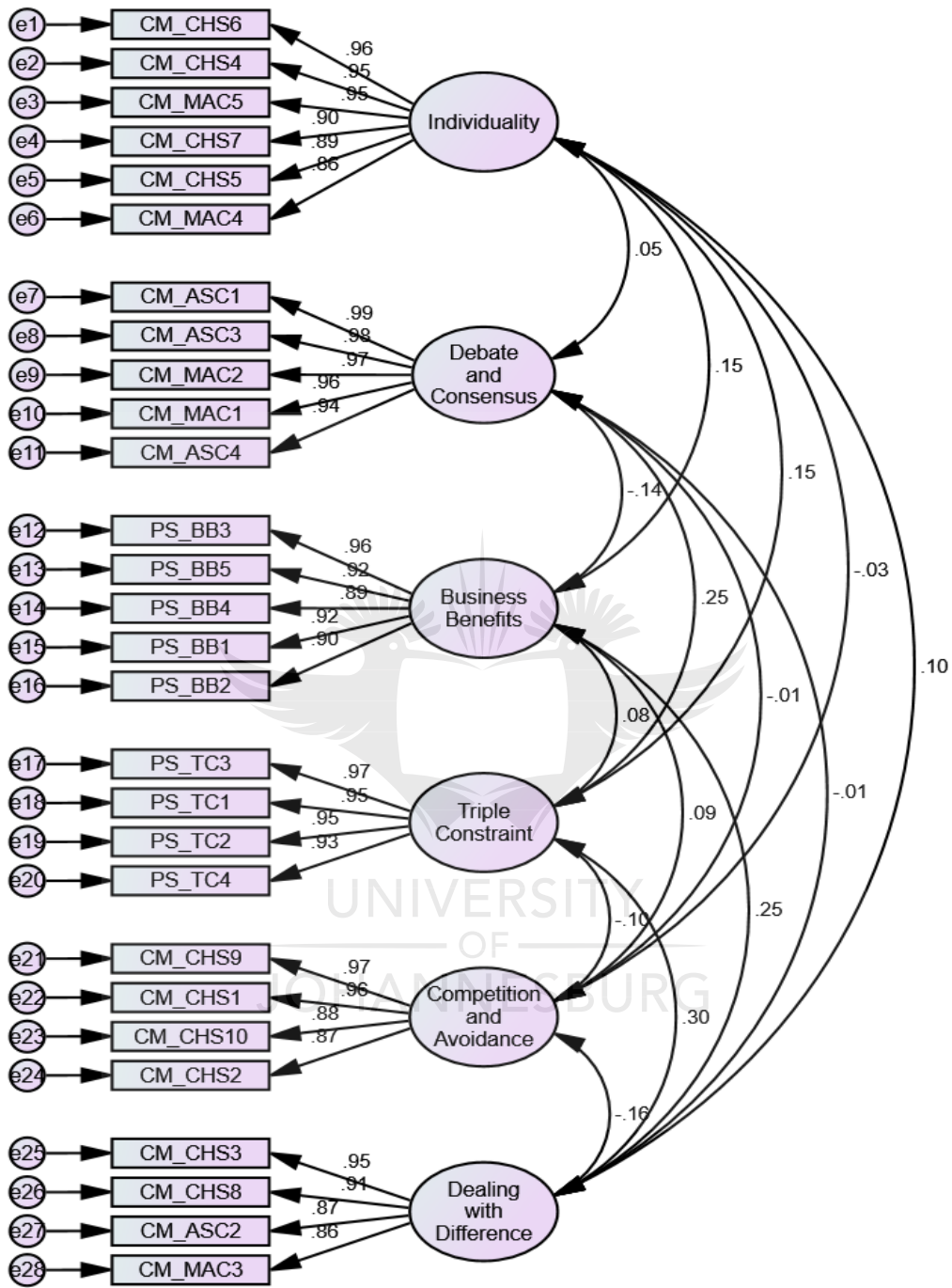


Figure 18: Initial structural model

Figure 18 depicts an initial structural model that indicates that observed variables CM\_CHS6, CM\_CHS4, CM\_MAC5, CM\_CHS7, CM\_CHS5 and CM\_MAC4 are extremely strong predictors of the latent variable *individuality* owing to the high regression weightings of 0.96, 0.95, 0.95, 0.90, 0.89 and 0.86 respectively. Observed variables CM\_ASC1, CM\_ASC3, CM\_MAC2, CM\_MAC1 and CM\_ASC4 are strong predictors of *debate and consensus* since their regression weightings are 0.99, 0.98, 0.97, 0.96, 0.94 respectively. Furthermore, observed variables PS\_BB1, PS\_BB2, PS\_BB3, PS\_BB4, and PS\_BB5 are strong predictors of *business benefit* due to the regression weightings of 0.92, 0.90, 0.96, 0.89 and 0.92 respectively. *triple constraint* is strongly predicted by observed variables PS\_TC1, PS\_TC2, PS\_TC3, PS\_TC4 based on the regression weightings of 0.95, 0.95, 0.97, and 0.93 respectively. Whereas observed variables CM\_CHS9, CM\_CHS1, CM\_CHS10, CM\_CHS2 are strong predictors of *competition and avoidance* based on regression weights of 0.97, 0.96, 0.88 and 0.87 respectively. The observable variables CM\_CHS3, CM\_CHS8, CM\_ASC2, CM\_MAC3 are strong predictors of the latent variable *dealing with difference* as can be seen from the regression weightings of 0.95, 0.91, 0.87, and 0.86 respectively.

Looking at the covariances between the latent variables as depicted in Figure 18, it can be seen that *individuality* positively correlates with *debate and consensus*, *business benefit*, *triple constraint* and *dealing with difference* as shown by covariances of 0.05, 0.15, 0.15 and 0.10 respectively. *debate and consensus* positively correlates with *Triple constraint* owing to a covariance of 0.25. Turning to *business benefit* there is a positive covariance with *triple constraint*, *competition and avoidance* and *dealing with difference*

with correlation values of 0.08, 0.09 and a slightly stronger 0.25 respectively. *triple constraint* shows a meaningful positive correlation of 0.30 with *dealing with difference*.

### 7.4.3 Evaluating the fitness of a measurement model

According to Awang (2014, p.56) there are a number of fitness indexes that demonstrate how fit the model is to the data at hand. Awang (2014, p.56), citing Hair et al (1995,2010) and Holmes-Smith (2006), points out the lack of consensus amongst researchers on which fitness indexes to use however, one fitness index from each category of model fit is recommended for use. The three model fits are Absolute Fit, Incremental Fit, and Parsimonious Fit.

**Table 22: The three categories of model fit, their level of acceptance and supporting literature**

<b>Name of Category</b>	<b>Name of Index</b>	<b>Level of acceptance</b>	<b>Literature</b>
<b>1) Absolute fit</b>	Discrepancy Chi Square	P-value > .05	Wheaton et al. (1977)
	<b>Root Mean Square Residual</b>	<b>RMR &lt; .09</b>	<b>Hu &amp; Bentler, 1999</b>
	Root Mean Square of Error Approximation	RMSEA < .05 good; .05 - .10 moderate; >0.10 bad	Hu & Bentler, 1999
	Goodness of Fit Index	GFI > .90	Joreskog and Sorbom (1984)
<b>2) Incremental fit</b>	Adjusted Goodness of Fit	AGFI > .90	Tanaka and Huba (1985)
	<b>Comparative Fit Index</b>	<b>CFI &gt; .95 great; &gt; .90 traditional; &gt; .80 sometimes permissible</b>	Bentler (1990)
	Tucker-Lewis Index	TLI > .90	Bentler and Bonett (1980)
	Normed Fit Index	NFI > .90	Bollen (1989b)
<b>3) Parsimonious Fit</b>	<b>Chi Square/Degrees of Freedom</b>	<b>Chi-Square/df &lt; 3.0 good; &lt; 5 sometimes permissible</b>	Hu and Bentler (1999)

#### 7.4.4 Model fit and modification

The model fit section essentially assesses a number of model fit measures (Arbuckle, 2014). Table 23 presents model fit measures, levels of acceptance and initial results with supporting literature

**Table 23 Model fit measures, levels of acceptance and initial results**

<b>Name of Category</b>	<b>Level of acceptance</b>	<b>Results</b>	<b>Literature</b>
<b>1) Absolute fit</b>	P-value > .05	.000	Wheaton et al. (1977)
	<b>RMR &lt; .09</b>	.034	<b>Hu &amp; Bentler, 1999</b>
	RMSEA < .05 good; .05 - .10 moderate; >0.10 bad	.196	Hu & Bentler, 1999
	GFI > .90	.557	Joreskog and Sorbom (1984)
• <b>Incremental fit</b>	<b>CFI &gt; .95 great; &gt; .90 traditional; &gt; .80 sometimes permissible</b>	.745	Bentler (1990)
	TLI > .90	.713	Bentler and Bonett (1980)
	NFI > .90	.710	Bollen (1989b)
• <b>Parsimonious Fit</b>	<b>Chi-Square/df &lt;3.0 good; &lt;5 sometimes permissible</b>	5.868	Hu and Bentler (1999)

The initial results in Table 23 shows that P-value, RMSEA, GFI, CFI, TLI, NFI, CMIN/DF fell outside the requisite levels of acceptance. The RMR is within tolerance at .034 falling well below the .09 maximum threshold. The implication of the results is that the initial structural model is not acceptable as none of the model fit measures were satisfactory. Based on the results, modification of the model is needed in order to improve the model fit measures. AMOS generates modification indices that can be used to conduct further model modification. Modification indices from AMOS reveal relationships that aren't defined in the model. A covariance requires to be added to indicate the relationships. Table 24 presents the modification indices that can be modified to improve the current model fit. The addition of a covariance between e15 and e16 will have the biggest impact since the modification index is 104.983. The covariances were added in line with Table

24 while observing the rule that only error terms on the same factor can be covaried as well as that an error term cannot be covaried with a factor and the model was rerun. The covariances that were effected in line with the rules mentioned above are highlighted in Table 24.

**Table 24 AMOS modification indices**

			M.I.	Par Change				M.I.	Par Change
e23	<-->	e24	38.339	.131	e6	<-->	e7	34.307	-.040
e19	<-->	e24	33.117	-.086	e5	<-->	e24	59.464	.142
e19	<-->	e22	15.323	.040	e5	<-->	e23	15.185	.068
e17	<-->	e25	18.886	-.048	e5	<-->	e21	22.255	-.055
e15	<-->	e16	104.983	-.096	e5	<-->	e19	24.977	-.061
e14	<-->	e21	15.270	.039	e5	<-->	e8	22.419	-.036
e14	<-->	e16	16.031	-.042	e5	<-->	e6	21.749	.077
e14	<-->	e15	17.265	-.040	e4	<-->	e24	24.355	-.086
e13	<-->	e16	17.009	-.042	e4	<-->	e7	18.823	-.026
e13	<-->	e15	15.425	-.037	e4	<-->	e5	36.280	-.085
e13	<-->	e14	35.199	.063	e3	<-->	e24	15.690	-.056
e11	<-->	e18	22.377	.042	e3	<-->	e23	15.423	-.052
e10	<-->	e13	25.724	.041	e3	<-->	e22	23.665	.047
e9	<-->	e11	21.064	.030	e3	<-->	e19	17.592	.039
e8	<-->	e21	19.565	.026	e2	<-->	e24	16.957	.054
e7	<-->	e11	18.273	-.021	e2	<-->	e3	15.322	.031
e7	<-->	e8	15.109	.011	e1	<-->	e10	18.545	-.028
e6	<-->	e23	17.875	.080	e1	<-->	e9	16.514	-.022
e6	<-->	e10	27.642	.056	e1	<-->	e7	22.034	.020

When dealing with modification indices, the highest modification index is covaried first. Interpreting the information on Table 24, it is implied that the relationship between e15 and e16 must be covaried first and the estimates recalculated.

#### 7.4.5 Summary of CFA results

Turning to Kenny(2015) it is suggested that it should be noted that a “good fitting” model is not necessarily a valid model. It is the view of Bandalos and Finney (2001) that the aim of factor analysis is not to get a better fit but to get information that enhances the understanding of the relationship amongst the variables.

The process stipulated in section 7.4.1 was followed i.e. the items with the lowest regression weightings were deleted first and the CFA run again. There were 11 iterations to achieve an acceptable model fit. The summary of the confirmatory factor analysis iterations are indicated in Table 25 below. The structural models are in the appendix.

**Table 25: CFA results**

	1	2	3	4	5	6	7	8	9	10	11
Chi-Square/df <3.0 good; <5 permissible	5.868	4.867	4.441	4.318	3.89	3.637	3.637	3.617	3.315	3.351	3.101
P-value > .05	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
RMR < .09	0.034	0.034	0.033	0.032	0.031	0.03	0.03	0.029	0.027	0.027	0.026
RMSEA < .05 good; .05 - 10 moderate	0.196	0.176	0.166	0.163	0.152	0.145	0.145	0.145	0.136	0.137	0.137
GFI > .90	0.557	0.621	0.649	0.66	0.67	0.691	0.698	0.722	0.744	0.764	0.788
CFI > .95 great;> .90 traditional; > .80 permissible	0.745	0.803	0.827	0.84	0.862	0.879	0.886	0.893	0.909	0.921	0.932

<b>TLI &gt; .90</b>	0.713	0.772	0.798	0.811	0.836	0.855	0.861	0.868	0.887	0.901	0.913
<b>NFI &gt; .90</b>	0.71	0.766	0.789	0.802	0.824	0.842	0.85	0.859	0.876	0.892	0.903

The trend that can be seen in Table 25 shows an improvement in CFI, TLI, NFI and Chi-Square/df values while RMSEA and GFI remained outside the acceptable threshold. The 11<sup>th</sup> iteration with the fits statistics of; CFI (0.932), TLI (0.913), NFI (0.903), GFI (0.788), RMR (0.026), RMSEA (0.137) and Chi-Square/df (3.101). The model fit results of the eleventh structural model are accepted as the structural model for the research. The researcher accepts the results since most of the fitness measures are above the required threshold. The eleventh structural model is presented in Figure 19.



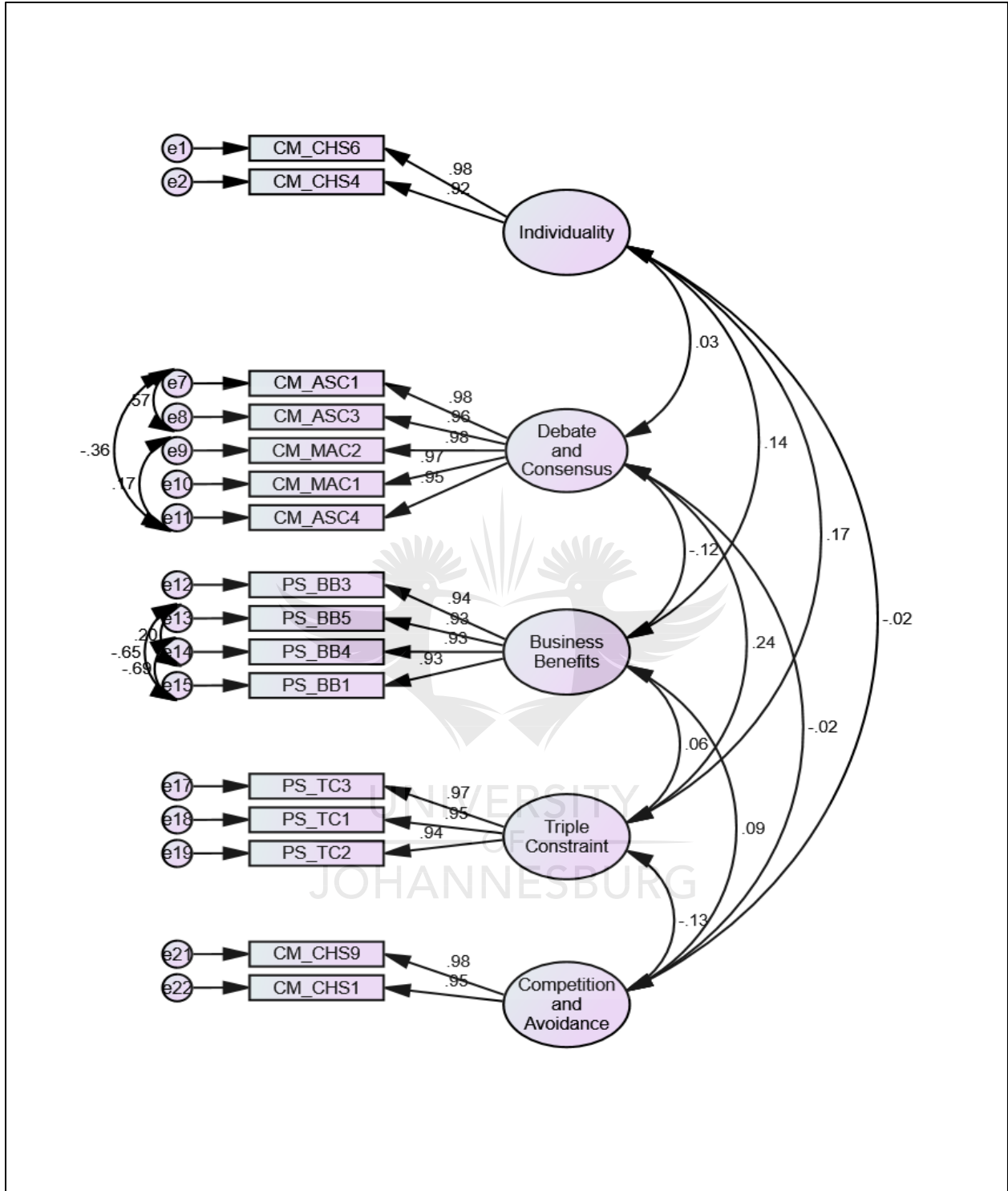


Figure 19: Eleventh structural model



## 7.5 Hypotheses testing and final model

There were five factors identified during the hypotheses development phase. The latent variables on conflict management were labelled as Minimize Affective Conflict (CM\_MAC), Accentuate Substantive Conflict (CM\_ASC) and apply appropriate Conflict Handling Styles (CM\_CHS). On the final structural model the variables of Individuality together with Competition and Avoidance allude to *Conflict Handling Styles (CM\_CHS)* whereas Debate and Consensus allude to *Accentuate Substantive Conflict (CM\_ASC)*.

The latent variables representing the conflict management factor Minimize Affective Conflict (CM\_MAC) were mostly deleted during the iteration to obtain good fit statistics as evidenced in structural model Figure 20.

### **H1: Minimize Affective conflict is positively related to Conflict Management**

The hypothesis is rejected.

The regression weightings on the observable variables maintained high predictor status on all at above 0.9 on all. There are positive correlations between Individuality as *Conflict Handling Styles (CM\_CHS)* and Debate and Consensus as *Accentuate Substantive Conflict (CM\_ASC)*. The following hypotheses are supported:

### **H2: Accentuate Substantive Conflict is positively related to Conflict Management**

**H3: use of appropriate Conflict Handling Style is positively related to Conflict Management.**

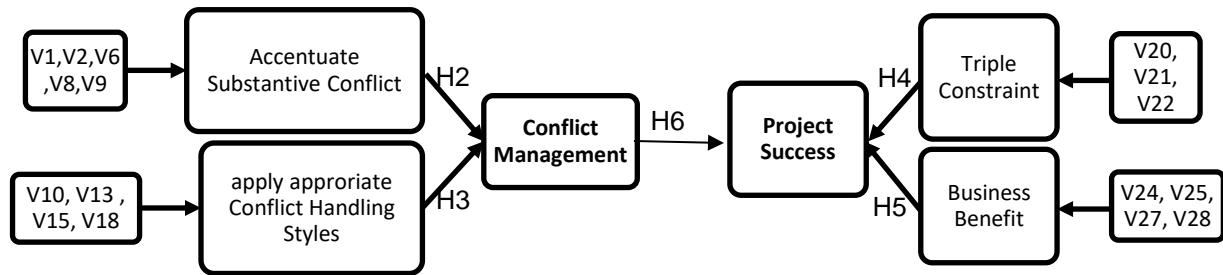
The regression weight showing the positive correlation between Project Success factors of *Business benefit(PS\_BB)* and *Triple constraint(PS\_TC)* in the structural model in Figure 24 supported the following hypotheses:

**H4: Triple constraint is positively related to project success.**

**H5: Business benefits is positively related to project success.**

Looking at the correlations between Individuality as *Conflict Handling Styles(CM\_CHS)* and *Business benefit(PS\_BB)* as together with Debate and Consensus as *Accentuate Substantive Conflict (CM\_ASC)* and *Triple constraint(PS\_TC)*, the regression weightings are positive. The positive correlation between these factors of Conflict Management and Project Success supports the final hypothesis that;

**H6: Conflict management has a positive effect on project success**



**Figure 20: Final model for the relationship between conflict management and project success**

Final model reliability and validity

Hair, Black, Babin, and Anderson (2010) suggest thresholds for Composite Reliability (CR), Average Variance Explained (AVE), Maximum Shared Variance (MSV) to establish reliability and validity. The thresholds are:

- Reliability (CR > 0.7)
- Convergent Validity (AVE > 0.5)
- Discriminant Validity (MSV < AVE and square root of AVE greater than inter construct correlations)

**Table 26: Final model reliability and validity**

	CR	AVE	MSV	Triple Constraint	Individuality	Debate and Consensus	Business Benefits	Competition and Avoidance
Triple Constraint	0.973	0.898	0.064	<b>0.948</b>				
Individuality	0.951	0.906	0.029	0.169	<b>0.952</b>			
Debate and Consensus	0.987	0.940	0.064	0.252	0.042	<b>0.970</b>		
Business Benefits	0.964	0.870	0.019	0.047	0.138	-0.117	<b>0.933</b>	
Competition And Avoidance	0.966	0.934	0.014	-0.119	-0.029	-0.020	0.087	<b>0.967</b>

A closer look at Table 26 reveals that the convergent validity is attained as evidenced by the AVE values for all latent variables above 0.5. The discriminant validity is achieved as can be seen in the square root of AVE being greater than any inter factor correlation on the final model matrix. The reliability also displayed good levels as the CR values were all above 0.7.

The fifth aim of conducting a confirmatory factor analysis and hypotheses testing has been addressed. The next objective is to discuss the final structural equation modelling implications.

## 7.6 Final model discussion

An expanded discussion of the implications revealed in Table 25 and Figure 20 will follow.

### 7.6.1 Implication one: predictors of conflict handling styles (CM\_CHS)

The indication from the model is that *Accommodating when you are wrong (CM\_CHS4)* and *Compromising when rivals with equivalent power are committed to mutually exclusive aims (CM\_CHS6)* are strong predictors of *Individuality* (conflict handling styles) in the project manager's approach to conflict management as evidenced by the regression weightings of 0.94 and 0.96 respectively. Turning to the project management standard of PMBOK, authored by Project Management Institute (2013), one finds that the knowledge area stakeholder management lends credence to the individual project manager's ability to accommodate or compromise in conflict situations. The positive covariance relationship between *Individuality* (conflict handling styles) and *Business*

*benefit (0.14)* as well as *individuality* (conflict handling styles) and *Triple constraint(0.17)* support the hypothesized relationship between conflict management and project success.

### **7.6.2 Implication two: predictors of accentuate substantive conflict (CM\_ASC)**

The model indicates that the observable variables *Deferment of consensus by emphasizing alternatives and expanding main concepts*, *Culture of debate and contestation of ideas is encouraged*, *Concentrate on performing project tasks*, *Discourage prejudice and interpersonal biases* , and *Not losing sight of the common goal* are strong predictors of *Debate and Consensus* (accentuate substantive conflict CM\_ASC) with regression weightings of 0.98, 0.96, 0.98, 0.97, and 0.95 respectively. A look at project management standards such as PMBOK (Project Management Institute, 2013) and International Organization for Standardization's ISO 21500 (Zandhuis and Stellingwerf 2013) one finds an emphasis on the theme of project integration. The PMBOK knowledge area of project integration management cuts across all five process groups of initiating, planning, executing, monitoring and controlling as well closing. The ability to manage conflict and engage in meaningful debate to arrive at a form of a consensus about the way forward is crucial at each stage of the project. The significant positive correlation between *Debate and Consensus* (accentuate substantive conflict) and *Triple constraint* further supports the hypothesized relationship between conflict management and project success. The covariance of 0.25 implies a direct influence. Various authors (Miller et al. 2015; Ng et al. 2007; Westerveld 2002) have also documented the impact of conflict management on project success.

### 7.6.3 Implication three: predictors of triple constraint

The model indicates that *Project meets technical performance(PS\_TC3) Measure and monitor cost overspending or underspending relative to original budget(PS\_TC1) Measure and monitor schedule overrun or underrun relative to original schedule(PS\_TC2) and specification requirements as originally set out during project definition are fulfilled(PS\_TC4)* are strong predictors of *Triple constraint* with regression weights of 0.97, 0.95, 0.95, and 0.93 respectively. The PMBOK (Project Management Institute, 2013) has dedicated three knowledge areas to show the importance of the triple constraint to project success namely; Project scope management, project time management, and project cost management. The model validates the importance of management of the *Triple constraint* to project success.

### 7.6.4 Implication four: predictors of business benefit

The indication from the model is that highly weighted variables of *Fulfilling objectives of the business case for the project(PS\_BB3=0.94), Faster delivery time to market(PS\_BB5=0.93); Benefits realization by the business such as return on investment (PS\_BB4= 0.93); Satisfaction of stakeholder and customer (PS\_BB1= 0.93)* are very strong predictors of *business benefit*. Research by (Duggal, 2010; Shenhar and Dvir 2007) reveal the importance of looking beyond the traditional triple constraint of scope, time and cost as a traditional measure of success. Rahschulte and Milhauser (2010) concur by stating that understanding and managing scope, time, and cost constraints is important however, the complexity of project work is increasing and the approach to project management must ensure project value for the organization. This is aligned with

the primary objectives since projects are initiated for organizational needs. Turning to the PMBOK Project Management Institute (2013), one finds that the knowledge area of project stakeholder management encapsulates a key portion of *business benefit*. Achieving business benefit is an outcome of successful stakeholder management. This lends further credence to the hypothesis that business benefit has a positive relationship to project success.

#### 7.6.5 Implication five: emergent themes

The fifth implication of the model is the emergence of two major themes in the form of people and process. The people theme can be observed in the factors *accentuate substantive conflict* and *conflict handling styles* while process theme relates to *triple constraint* and *business benefit*. It is clear that the people as well as processes employed contribute to project success.

#### 7.6.6 Implication six: comparison to theoretical model

When comparing the final model to the initial model, the final model has fewer variables. The regression weightings support the association made with the different factors that have been retained in the final model. In the process of model fit the factor *dealing with difference* (minimize affective conflict) was completely dropped for improved and better fit statistics of the final structural model. The final model has 12 fewer items than the theoretical model. Two factors of conflict management i.e. *accentuate substantive conflict* and *conflict handling styles* were retained in the final model compared to the three factors of conflict management in the theoretical model. Relating to project success the factors

of *triple constraint* and *business benefit* were retained in the final model as hypothesized in the theoretical model. The validity and reliability of the final model was confirmed to be quite strong.

#### 7.6.7 Implication seven: conclusion

The construction of a predictive model for conflict management and project success was the primary aim of this chapter. There was a multi objectives process defined in order to facilitate the fulfilment of the primary goal.

The process commenced with the definition of a predictive model framework for structural equation construction. The framework comprised of phases such as: data preparation, developing a theoretical mode, EFA, CFA, hypotheses testing and the discussion of the final model.

The next goal was the implementation of the predictive modelling framework and preparation of the data for the structural equation modelling process. The codification of data was key as well as elimination of responses with missing values. This was in preparation for the exploratory factor analysis.

The next objective was the use of literature to develop a theoretical model for conflict management and project success. The theoretical model had 3 factors for conflict management: *accentuate substantive conflict, minimize affective conflict and apply appropriate conflict handling styles*. Project success comprised of *business benefit and*



*triple constraint*. The perspectives presented in literature that informed the theoretical model were utilised to contrast with the final model outcome.

The next objective was to conduct an exploratory factor analysis on the data received from the survey instrument using SPSS. The EFA grouped the six factors as: *individuality, debate and consensus, business benefit, triple constraint, competition and avoidance, and dealing with difference*. These results were used during the construction phase of the confirmatory factor analysis.

The next objective was to conduct a CFA. The results from the exploratory factor analysis were utilised as the data set in AMOS during the construction of the measurement model. The confirmatory factor analysis output values were contrasted with the given model fit indices from literature. The threshold levels for each of the eight fit measures were listed as guideline for the acceptance of the final model.

The initial structural model was not accepted due to only one model fit measure meeting the threshold requirements. A modification of the model was done according to the modification indices given in the output file of AMOS. The model slightly improved whereby three of the eight fitness measures were within tolerance. The next step taken to improve model fit was to delete the item with the lowest regression weight and run the model to see the output of the model fit. The third structural model slightly improved the overall fit however, there were only three factors within tolerance. The accepted structural model was the eleventh model after the repetition of the step to delete items with lowest regression weight. The model fit measures in eleventh structural model were accepted by

the researcher with the note that the fit was not perfect however, it was good as five measures were well within acceptable threshold.

The final objective was the discussion of the implications of the final model. The major findings were the correlations between variable of conflict management and variables of project success. This was evidenced by the positive covariance evidence by the regression weights seen in the final structural model. *Individuality* (conflict handling styles) covaried with *business benefit* and *triple constraint* while *debate and consensus* (accentuate substantive conflict) meaningfully correlated with *triple constraint* thus confirming the hypothesised relationship between conflict management and project success.

The identification of the two emergent themes of people and process in line with the knowledge areas from literature was significant in reinforcing some of the key aspects of project management. The emergent themes place focus on the role of the people as well as the process towards managing conflict during the project and ensuring project success upon completion.

The next chapter provides a conclusion to the research with a summary of the major research findings.

## **8 Conclusion**

### **8.1 Introduction**

Organization, when faced with opportunities and challenges, continue to turn to project management to fulfil their strategic goals and enhance their competitiveness. The current research aimed to look at conflict management in outsourced engineering project within South Africa. The focus was on the role of conflict management in contributing towards project success. The view is that if the impact of conflict management in engineering projects within South Africa is better understood then it can be managed appropriately to create an environment for the success of these projects.

There are three goals of this final chapter. Firstly, it is to answer the research questions and fulfil the objectives outlined in the first chapter. Secondly, it is to provide a summary of finds in relation to the research objectives. Thirdly, it is to give an outline of the research limitations and suggestion future research possibilities.

### **8.2 Research questions and objectives**

There are various authors that have argued that conflict management has an impact on project success. If the relationship between conflict management and project success is known, it can be better managed to minimize failures in projects. This leads to the two research questions:

1. what is the relationship between conflict management strategies and project success?

## 2. How can conflict management be applied to enable project success?

In the quest to answer these questions the following research objectives were formulated.

- To assess the relationship between project success and conflict management strategies.
- To provide a framework to address and manage conflict in outsourced engineering projects in South Africa for the benefit of organizations and engineering professionals that are involved in projects.

### 8.3 Findings

Looking at the final structural model in Figure 19, one finds that there are two *conflict management* factors and two *project success* factors that are retained from the original five factors hypothesised in the theoretical model. Turning to assess loadings on these factors, it can be seen that the regression weights load very highly (all > 0.9) this is an indication of a stronger predictor relationship between the variables and the factors. Zooming into the relationship between *conflict management* and *project success* in answering the initial research question, a look at the correlations values and one finds the following in Figure 19:

- The significant positive correlation between *debate and consensus* (accentuate substantive conflict) which is a variable of *conflict management* as well as *triple constraint* which is a variable of *project success*. The covariance of 0.25 implies a direct influence between *conflict management* and *project success*.

- *Debate and consensus* (accentuate substantive conflict) correlated negatively with *business benefits* with a covariance value of -0.12. The relationship implies presence of increased debate and consensus can adversely impact business benefit aspect of the project. It can be argued that the bulk of the aspects that relate to business benefit are importantly agreed upon during the project scoping phase. Debating issues or making changes as the project is ongoing could potentially harm the final product and the benefit that would have been accrued to the business had no changes been made. The PMBOK guide highlights the need for stakeholder management and involvement on this aspect.
- *Individuality* (conflict handling styles) has significantly positive correlations with *business benefit* and *triple constraint* evidence by covariance values of 0.14 and 0.17 respectively. This implies that conflict handling style, which alludes to the individual's approach to conflict management and their ability to respond appropriately, will be beneficial to the business as well as the other project metrics of cost, time, and scope.

Therefore, the first research question is answered affirmatively by stating that there is a positive relationship between conflict management strategies and project success.

The approach relating to the second research question (how can conflict management be applied to enable project success?) is the following:

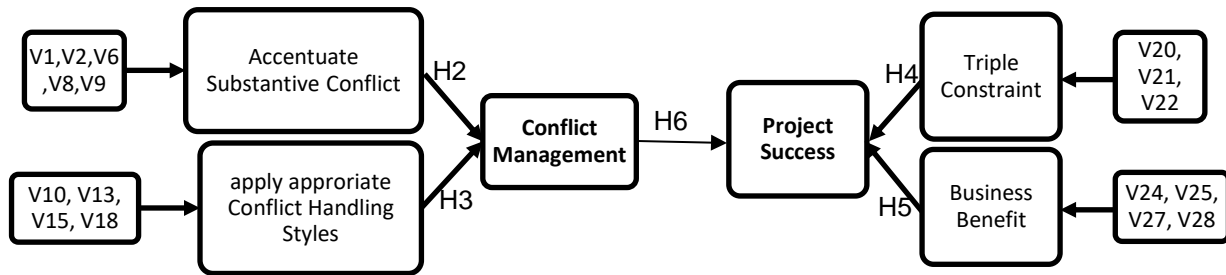
The factors retained in the final model were interpreted through the lens of the PMBOK knowledge areas. The following can be stated; accentuate substantive conflict was

closely related to the knowledge area of *project integration management*. There is a need to consistently debate and discuss issues through every phase of the project. To accentuate substantive conflict ensures that the best views are aired out at any of the five project management process stages (initiating, planning, executing, monitoring and control, closing). The application of this approach enables effective project integration management. *Conflict handling styles* are best encapsulated in the knowledge area of stakeholder management. This further interacts with the project success factor of *business benefit*. A look at *triple constraint* brings us to the knowledge areas of project scope, cost and time management.

To answer the second research question, the model highlights that conflict management, finding expression through the application of project integration management and project stakeholder management in interaction with project scope management, project time management and project cost management is key to enabling project success.

Linking this back to the important parameters that measure project success, it displays that when conflict is managed appropriately since it cannot be eliminated entirely, it leads to the success of the project.

The framework that can be applied in engineering projects in South Africa is given in Figure 21.



**Figure 21: Final model for the relationship between conflict management and project success**

#### 8.4 Research limitations

Limitation one, the use of a self-administered survey. Though this is one of the most popular methods used in research, it can induce bias and the appropriateness/credentials of the respondent cannot always be guaranteed.

Limitation two is that the use of the quantitative method limits the ability to get an understanding of the details that informs the responses. The current research did not get the benefit of qualitative research method. Triangulation would have strengthened the robustness of the results.

Limitation three is that the predictive model is only limited to engineering project sector thus cannot be generalized to other project management sectors within South Africa.

Limitation four is that the project is focused on the South African engineering sector whereas it may yield different results had the survey been expanded to other environments globally.

## 8.5 Future research

Future research on the impact of conflict management on project success could be conducted with the use of other modelling techniques. Secondly, the use of qualitative tools to gather data could provide an more in-depth understanding of the underlying causes for the constructs identified ultimately contributing to a richer research output. Lastly, South Africa is a multi-cultural society and project team members are made up of people with different backgrounds and values (cultural, education, ethnical, professional). The recommendation is to explore the role these dynamics play in projects within the engineering and the built environment.

## 8.6 Final Words

The current research investigated the relationship between conflict management and project success in outsourced engineering projects in South Africa. The constructs of conflict management and project success were delineated into three and two factors respectively, and six hypotheses were proposed for testing. Statistical analysis was employed to test the theoretical model. It was concluded that the application of conflict management by accentuating substantive conflict and applying appropriate conflict handling style leads to project success; and project professionals may apply the framework towards a better understanding of the impact of conflict management in engineering projects within South Africa.



## 9 Appendix A

Faculty of Management University of Johannesburg

Postgraduate School of Engineering Management

PO Box 524

Auckland Park

2006

South Africa

Dear sir/madam

### **POSTGRADUATE RESEARCH REQUEST: CONFLICT MANAGEMENT IN OUTSOURCED ENGINEERING PROJECTS IN SOUTH AFRICA**

My name is Bulali Mdontsane, MEng Engineering Management student at The University of Johannesburg.

I, the researcher, request your participation in the form of answering the relevant questions, set out in an online questionnaire.

#### Research study information

**Background of this study:** organizations turn to project management to increase competitiveness and fulfill strategic goals, the attainment of these objectives is dependent on success of projects. Organizations outsource for cost efficiencies and due to lack of expertise. Conflict inherently arises as different individuals interface in project activities.

Previous authors have argued that the management of the conflict has an impact on project success.

**Aim of the study:** determine how can conflict management be applied to enable project success.

**Research Objectives:**

1. To assess the relationship between project success and conflict management strategies.
2. To provide a framework to manage conflict in outsourced engineering projects in South Africa for the benefit of organizations and engineering professionals that are involved in managing projects.

To attain objective results, the survey is aimed towards project management practitioners and professionals with the appropriate knowledge and experience in the Engineering and Built Environment in South Africa.

The participation in the survey is voluntary and your response will be kept *strictly confidential*. The survey will run until 23 December 2016.

The expected duration to complete the survey is approximately 15 minutes. The survey is suitable for mobile devices and can be accessed on this link:

<https://goo.gl/forms/SNwSjBFvf4yYzmjY2>

For queries and further information relating to the research project please contact me via 0713124489/[mdontsane@gmail.com](mailto:mdontsane@gmail.com), or my supervisor (Dr. Hannelie Nel) [hannelien@uj.ac.za](mailto:hannelien@uj.ac.za)

Thank you for your time in furthering this research endeavor.

Bulali Mdontsane

Researcher

### Section A: Demographics

This survey seeks to collect information about your experiences in outsourced engineering projects in south Africa.

Please tick appropriate box. <b>Years of Experience</b>	Under 3	3-5	5-10	10-15	15 and above
<b>Level of Education</b>	Postgrad	Undergrad	College	Matric	Other
<b>Company</b>	Client	Contractor	Consultant		
<b>Number of projects to date</b>	Under 10	11- 25	26-50		51 and Above
<b>Professional Registration</b>	ECSA	SACPCMP	CESA	PMI	other
<b>Nationality</b>	South African		Non-South African		
<b>Position (please specify)</b>					

## Section B: Survey

The 1 to 5 rating has been provided to measure your experiences in a project ranging on a scale whereby strongly agree is a statement that is fully representative of your experience and strongly disagree is on the extreme opposite end.

Please tick appropriate box

<b>Construct 1: Minimize Affective Conflict</b>		<b>Strongly Disagree</b> 1	<b>Disagree</b> 2	<b>Neutral</b> 3	<b>Agree</b> 4	<b>Strongly Agree</b> 5
1.	Were interpersonal biases discouraged?					
2.	Was focus placed on the task whilst it is performed?					
3.	Was increased communication encouraged amongst stakeholders?					
4.	Were contradictions stemming from individuals disliking each other in a team lessened?					
5.	Were disagreements brought about by difference in emotions reduced?					
<b>Construct 2: Accentuate Substantive Conflict</b>		<b>Strongly Disagree</b> 1	<b>Disagree</b> 2	<b>Neutral</b> 3	<b>Agree</b> 4	<b>Strongly Agree</b> 5
6.	Was consensus deferred by emphasising alternative views?					
7.	Were opposing viewpoints recognised by all parties involved?					
8.	Was a culture of debate encouraged?					
9.	Was there a focus on not losing sight of the common goal?					
<b>Construct 3: use appropriate Conflict Handling Styles</b>		<b>Strongly Disagree</b> 1	<b>Disagree</b> 2	<b>Neutral</b> 3	<b>Agree</b> 4	<b>Strongly Agree</b> 5

10.	Was competing used to deal with important issues where unpopular actions were required?					
11.	Was competing used against those that take advantage of non-competitive behaviour in the project?					
12.	Were others accommodated where issues were more important to them?					
13.	Were individuals accommodating when they are wrong?					
14.	Did individuals compromise in order to arrive at rational solutions during time pressured situations?					
15.	Did individuals of equal power compromise when committed to different aims but only one can adopted?					
16.	Did individuals compromise when differing views were too crucial to be conceded?					
17.	Did individuals with dissimilar outlooks combine their insights by collaborating?					
18.	Did individuals adopt an avoiding position where the value of the difference in views was more than that of resolving it?					
19.	Did opposing individuals use avoiding to regain perspective?					
<b>Construct 4: Triple Constraint</b>		<b>Strongly Disagree</b>	<b>Disagree</b>	<b>Neutral</b>	<b>Agree</b>	<b>Strongly Agree</b>
		<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>
20.	Were costs measured relative to budget?					

21.	Was the schedule monitored in relation to set deadlines?					
22.	Did the project meet technical performance requirements?					
23.	Was the specification fulfilled as set out during project definition?					
<b>Construct 5: Business Benefits</b>		<b>Strongly Disagree</b>	<b>Disagree</b>	<b>Neutral</b>	<b>Agree</b>	<b>Strongly Agree</b>
		<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>
24.	Were stakeholders satisfied?					
25.	Did the end-user/customer embrace the final product/project outcome?					
26.	Were the objectives of the business case fulfilled by the project?					
27.	Were benefits such as return on investment(ROI) realized by the business?					
28.	Did the project result in enhancement of delivery time to market?					

## 10 Appendix B: CFA Model Iterations

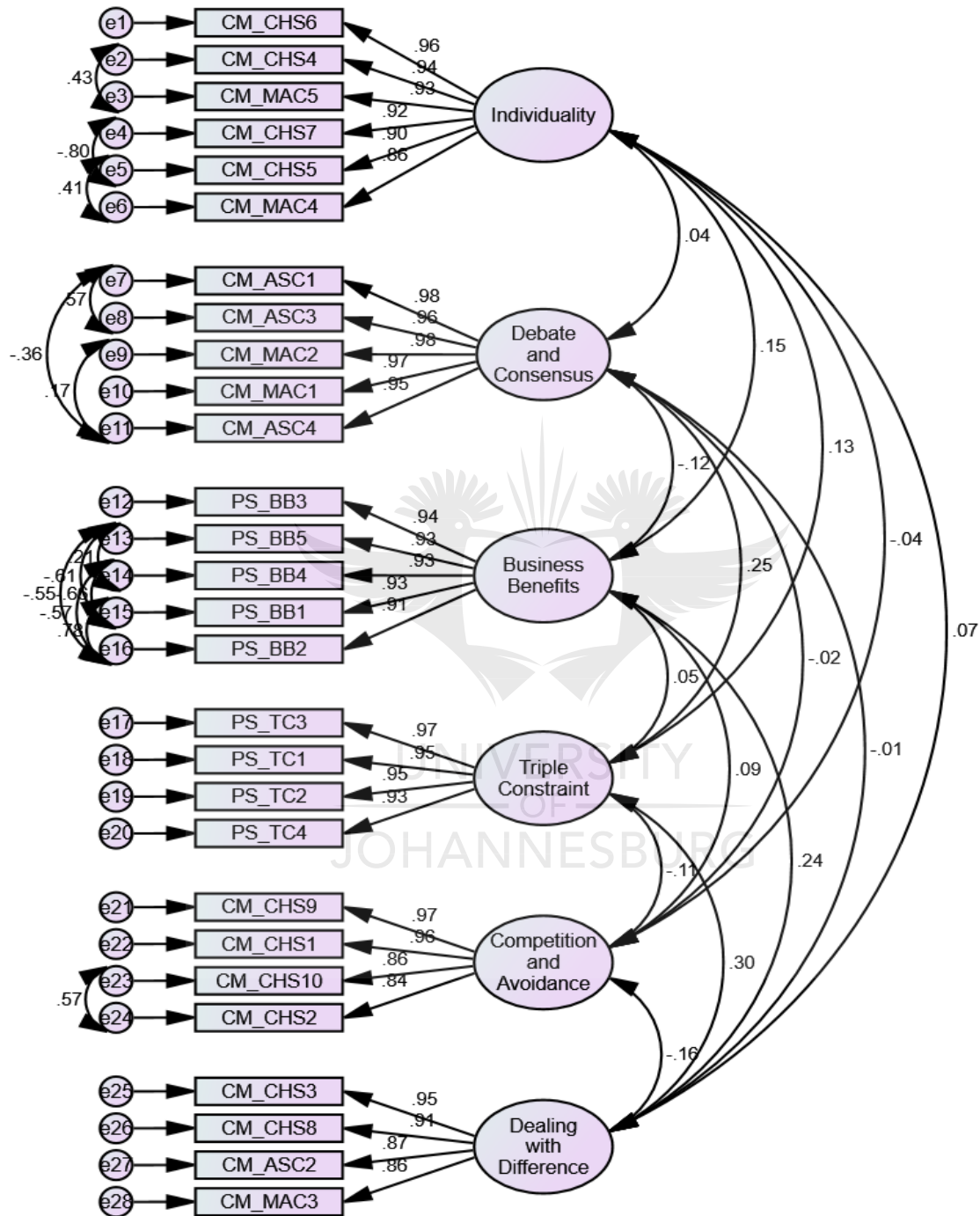


Figure 22: Second structural model

Table 27: Model fit results of third structural model

<i>Name of Category</i>	<i>Level of acceptance</i>	<i>Results</i>	<i>Change</i>
<b>1) Absolute fit</b>	P-value > .05	.000	↔
	<b>RMR &lt; .09</b>	.033	↑
	RMSEA < .05 good; .05 - .10 moderate; >0.10 bad	.166	↑
	GFI > .90	.649	↑
• <b>Incremental fit</b>	<b>CFI &gt; .95 great; &gt; .90 traditional; &gt; .80 sometimes permissible</b>	.827	↑
	TLI > .90	.798	↑
	NFI > .90	.789	↑
• <b>Parsimonious Fit</b>	<b>Chi-Square/df &lt; 3.0 good; &lt; 5 sometimes permissible</b>	4.441	↑





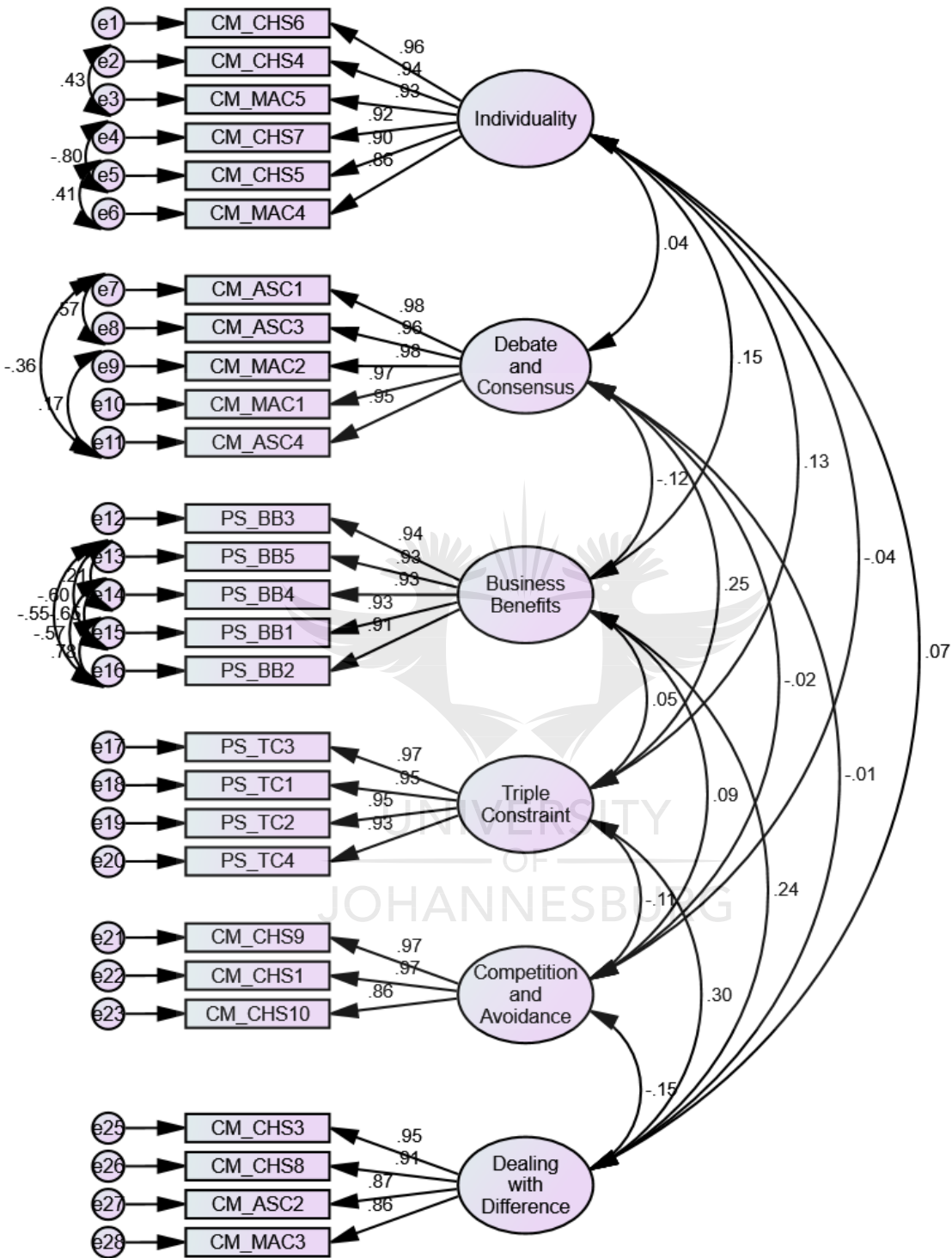


Figure 23: Third Structural Model

Table 28: Model Fit results fourth structural model

<i>Name of Category</i>	<i>Level of acceptance</i>	<i>Results</i>	<i>Change</i>
<b>1) Absolute fit</b>	P-value > .05	.000	↔
	<b>RMR &lt; .09</b>	.032	↑
	RMSEA < .05 good; .05 - .10 moderate; >0.10 bad	.163	↑
	GFI > .90	.660	↑
• <b>Incremental fit</b>	<b>CFI &gt; .95 great; &gt; .90 traditional; &gt; .80 sometimes permissible</b>	.840	↑
	TLI > .90	.811	↑
	NFI > .90	.802	↑
• <b>Parsimonious Fit</b>	<b>Chi-Square/df &lt;3.0 good; &lt;5 sometimes permissible</b>	4.318	↑



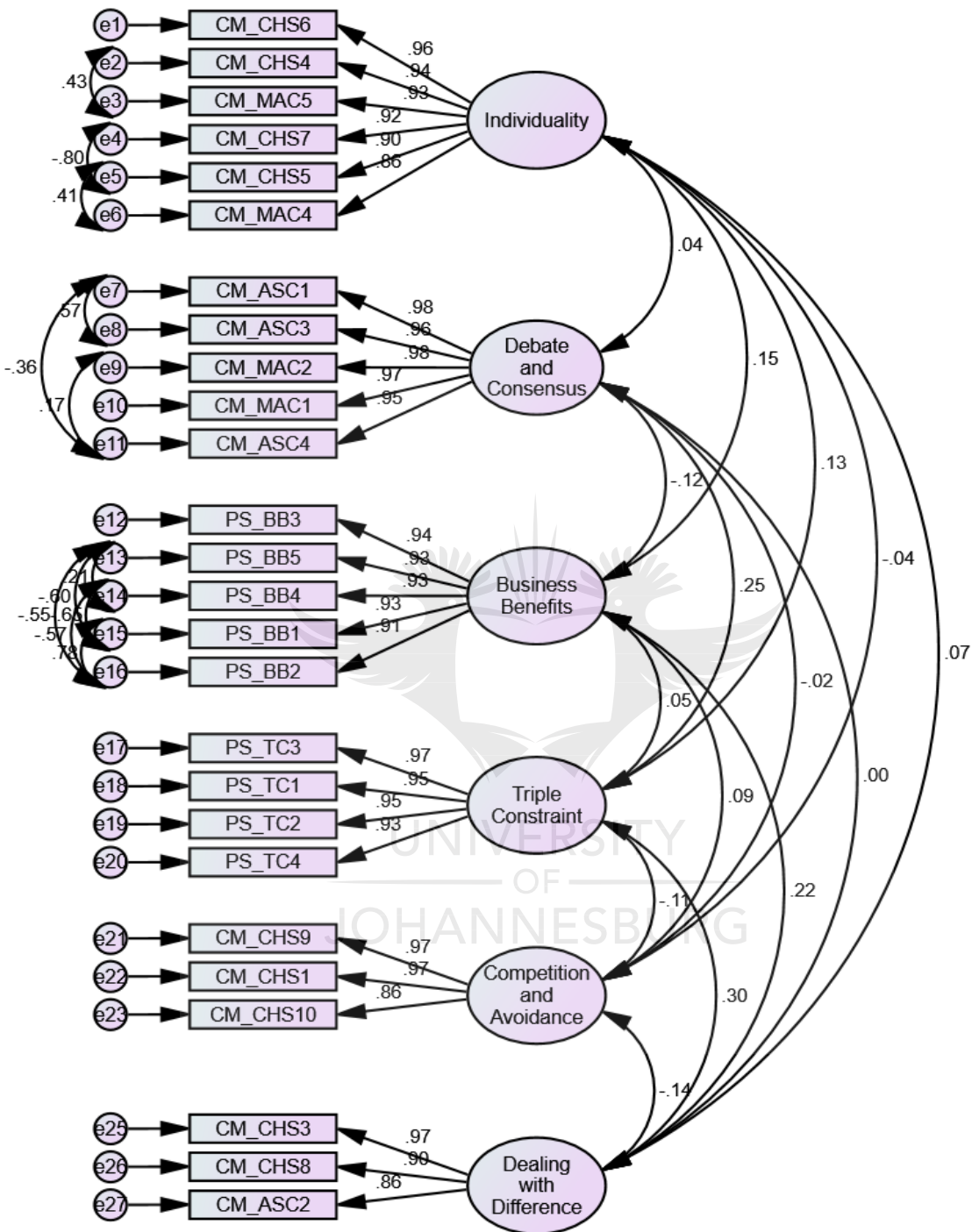
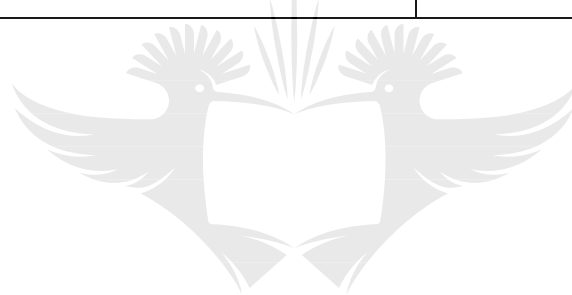


Figure 24: Fourth structural model

**Table 29: Model Fit results of fifth structural model**

<b>Name of Category</b>	<b>Level of acceptance</b>	<b>Results</b>	<b>Change</b>
<b>1) Absolute fit</b>	P-value > .05	.000	↔
	RMR < .09	.031	↑
	RMSEA < .05 good; .05 - .10 moderate; >0.10 bad	.152	↑
	GFI > .90	.670	↑
• <b>Incremental fit</b>	<b>CFI &gt; .95 great; &gt; .90 traditional; &gt; .80 sometimes permissible</b>	.862	↑
	TLI > .90	.836	↑
	NFI > .90	.824	↑
• <b>Parsimonious Fit</b>	<b>Chi-Square/df &lt;3.0 good; &lt;5 sometimes permissible</b>	3.890	↑



UNIVERSITY  
OF  
JOHANNESBURG

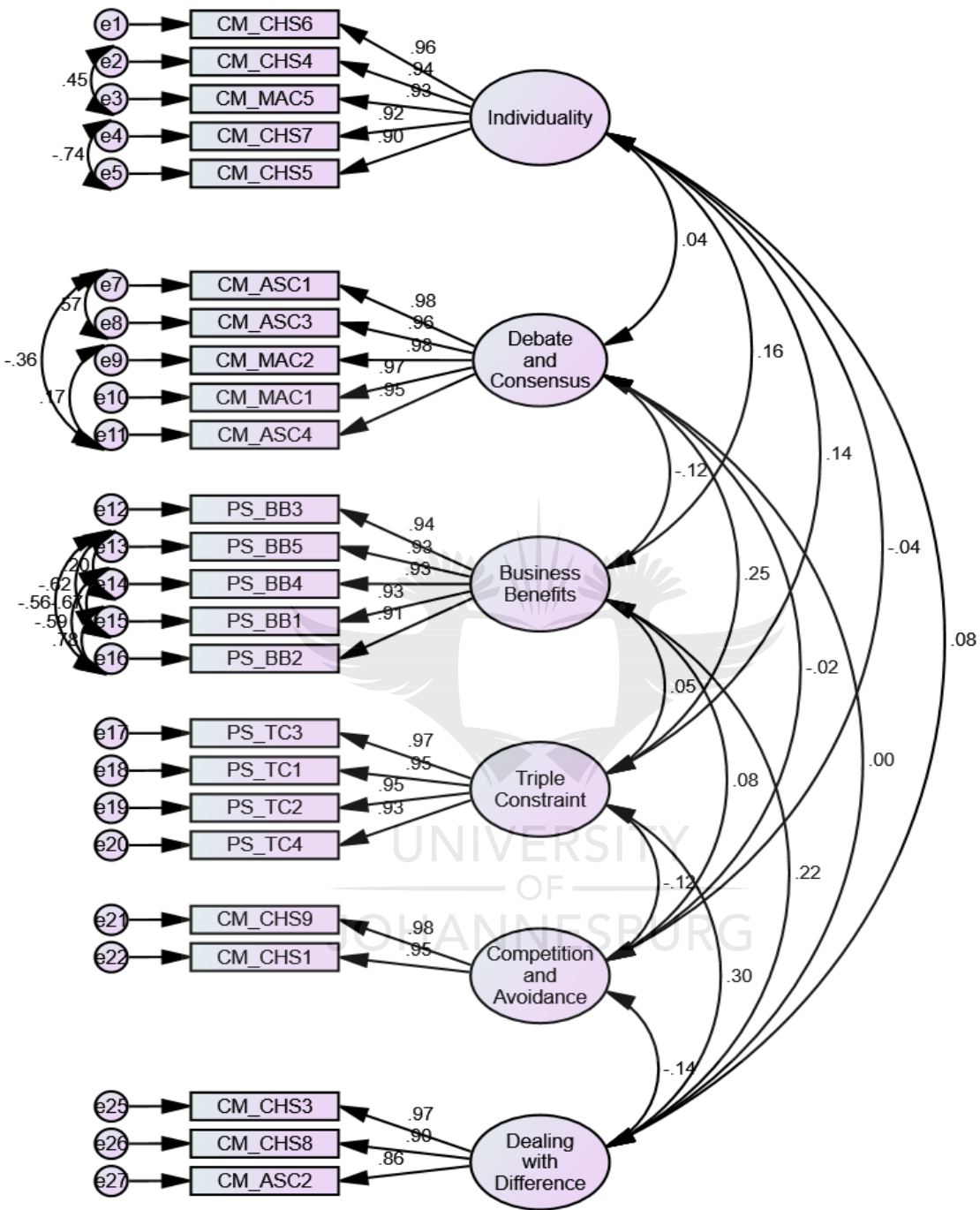


Figure 25: fifth structural model

**Table 30: Model Fit results of sixth structural model**

<b>Name of Category</b>	<b>Level of acceptance</b>	<b>Results</b>	<b>Change</b>
<b>1) Absolute fit</b>	P-value > .05	.000	↔
	RMR < .09	.030	↑
	RMSEA < .05 good; .05 - .10 moderate; >0.10 bad	.145	↑
	GFI > .90	.691	↑
• <b>Incremental fit</b>	<b>CFI &gt; .95 great; &gt; .90 traditional; &gt; .80 sometimes permissible</b>	.879	↑
	TLI > .90	.855	↑
	NFI > .90	.842	↑
• <b>Parsimonious Fit</b>	<b>Chi-Square/df &lt;3.0 good; &lt;5 sometimes permissible</b>	3.637	↑



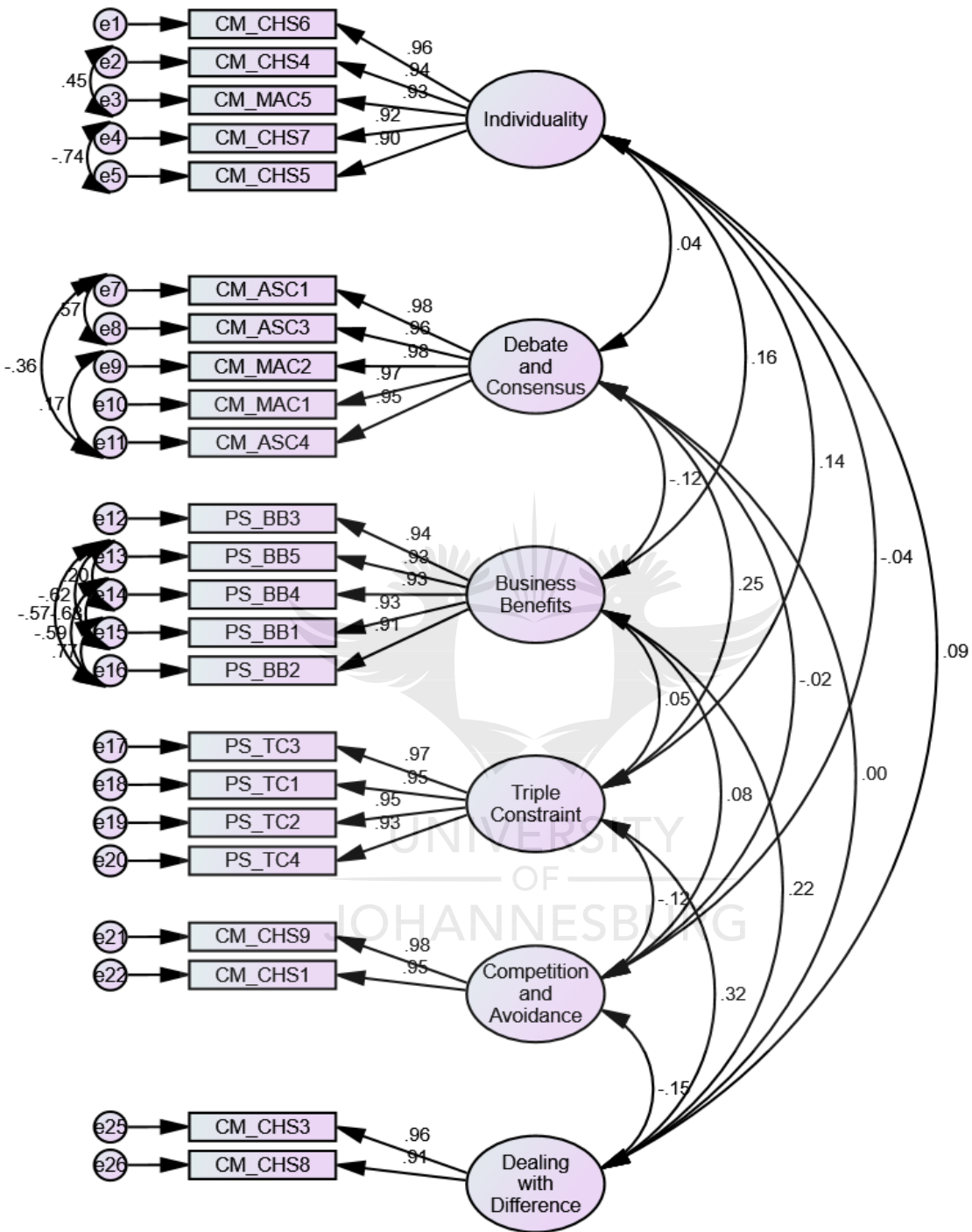


Figure 26 : Sixth structural model

Table 31: Model Fit results of seventh structural model

<i>Name of Category</i>	<i>Level of acceptance</i>	<i>Results</i>	<i>Change</i>
<b>1) Absolute fit</b>	P-value > .05	.000	↔
	<b>RMR &lt; .09</b>	.030	↔
	RMSEA < .05 good; .05 - .10 moderate; >0.10 bad	.145	↔
	GFI > .90	.698	↑
• <b>Incremental fit</b>	<b>CFI &gt; .95 great; &gt; .90 traditional; &gt; .80 sometimes permissible</b>	.886	↑
	TLI > .90	.861	↑
	NFI > .90	.850	↑
• <b>Parsimonious Fit</b>	<b>Chi-Square/df &lt; 3.0 good; &lt; 5 sometimes permissible</b>	3.637	↑





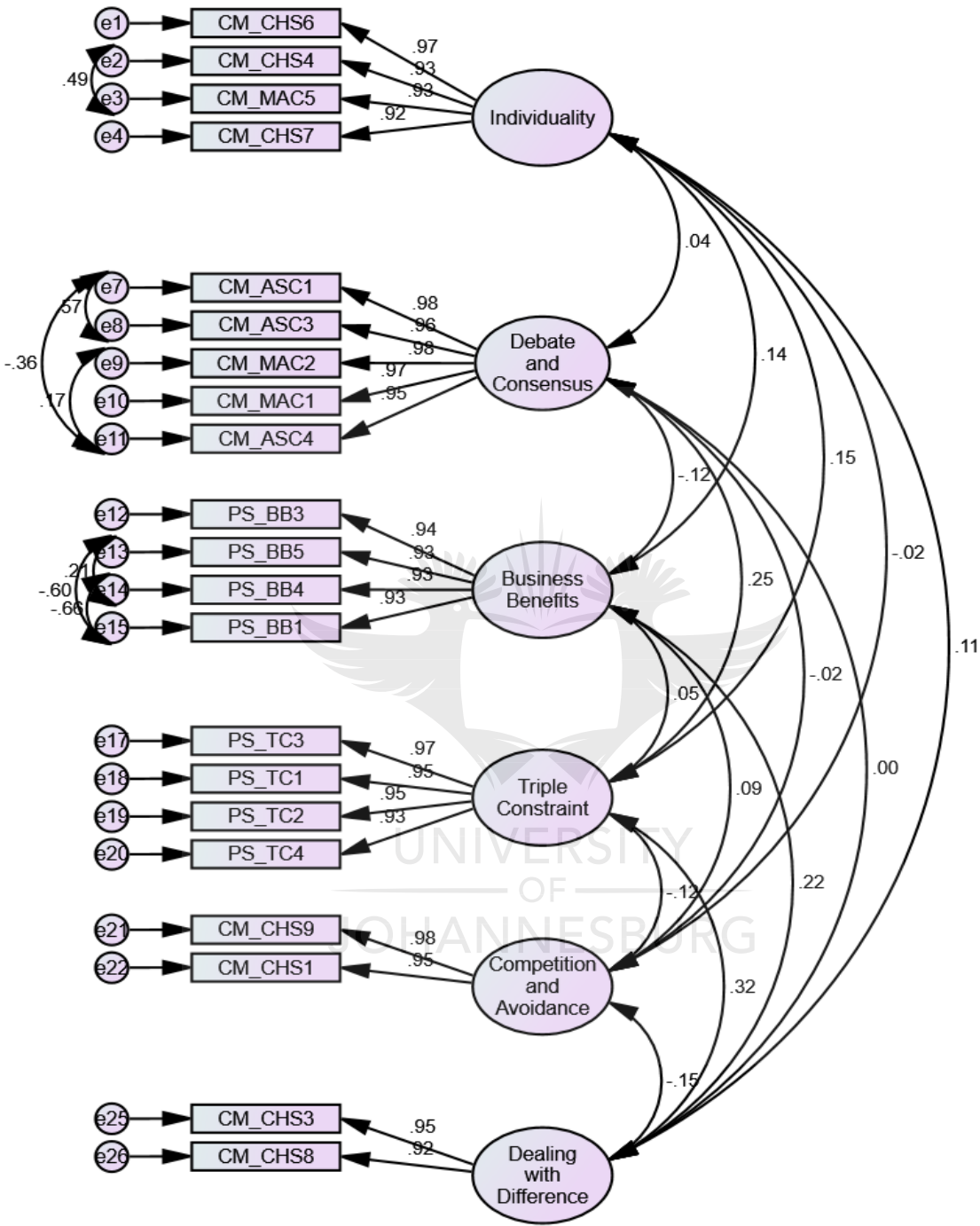


Figure 27 seventh structural model

Table 32 Model Fit results of eighth structural model

<i>Name of Category</i>	<i>Level of acceptance</i>	<i>Results</i>	<i>Change</i>
<b>1) Absolute fit</b>	P-value > .05	.000	↔
	RMR < .09	.029	↑
	RMSEA < .05 good; .05 - .10 moderate; >0.10 bad	.145	↔
	GFI > .90	.722	↑
• <b>Incremental fit</b>	<b>CFI &gt; .95 great; &gt; .90 traditional; &gt; .80 sometimes permissible</b>	.893	↑
	TLI > .90	.868	↑
	NFI > .90	.859	↑
• <b>Parsimonious Fit</b>	<b>Chi-Square/df &lt;3.0 good; &lt;5 sometimes permissible</b>	3.617	↑



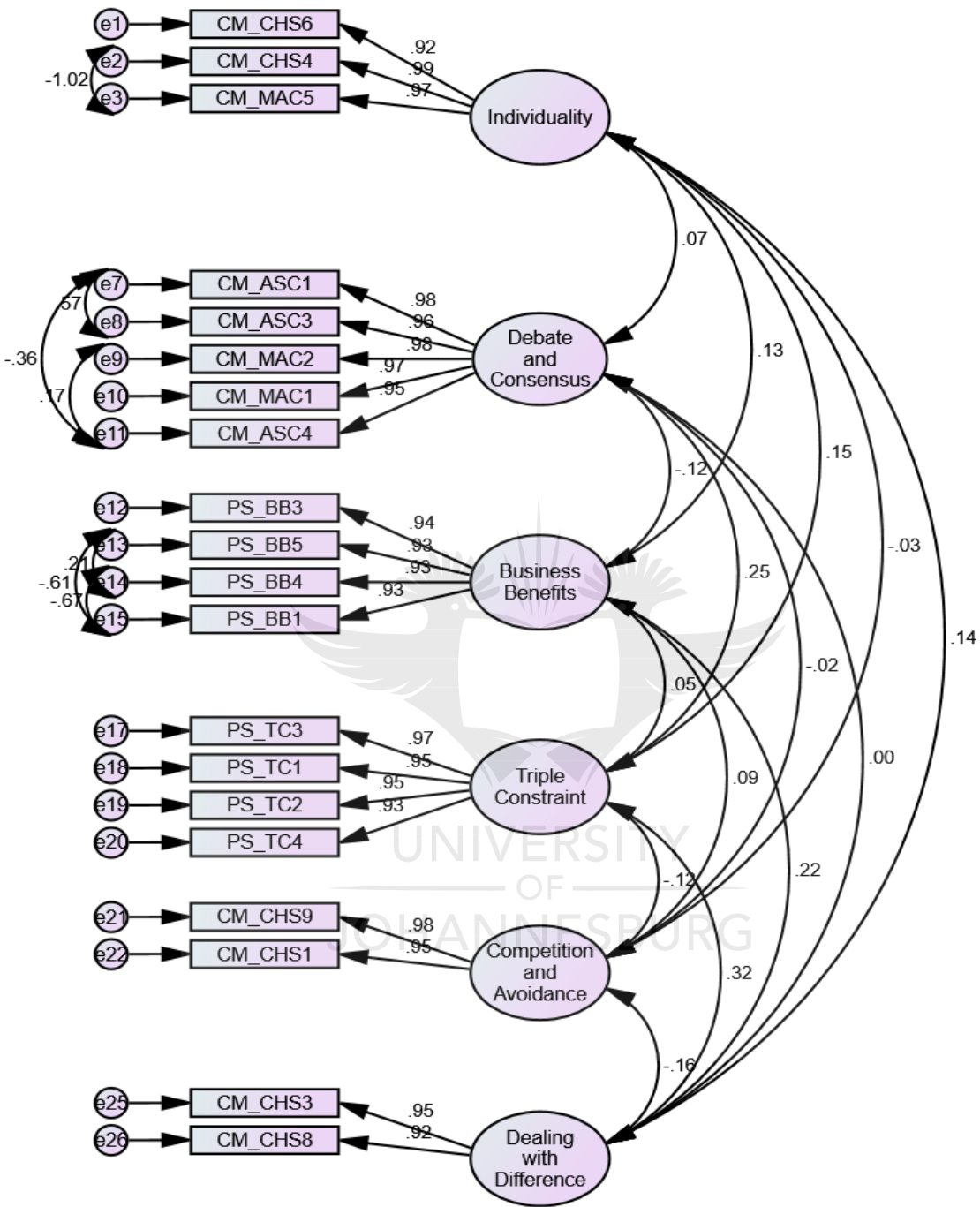


Figure 28: Eighth structural model

**Table 33: Model Fit results of ninth structural model**

<b>Name of Category</b>	<b>Level of acceptance</b>	<b>Results</b>	<b>Change</b>
<b>1) Absolute fit</b>	P-value > .05	.000	↔
	RMR < .09	.027	↑
	RMSEA < .05 good; .05 - .10 moderate; >0.10 bad	.136	↔
	GFI > .90	.744	↑
• <b>Incremental fit</b>	<b>CFI &gt; .95 great; &gt; .90 traditional; &gt; .80 sometimes permissible</b>	.909	↑
	TLI > .90	.887	↑
	NFI > .90	.876	↑
• <b>Parsimonious Fit</b>	<b>Chi-Square/df &lt;3.0 good; &lt;5 sometimes permissible</b>	3.315	↑



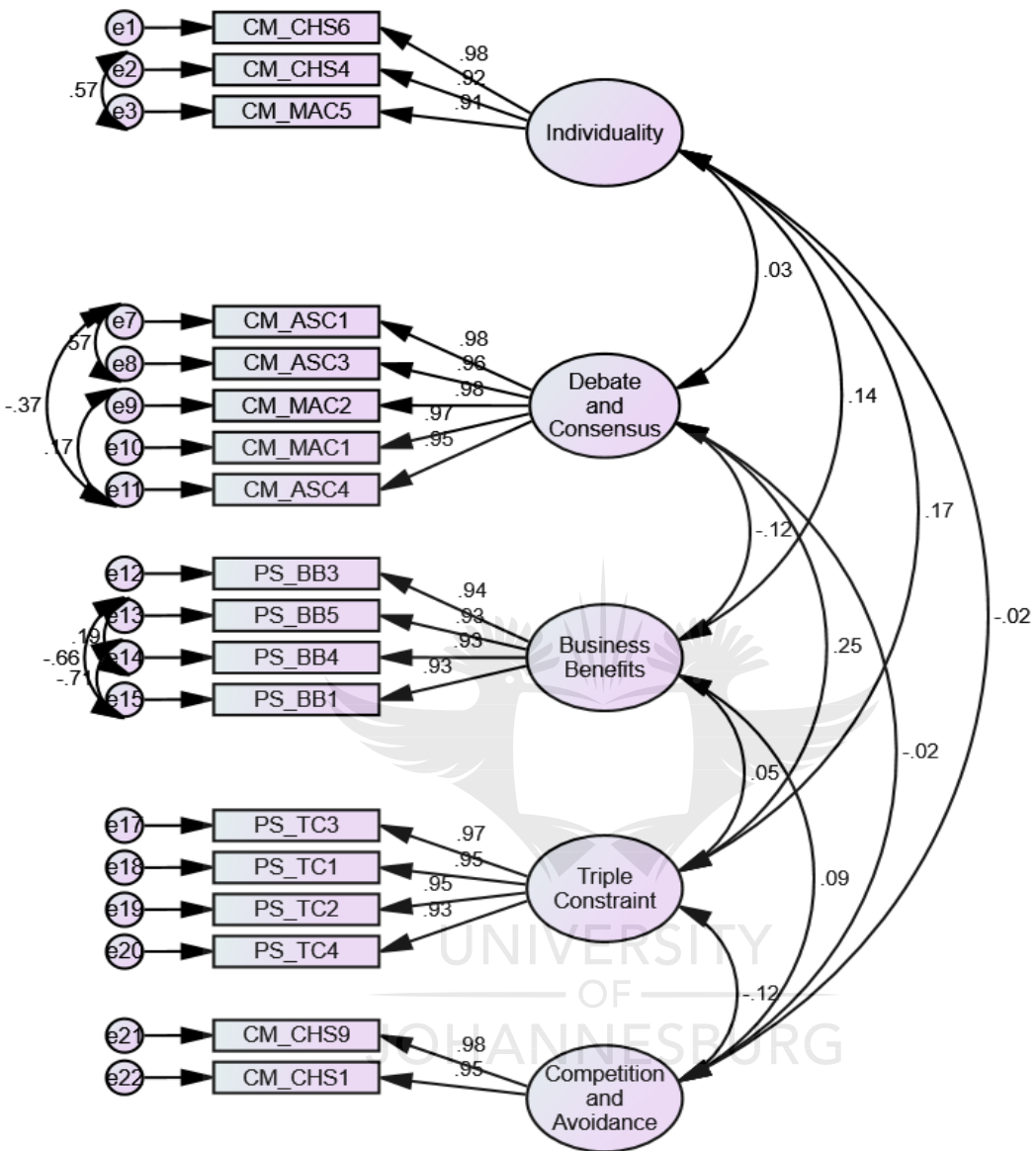


Figure 29: Ninth structural model

Table 34: Model Fit results of tenth structural model

Name of Category	Level of acceptance	Results	Change
1) <b>Absolute fit</b>	P-value > .05	.000	↔
	RMR < .09	.027	↑
	RMSEA < .05 good; .05 - .10 moderate; >0.10 bad	.137	↓
	GFI > .90	.764	↑
• <b>Incremental fit</b>	CFI > .95 great; > .90 traditional; > .80 sometimes permissible	.921	↑
	TLI > .90	.901	↑
	NFI > .90	.892	↑
• <b>Parsimonious Fit</b>	Chi-Square/df <3.0 good; <5 sometimes permissible	3.351	↓

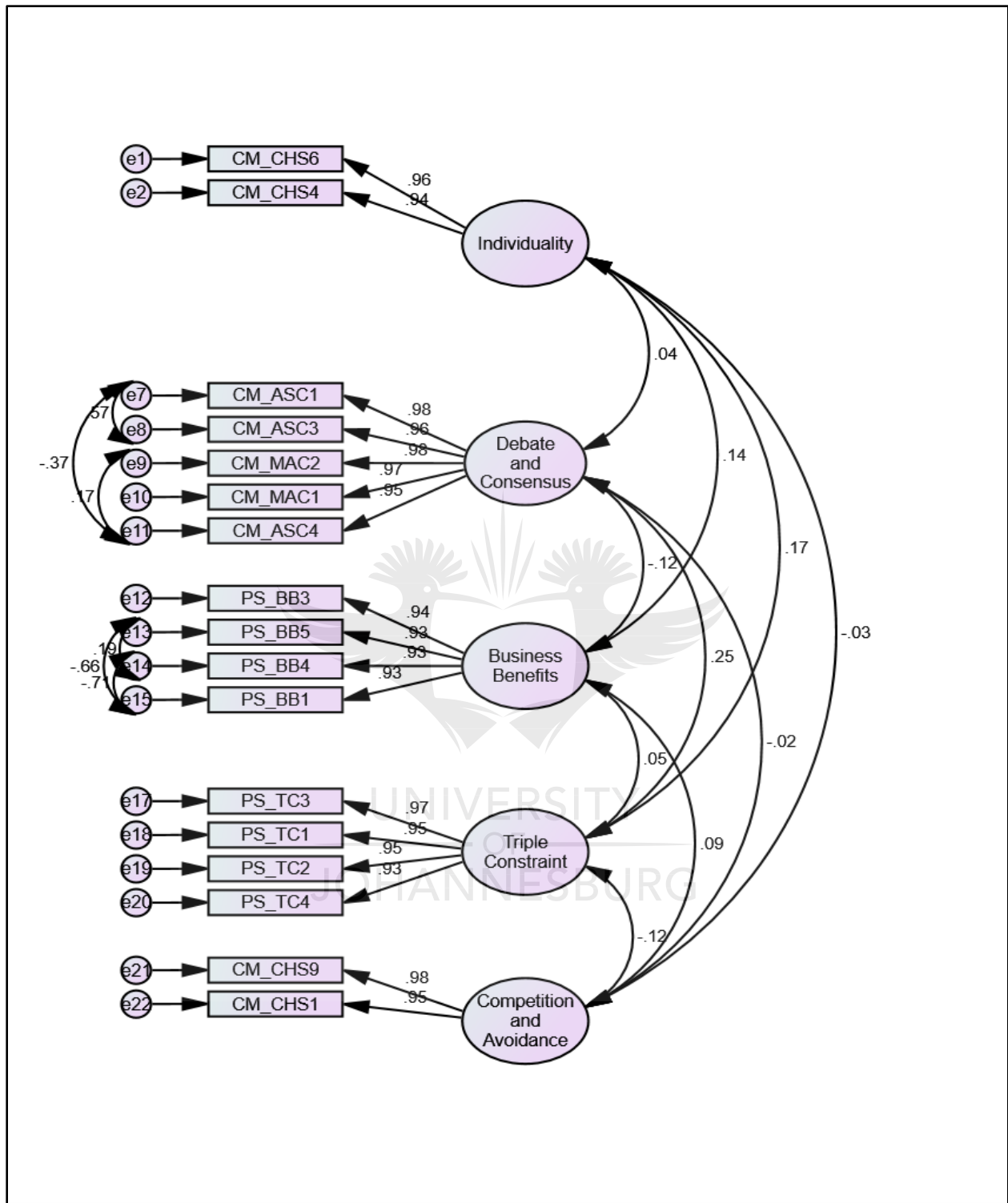


Figure 30 Tenth structural model



UNIVERSITY  
OF  
JOHANNESBURG



## 11 References

Adler, T.R., 2005. The swift trust partnership: A project management exercise investigating the effects of trust and distrust in outsourcing relationships. *Journal of Management Education*, 29(5), pp.714-737

Alderman, N. and Ivory, C., 2007. Partnering in major contracts: Paradox and metaphor. *International Journal of Project Management*, 25(4), pp. 386-393.

Amason, A.C., 1996. Distinguishing the effects of functional and dysfunctional conflict on strategic decision making: Resolving a paradox for top management teams. *Academy of management journal*, 39(1), pp.123-148.

Andersen, E.S., Dyrhaug, Q.X. and Jessen, S.A., 2002. Evaluation of Chinese projects and comparison with Norwegian projects. *International Journal of Project Management*, 20(8), pp. 601-609

Arbuckle, J. L. ,2014. Amos (Version 23.0) [Computer Program]. Chicago: IBM SPSS.

Arbuckle, J. L. 2014. Amos 23.0 User's Guide. Chicago: IBM SPSS.

Attarzadeh, I. and Ow, S.H., 2008. Project management practices: the criteria for success or failure. *Communications of the IBIMA*, 1, pp.234-241.

Awang, Z., 2014. A handbook on SEM for academicians and practitioners. *Universiti Sultan Zainal Abidin*.

Babbie, E., 2007. *The practice of social research*. Belmont, CA: Thomson Wadsworth Learning.

Baccarini, D., 1999. The logical framework method for defining project success. *Project management journal*, 30(4), pp.25-32.

Baker, B.N., Murphy, D.C. and Fisher, D., 2008. Factors affecting project success. *Project Management Handbook, Second Edition*, pp.902-919.

Bandalos, D. L., & Finney, S. J. (2001). Item parceling issues in structural equation modeling. In Marcoulides, G. A. & Schumacker, R. E. (Eds.), *New developments and techniques in structural equation modeling* (pp. 269-296). Mahwah, NJ: Erlbaum.

Barker, J., Tjosvold, D. and Andrews, I.R., 1988. Conflict Approaches of Effective and Ineffective Project Managers: A Field Study in a Matrix Organization [1]. *Journal of Management Studies*, 25(2), pp.167-178.

Barki, H. and Hartwick, J. 2001, "Interpersonal Conflict and Its Management in Information System Development", *MIS Quarterly*, vol. 25, no. 2, pp. 195-228.

Belassi, W. and Tukel, O.I. 1996, "A new framework for determining critical success/failure factors in projects", *International Journal of Project Management*, vol. 14, no. 3, pp. 141-151.

Belout, A. and Gauvreau, C., 2004. Factors influencing project success: the impact of human resource management. *International journal of project management*, 22(1), pp.1-11.

Blake, R.R. and Mouton, J.S., 1964. The new managerial grid: strategic new insights into a proven system for increasing organization productivity and individual effectiveness, plus a revealing examination of how your managerial style can affect your mental and physical health. Gulf Pub. Co.

Blumberg, B.F., Cooper, D.R., Schindler, P.S., 2014. *Business research methods*. McGraw-Hill education.

Boudet, H., Jayasundera, D., and Davis, J. 2011, 'Drivers of Conflict in Developing Country Infrastructure Projects: Experience from the Water and Pipeline Sectors', *Journal of Construction Engineering and Management*, 137, 7, pp. 498-511

Brown, T.A., 2015. *Confirmatory factor analysis for applied research*. Guilford Publications.

Byrne, B.M., 2016. Structural equation modeling with AMOS: Basic concepts, applications, and programming. Routledge.

CAHYONO, A. and HARTIJASTI, Y., 2012. Conflict Approaches of Effective Project Manager in the Upstream Sector of Indonesian Oil and Gas Industry. *South East Asian Journal of Management*, 6(2), pp. 65-80.

Chen, C., 2010. Managing projects from a client perspective: the concept of meetings-flow approach.. *International Journal of Project Management*, 29(6), pp. 671-686.

Chen, C.-Y., Chen, P.-C. and Lu, Y.-R., 2013. The coordination processes and dynamics within the inter-organizational context of contract-based outsourced engineering projects. *Journal of Engineering and Technology Management*, 30(2), pp. 113-135.

Chiocchio, F., Forgues, D., Paradis, D. and Iordanova, I., 2011. Teamwork in integrated design projects: Understanding the effects of trust, conflict, and collaboration on performance. *Project Management Journal*, 42(6), pp.78-91.

CLARKE, N., 2010. Emotional intelligence and its relationship to transformational leadership and key project manager competences. *Project Management Journal*, 41(2), pp. 5-20

Collis, J. and Hussey, R., 2013. *Business research: A practical guide for undergraduate and postgraduate students*. Palgrave Macmillan.

Couillard, J., 1995. The role of project risk in determining project management approach. *Project Management Journal*, 26, pp.3-15.

Crawford, L. and Pollack, J., 2004. Hard and soft projects: a framework for analysis. *International Journal of Project Management*, 22(8), pp.645-653.

Creasy, T. and Anantatmula, V.S. 2013, "From Every Direction-How Personality Traits and Dimensions of Project Managers Can Conceptually Affect Project Success", *Project Management Journal*, vol. 44, no. 6, pp. 36-51.

Davis, S. ,2011. Investigating the impact of project managers' emotional intelligence on their interpersonal competence. *Project Management Journal*, 42(4), 37–57.

De Dreu, C., and Weingart, L. (2003). Task verses relationship conflict, team performance, and team member satisfaction: A meta-analysis. *Journal of Applied Psychology*, 88(4), 741–749.

Dictionary, O.E., 1989. Oxford: Oxford university press

Duggal, J.S., 2010. Next Level Up: How Do You Measure Project Success? Rethinking the Triple Constraint. *Project Management Institute Community Post*

Dvir, D., Raz, T. and Shenhar, A.J., 2003. An empirical analysis of the relationship between project planning and project success. *International journal of project management*, 21(2), pp.89-95.

Engwall, M., 2003. No Project is an Island: linking projects to history and context. *Research Policy*, 32(5), pp. 789-808.

Ensari, N., Camden-Anders, S. and Schlaerth, A. 2016, "Constructive Management and Resolution of Conflict" in *Encyclopedia of Mental Health (Second Edition)*, ed. H.S. Friedman, Academic Press, Oxford, pp. 340-349.

Fabrigar, L.R., Wegener, D.T., MacCallum, R.C. and Strahan, E.J., 1999. Evaluating the use of exploratory factor analysis in psychological research. *Psychological methods*, 4(3), p.272.

Gaskin, J., 2013. SEM Series Part 5a: Confirmatory Factor Analysis [Online Video]. Available:<http://www.youtube.com/watch?v=MCYmyzIY&list=PLnMJlBz3sefLdYnz7TysHKrMBby7igpV9&index=6> [Accessed 12 January 2017]

Gaskin, J. 2016. *SEM series part 3: Exploratory Factor Analysis* [online video]. Available: <https://www.youtube.com/watch?v=VBsuEBsO3U8> [Accessed 20 January 2017]

Hair, J., Black, W., Babin, B., and Anderson, R., 2010. *Multivariate data analysis* (7<sup>th</sup> edition): Prentice-Hall, Inc. Upper Saddle River, NJ, USA.

Hall, J. 1969. "Conflict management survey: A survey of one's characteristic reaction to and handling conflict between himself and others". Canoe, TX:Teleometrics International.

Harrington, D., 2009. *Confirmatory factor analysis*. Oxford University Press.

Hu, L.T. and Bentler, P.M., 1999. Cutoff criteria for fit indexes in covariance structure analysis: Conventional criteria versus new alternatives. *Structural equation modeling: a multidisciplinary journal*, 6(1), pp.1-55.

Holt, J.L. and DeVore, C.J. 2005, "Culture, gender, organizational role, and styles of conflict resolution: A meta-analysis", *International Journal of Intercultural Relations*, vol. 29, no. 2, pp. 165-196.

Ika, L.A., 2009. Project success as a topic in project management journals. *Project Management Journal*, 40(4), pp.6-19.

JEHN, K.A., 1997. A Qualitative Analysis of Conflict Types and Dimensions in Organizational Groups. *Administrative Science Quarterly*, 42(3), pp. 530-557.

JEHN, K.A., 1995. A Multimethod Examination of the Benefits and Detriments of Intragroup Conflict. *Administrative Science Quarterly*, 40(2), pp. 256-282.

JEHN, K.A., 1994. Enhancing Effectiveness: An Investigation Of Advantages And Disadvantages Of Value-Based Intragroup Conflict. *Int Jnl of Conflict Management*, 5(3), pp. 223-238.

JEHN, K.A. and MANNIX, E.A., 2001. The Dynamic Nature of Conflict: A Longitudinal Study of Intragroup Conflict and Group Performance. *The Academy of Management Journal*, 44(2), pp. 238-251.

JEHN, K.A., NORTHCRAFT, G.B. and NEALE, M.A., 1999. Why Differences Make a Difference: A Field Study of Diversity, Conflict, and Performance in Workgroups. *Administrative Science Quarterly*, 44(4), pp. 741-763.

JEHN, K.A., RISPENS, S. and SHERRY M.B. THATCHER, 2012. Managing Conflict in Groups and Teams: Conflict about Conflict. Emerald Group Publishing Limited, pp. 133-159.

Joseph, N., 2014. *A predictive model for information technology project success* (Doctoral dissertation).

Jugdev, K. and Müller, R., 2005. A retrospective look at our evolving understanding of project success. Project Management Institute.

KANKANHALLI, A., TAN, B.C.Y. and WEI, K., 2006. Conflict and Performance in Global Virtual Teams. *Journal of Management Information Systems*, 23(3), pp. 237-274.

Kaushal, R. and Kwantes, C.T. 2006, "The role of culture and personality in choice of conflict management strategy", *International Journal of Intercultural Relations*, vol. 30, no. 5, pp. 579-603.

Kenny, D.A., Kaniskan, B. and McCoach, D.B., 2015. The performance of RMSEA in models with small degrees of freedom. *Sociological Methods & Research*, 44(3), pp.486-507.

Kim, E.j., Yamaguchi, A., Kim, M. and Miyahara, A. 2015, "Effects of taking conflict personally on conflict management styles across cultures", *Personality and Individual Differences*, vol. 72, pp. 143-149.

Kilmann, R.H. and Thomas, K.W., 1978. Four perspectives on conflict management: An attributional framework for organizing descriptive and normative theory. *Academy of Management Review*, 3(1), pp.59-68.



Kothari, C., 2004. *Research Methodology: Methods and Techniques*. 2nd Revised Edition ed. New Delhi: New Age Publishers.

Kurtzberg, T.R. and Mueller, J.S. ,2005. The influence of daily conflict on perceptions of creativity: A longitudinal study", *The International Journal of Conflict Management*, 16 (4), pp. 335-353.

Labuschagne, L ; Marnewick, C; Eloff, M; Steyn, H; and Tobin P. 2013 *The Prosperus Report 2013: Project Management Maturity versus Project Outcomes in Africa*. Johannesburg.

Larson, E.W. and Gobeli, D.H., 1987. Relative effectiveness of different project structure. *Project Management Journal*, 18(2), pp.81-85.

Leung, M., Yu, J. and Liang, Q. 2014, "Analysis of the Relationships between Value Management Techniques, Conflict Management, and Workshop Satisfaction of Construction Participants", *Journal of Management in Engineering*, vol. 30, no. 3, pp. 04014004.

Lim, C.S and Mohamed, M.Z. 1999. Criteria of project success: An exploratory re-examination. *International Journal of Project Management*, 17,243-248.

Lloyd, P., 2014, August. The status of the LP gas industry in South Africa. In *Industrial and Commercial Use of Energy (ICUE), 2014 International Conference on the* (pp. 1-7). IEEE.

Marnewick, C., 2012. A longitudinal analysis of ICT project success. In *Proceedings of the South African Institute for Computer Scientists and Information Technologists Conference* (pp. 326-334). ACM.

Meredith, J.R and Mantel J.S. Jr. 2011. "Project Management: A Managerial approach", Wiley.

Merriam, S.B. 2014. *Qualitative research: A guide to design and implementation*, 3<sup>rd</sup> Edition. San Francisco, CA: Jossey-Bass

Mkhize, M., 2013. *Transformation of the Gas sector*. Johannesburg: Department of Energy.

Michel, H. 1998, "FEATURE—The Next 25 Years: The Future of the Construction Industry", *Journal of Management in Engineering*, vol. 14, no. 5, pp. 26-31.

Miller, A., Balapurria, M. and Mohamed Sesay, M.M. 2015, "Facilitating Project Success by Eliminating Interpersonal Conflicts", *Journal of Information Technology and Economic Development*, vol. 6, no. 1, pp. 41-57.

Mudau, R. and Pretorius, L., 2009, August. Project control and risk management for project success: A South African case study. In *Management of Engineering and Technology, 2009. PICMET 2009. Portland International Conference on* (pp. 1409-1414). IEEE

Mueller, T., Parker, H. and Ross, A., 2008. Conflict reduction in cross functional projects in South African automotive firms. *Acta Commercii*, 8(1), pp.231-240.

National-Treasury, 2016. *National Treasury*. [Online]  
Available at: <http://www.treasury.gov.za/publications/guidelines/>

Ng, H., Peña-Mora, F. and Tamaki, T. 2007, "Dynamic Conflict Management in Large-Scale Design and Construction Projects", *Journal of Management in Engineering*, vol. 23, no. 2, pp. 52-66.

Nordigården, D., Rehme, J., Brege, S., Chicksand, D. and Walker, H., 2014. Outsourcing decisions—the case of parallel production. *International Journal of Operations and Production Management*, 34(8), pp.974-1002

Pinto, J.K. and Mantel Jr, S.J., 1990. The causes of project failure. *Engineering Management, IEEE Transactions on*, 37(4), pp.269-276.

Posner, B.Z., 1986. What's all the fighting about? Conflicts in project management. *Engineering Management, IEEE Transactions on*, (4), pp.207-211.

Prieto-Remón, T.C., Cobo-Benita, J.R., Ortiz-Marcos, I. and Uruburu, A. 2015, "Conflict Resolution to Project Performance", *Procedia - Social and Behavioral Sciences*, vol. 194, pp. 155-164.

Project Management Institute., 2013, *A guide to the project management body of knowledge : (PMBOK® guide)*, Project management institute, Newtown Square, Pa.

Rahim, M.A., 2010. *Managing conflict in organizations*. Transaction Publishers.

Rahim, M.A. 2002, "Toward a theory of managing organizational conflict", *International Journal of Conflict Management*, vol. 13, no. 3.

Rahim, M.A., 1983. A measure of styles of handling interpersonal conflict. *Academy of Management journal*, 26(2), pp.368-376.

Rahschulte, T. and Milhauser, K., 2010, October. Beyond the Triple Constraints-Nine Elements Defining Project Success Today. In PMI Global Conference, North America, Washington DC, USA (pp. 9-12).

Renwick, P.A., 1975. Perception and management of superior-subordinate conflict. *Organizational Behavior and Human Performance*, 13(3), pp.444-456.

Sekaran, U. and Bougie, R., 2011. Research method for business: A skill building approach.

Shenhar, A. J., & Dvir, D. (2007). Reinventing project management: The diamond approach to successful growth & innovation. Boston: Harvard Business School Press.

Sportsman, S. and Hamilton, P., 2007. Conflict management styles in the health professions. *Journal of professional nursing*, 23(3), pp.157-166.

Sudhakar, G.P.,2015. A Review of Conflict Management Techniques in Project. *Brazilian Journal of Operations and Production Management*, 12(2), pp.214-232.

Thamhain, H. (2004). Team leadership effectiveness in technology based project environment. *Project Management Journal*, pp. 35–46.

Treasury, N., 2016. Publications:Guidelines. [Online] Available at: <http://www.treasury.gov.za/publications/guidelines/> [Accessed 08 April 2016].

Tjosvold, D. 2008, "The conflict-positive organization: it depends upon us", *Journal of Organizational Behavior*, vol. 29, no. 1, pp. 19-28.

Tjosvold, D. 2008, "Conflicts in the study of conflict in organizations" in , ed. C. K. W. De Dreu M. J. Gelfand, Taylor & Francis Group/Lawrence Erlbaum Associates, New York, NY, pp. 445-453.

Tjosvold, D., Wong, A.S.H. & Wan, P.M.K. 2010, "Conflict Management for Justice, Innovation, and Strategic Advantage in Organizational Relationships", *Journal of Applied Social Psychology*, vol. 40, no. 3, pp. 636-665.

Tjosvold, D., Wu, P. & Chen, Y.F. 2010, "The Effects of Collectivistic and Individualistic Values on Conflict and Decision Making: An Experiment in China", *Journal of Applied Social Psychology*, vol. 40, no. 11, pp. 2904-2926.

TURNER, J.R. and MÜLLER, R., 2003. On the nature of the project as a temporary organization. *International Journal of Project Management*, 21(1), pp. 1-8.

Volkema, R.J. and Bergmann, T.J., 1995. Conflict styles as indicators of behavioral patterns in interpersonal conflicts. *The Journal of Social Psychology*, 135(1), pp.5-15.

Westerveld, E. 2003, "The Project Excellence Model®: linking success criteria and critical success factors", *International Journal of Project Management*, vol. 21, no. 6, pp. 411-418.

Wilson, J. 2010. *Essentials of business research: a guide to doing your research project*. Sage Publications, p.7

Xiang, J., 2010. Business Process Redesign Project Implementation and Outcomes - A proposed Model and Its Validation

Yang, L., Chen, J. and Wang, X. 2015, "Assessing the effect of requirement definition and management on performance outcomes: Role of interpersonal conflict, product advantage and project type", *International Journal of Project Management*, vol. 33, no. 1, pp. 67-80.

Yazid, Z. 2015, "Exploring Conflict Management Using Qualitative Approach", *Gadjah Mada International Journal of Business*, vol. 17, no. 1, pp. 65-82.

Yousefi, S., Hipel, K.W. and Hegazy, T. 2010, "Attitude-based strategic negotiation for conflict management in construction projects", *Project Management Journal*, vol. 41, no. 4, pp. 99-107.

Yuying Zhang, Bo Yang and Mingzhu Liu 2012, "The influence of cultural intelligence and relationship quality on Offshore IS Outsourcing project success: From the Vendor's perspective", *Information Science and Service Science and Data Mining (ISSDM), 2012 6th International Conference on New Trends in*, pp. 568.

Zandhuis, A. and Stellingwerf, R., 2013. ISO 21500: Guidance on Project Management; a Pocket Guide. Van Haren.

Zhang, S. and He, Y., 2012, June. The Analysis of Resource Conflicts Based on Hawk and Dove Game in Multi-projects Management. In *Computational Sciences and Optimization (CSO), 2012 Fifth International Joint Conference on* (pp. 702-705). IEEE.



ProQuest Number:28289109

All rights reserved

INFORMATION TO ALL USERS

The quality of this reproduction is dependent on the quality of the copy submitted.

In the unlikely event that the author did not send a complete manuscript and there are missing pages, these will be noted. Also, if material had to be removed, a note will indicate the deletion.



ProQuest 28289109

Published by ProQuest LLC (2021). Copyright of the Dissertation is held by the Author.

All Rights Reserved.

This work is protected against unauthorized copying under Title 17, United States Code  
Microform Edition © ProQuest LLC.

ProQuest LLC  
789 East Eisenhower Parkway  
P.O. Box 1346  
Ann Arbor, MI 48106 - 1346