Organizational Justice and its Impact on Project Performance: An Explanatory Framework in the Context of the Construction Industry

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Abstract

Despite the constant improvement of project management tools and methodologies the performance of projects is decreasing. Considering the forecast that the volume of projects undertaken will roughly double by 2025 this is a considerable issue for the profession. Therefore this work focuses on the psycho-social relationships in projects, in particular organisational justice (climate) and their impact on performance in order to present an alternative approach to increase project performance and to highlight this under-researched area.

Three studies were conducted for the purpose of this work: first, a questionnaire was used to explore the relationships between organisational justice (climate) and different aspects of performance, mediated through antecedents of project performance. The questionnaire produced a final sample of 194 cases and was analysed using structural equation modelling (SEM). Second, focus groups were administered to better understand how organisational justice (climate) effects performance. A phenomenological analysis was conducted to explore the lived experience of the participants. And third, a case study was undertaken to explain how organisational justice (climate) relates to various antecedents of project performance. The case study was analysed using propositions and pattern matching.

All three studies revealed that there are significant and strong relationships between organisational justice (climate) and project performance. These relationships are complex and manifold, but it can be concluded overall that the adoption of fair principles and procedures in projects improves the project performance. Based on the triangulation of the three studies an explanatory framework was developed, which includes details on all the different aspects.

In essence, this research showed that next to tools and methodologies it is important to pay attention to the psycho-social relationships in projects in order to be able to face the upcoming challenges of the profession.

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1.4	Research objectives	The research objectives are defined.
1.5	Structure of the thesis	The structure of the thesis outlined.
1.6	Summary	A summary of the key points of the chapter is provided.

1 Introduction

1.1 Introduction

This introduction chapter provides an overview over the broader context of the research. The research problem including the research question and objectives is stated and the methods used to answer the question are briefly introduced. Finally the contribution to knowledge from a theoretical, methodological and practical point of view is explained and the structure of the thesis is outlined.

> *Compared to last year, fewer projects are being completed within budget or meeting original goals and business intent. More projects are actually failing and creating significant monetary loss for their organization (PMI, 2016, p. 2).*

1.2 Research context

One of the leading professional bodies in project management, the Project Management Institute, highlights in its latest global survey that despite all the research which has been put into project management over the last decades the performance of projects is still worsening. This is a startling finding especially when considering that it is expected that more than £ 7 trillion will be spent in 2025 on worldwide capital projects and infrastructure, up from just around £ 3 trillion in 2012 (PWC, 2014). This is supported by research conducted by another leading professional body in project management which found that only 22% of projects conducted in the UK are wholly successful and that 6% of projects are wholly unsuccessful (APM, 2015) and by a global survey focused on major construction projects which found that 53% of projects conducted in the last financial year were underperforming (KPMG, 2015).

These exemplary figures show that an improvement in the management of projects is overdue. The awareness of the high impact of projects, and therefore also the importance of project management, has been growing and became

urgent in 2007 with the global recession and is still continuing. The environment where major construction projects are undertaken has always been challenging, but it will be even more complex in the future as various paradigm shifts in demography, global economic power and urbanization will cause tremendous demand for additional infrastructure (PWC, 2014). In order to face these challenges it is viewed to be a competitive advantage to have proper project management practices in place which deliver value to the overall business (PMI, 2010). But it has been recognised recently that it is not enough anymore to focus on project management methods and techniques, it is necessary to "look beyond technical skills" (PMI, 2016, p. 2) in order to achieve a significant positive impact on the performance of projects. The methods and techniques are seen as the fundamental requirements which need to be in place in order to deliver a project, but it is emphasised that leadership, and strategic and business management skills are necessary in order to overcome the shortcomings in projects (ibid). This focus on the social relationships in projects is also supported by a study, which found out that 82% of clients expect more collaboration in projects over the next five years (KPMG, 2015).

Therefore this study addresses the relational and psycho-social aspects in projects in order to propose an alternative approach to improve the poor performance of construction projects. One aspect of relational and psycho-social aspects in projects this work focusses on is organizational justice, which is defined as the perception of fairness in organizations. Previous research on organizational justice in permanent organizations has shown that the adoption of fair principles and procedures has positive impact on employees and organizations, e.g. organizational citizenship behaviour, outcome and performance satisfaction, role performance as well as trust or commitment (Cohen-Charash and Spector, 2001; Colquitt et al., 2001; Viswesvaran and Ones, 2002). These benefits are also potentially beneficial for the performance improvement of projects and hence, the impact of organizational justice on project performance shall be investigated with this work.

The perception of fairness in organizations is based on the theory of organizational justice which was developed by Greenberg (1987). Organizational

justice refers to how individuals in organizations perceive fair treatment by their supervisor or manager and it is generally divided into three dimensions:

1) Distributive justice, which is concerned with the fair distribution of outcomes,
2) Procedural justice, which is concerned with the procedures which are used for decision making, and
3) Interactional justice, which is concerned with the communication of outcomes and procedures.

But organizational justice is not only perceived on an individual level. Research has shown, that also the treatment of the whole team influences the individual's perception of fairness. This team perspective is referred to as organizational justice climate (Li and Cropanzano, 2009) and it is also divided into the three dimensions highlighted above. For the purpose of this thesis the term 'organizational justice (climate)' will be used to refer to both concepts and the individual terms to refer to each concept separately.

Hence, this work intends to introduce organizational justice into the project environment, to investigate its potential influence to improve the performance of projects and raise the awareness of the importance of psycho-social aspects.

1.3 Problem statement and research question

Based on these remarks the central problem of this research is to investigate how the adoption of fair principles and procedures in projects can contribute to an improved project performance. The following research question was developed:

> **How do the three dimensions of organizational justice and organizational justice climate influence construction project performance?**

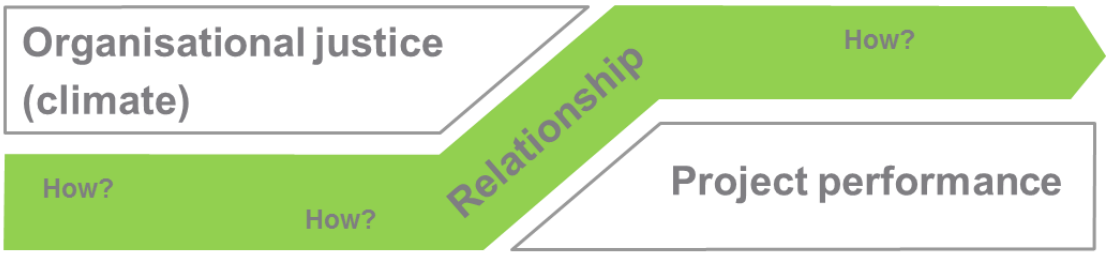

Figure 1.1 – Research question

1.4 Research objectives

The aim of this research project is to develop an explanatory framework for the explanation of the relationship of organizational justice (climate) and construction project performance. To achieve this aim the following objectives have been derived:

1. To synthesize the literature of organizational justice and construction project management in order to develop a sound theoretical justification of the research.
2. To identify the influence of organizational justice (climate) on different aspects of construction project performance in order to highlight the potentially positive impact on performance.
3. To explore the mediating effect of antecedents of project performance on the identified relationships between organizational justice (climate) and construction project performance in order to investigate these relationships in more detail.
4. To obtain an understanding of how organizational justice influences the performance of construction projects in order to explain the previously identified relationships.
5. To propose an explanatory framework which explains organizational justice (climate), antecedents of project performance and the different aspects of construction project performance in order to summarise and visualise the findings.

1.5 Structure of the thesis

A holistic overview of the systematic and methodical way this research was conducted is shown below. The research is driven by the research question and the research objectives. A mixed methods research approach is applied to collect and analyse the data in order to answer the research objectives and to obtain the conceptual as well as the explanatory framework as the main outputs of this work. This thesis is divided into eight chapters of which the salient points will be highlighted in the following and illustrated in figure 1.2:

Chapter 1 - Introduction

The current chapter introduces the field of research, states the research questions and defines the aim and objectives of this study.

Chapter 2 – Literature review

The second chapter provides an overview about the current state of the construction project management literature, shows the need for more research regarding the social relationships in projects and introduces the theory of organizational justice (climate). For this purpose the characteristics and structure of the construction supply chain and the different roles in the project team are analysed. The different aspects of performance of construction projects are discussed and related to their antecedents and potentially negative outcomes as well as conflicts. The social relationships in projects are evaluated and provide a link to the organizational justice theory. The development including various theories, models and trends of organizational justice are explained and their benefits and prerequisites are highlighted. Additionally a multi-level perspective is adopted in order to introduce the idea of organizational justice climate. And finally the conceptual model which links the two concepts of construction project performance and organizational justice is developed.

Chapter 3 – Research methodology

The third chapter discusses the methodological approach of this work including the research philosophy, design and data collection and analysis methods. For this purpose the philosophical considerations regarding ontology, epistemology,

axiology, rhetoric, and methodology are discussed and a philosophical research framework is developed. The reasoning, i.e. the way to draw conclusions from the research, is also discussed regarding its different approaches and the quantitative, qualitative and multiple-methods research designs are reviewed. Finally the research strategies as the links between the philosophy and the research methods are explained and the time horizon is defined.

Chapter 4 – Research methods

The fourth chapter presents the research methods which are adopted for this work. The way of conducting a systematic literature review is briefly introduced. Then the data collection and analysis for the questionnaire is discussed in detail and all necessary information for the structural equation modelling is provided. The important points for the data collection and analysis for the focus groups as well as for the case study are highlighted and discussed.

Chapter 5 – Primary findings

The fifth chapter is dedicated to the findings of the primary data collection, i.e. the questionnaire. For this purpose the administration of the questionnaire is described and the descriptive statistics of the data are presented. The measurement model and the structural model are tested in the next steps and the parameter estimates are identified.

Chapter 6 – Supplementary findings

The sixth chapter presents the findings of the supplementary data collection, i.e. the focus groups and the case study. The administration of the focus groups is explained, findings are introduced and the different themes are shown in detail. Furthermore the administration of the case study is presented, including the description of the case and the findings.

Chapter 7 - Discussion

In the seventh chapter the findings are discussed and set into context. This includes a triangulation of the findings from the three different studies conducted in this research and a contextualisation with the main models in organizational justice theory. Finally an explanatory framework is proposed.

Chapter 8 – Conclusion

The eighth chapter concludes this work and provides a summary of all the work undertaken. Furthermore the contribution to the body knowledge is explained and limitations as well as areas of future research are highlighted.

1.6 Summary

This introduction chapter presented the context of the research, which is the poor performance of projects and at the same time the expected increased spending on projects. It was explained that an alternative approach to performance improvement is necessary by focusing on the relational and psycho-social aspects of projects, in particular on organizational justice. Based on these considerations the research question was developed which aims to investigate how the three dimensions of organizational justice and organizational justice climate influence the performance of construction projects. The objectives of the study were highlighted as well.

In addition the structure of the thesis was introduced. The thesis will be divided into eight chapters, i.e. introduction, literature review, research methodology, research method, findings of core data collection, supplementary findings, discussion and conclusion.

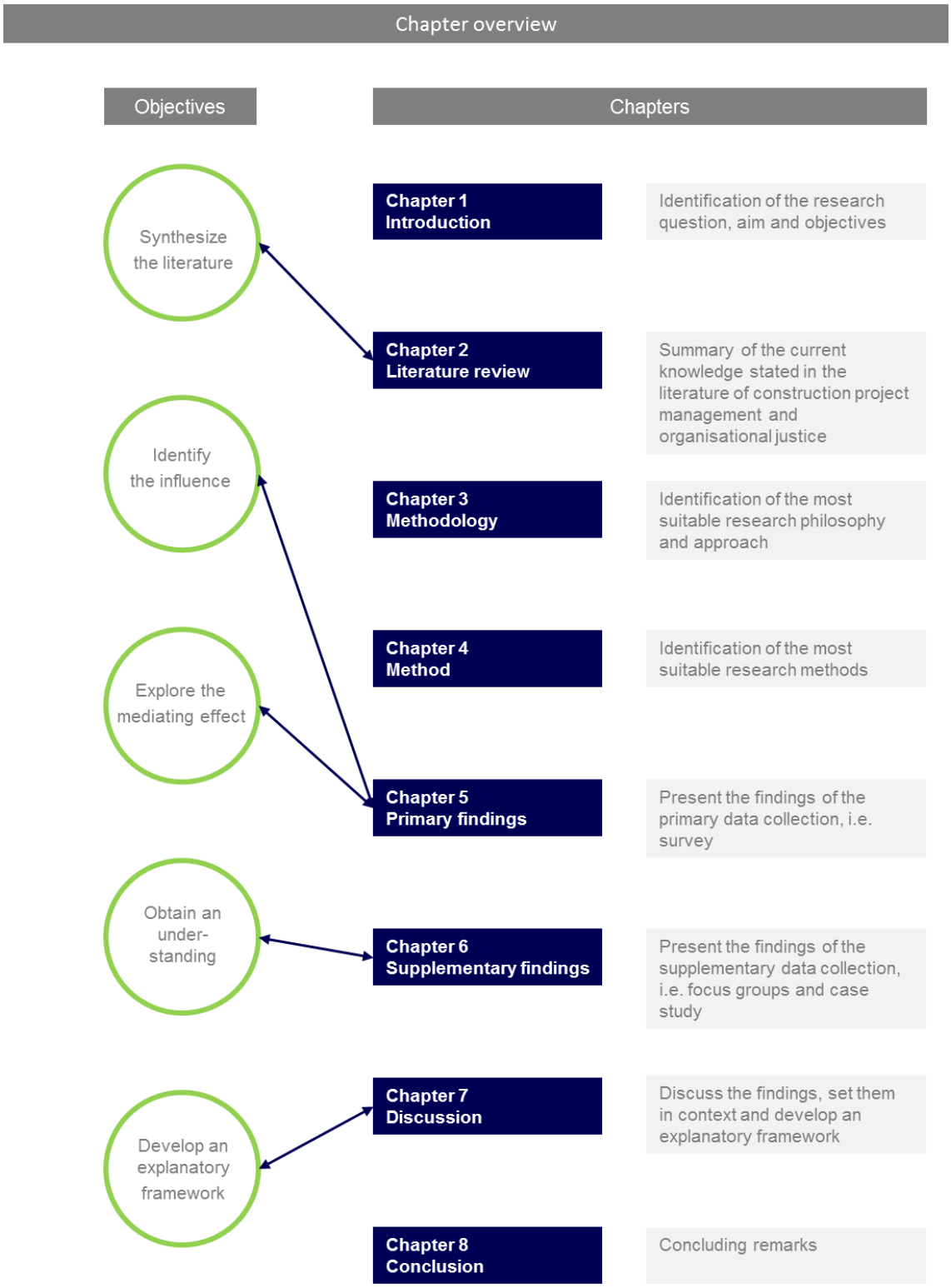

Figure 1.2 – Chapter overview

2 Literature review

2.1	Introduction	The purpose, the context and the fields of the subsequent literature review are explained.
2.2	Structure of the construction industry	An overview over the structure of the construction industry including an evaluation of its fragmentation and competitiveness is given.
2.3	Construction supply chain	The characteristics and the structure of the construction supply chain are analysed, the different roles in the construction project team are defined and the organisation and complexity of projects is evaluated.
2.4	Project performance	It is defined how construction project performance is measured, which issues influence the performance negatively and how conflict and dispute are handled in construction projects.
2.5	Construction and project management theories	An overview over the current construction and project management theories is given.
2.6	Social relationships in the construction supply chain	The boundaries in construction projects and temporary multi-organisations are evaluated, the importance of cooperation and collaboration is elaborated next to the special role of trust.
2.7	Organisational justice	The history and development of organisational justice is briefly outlined, theories and models as well as current trends in this field of research are explained and the benefits as well as the prerequisites of organisational justice are analysed.
2.8	Organisational justice from a multilevel perspective	Organisational justice is discussed from the team perspective as organisational justice climate, from the peer perspective as peer justice and also in the context of the supply chain.
2.9	Development of a conceptual framework	A conceptual framework of organisational justice, organisational justice climate and construction project performance.
2.10	Summary	A summary of the key points of the chapter is provided.

2 Literature review

2.1 Introduction

The literature review undertaken for this work is based on two fields of expertise: the construction project management literature and the organizational justice literature.

In general the current state of research is documented in research journals, which are used as the basis for the literature review undertaken. According to international rankings (e.g. ABS, 2015) the journals are categorized into five categories: from 4*, which are the very best journals, to 4 to 3 to 2 to 1, which are the lowest rated journals. In an effort to establish a high quality data basis of the literature review the quality of the journals cited is considered appropriately depending on the field of expertise.

On the one hand the construction project management literature is mainly published in specialised research journals which are only concerned with construction management in the broadest sense. It is attempted to use mainly high quality papers from internationally renowned peer reviewed journals, but in particular cases it is necessary to come back to lower quality journals as no other resources are available. To round up the construction project management literature review specialised books are sporadically consulted, especially for definitions.

The construction project management expertise relevant for this work is firstly concerned with the structure of the construction industry and its supply chain. In this context amongst others the strengths and weaknesses of the construction process, the roles in construction teams and the complexity of projects are discussed. Second, the project performance with an analysis of project success criteria and dysfunctionalities and the social relationships within the supply chain are evaluated. And third, the current trends in construction management and the underlying theories are discussed.

On the other hand the organizational justice literature is partly published in specialised research journals which are focused on social or organizational psychology and partly in general business journals. The organizational justice literature is mainly published in very high quality and internationally renowned peer reviewed journals. To complete the organizational justice literature review specialised books are also consulted on rare occasions.

The organizational justice expertise relevant for this work discusses the development and the dimensions of organizational justice including current trends, benefits and prerequisites. Additionally the multilevel perspective of organizational justice including organizational justice in the supply chain and organizational justice climate is evaluated.

The literature review closes with the development of a conceptual framework which connects the two fields of expertise and forms the basis for the research conducted in the work at hand. The structure of the literature review is also displayed in Figure 2.1.

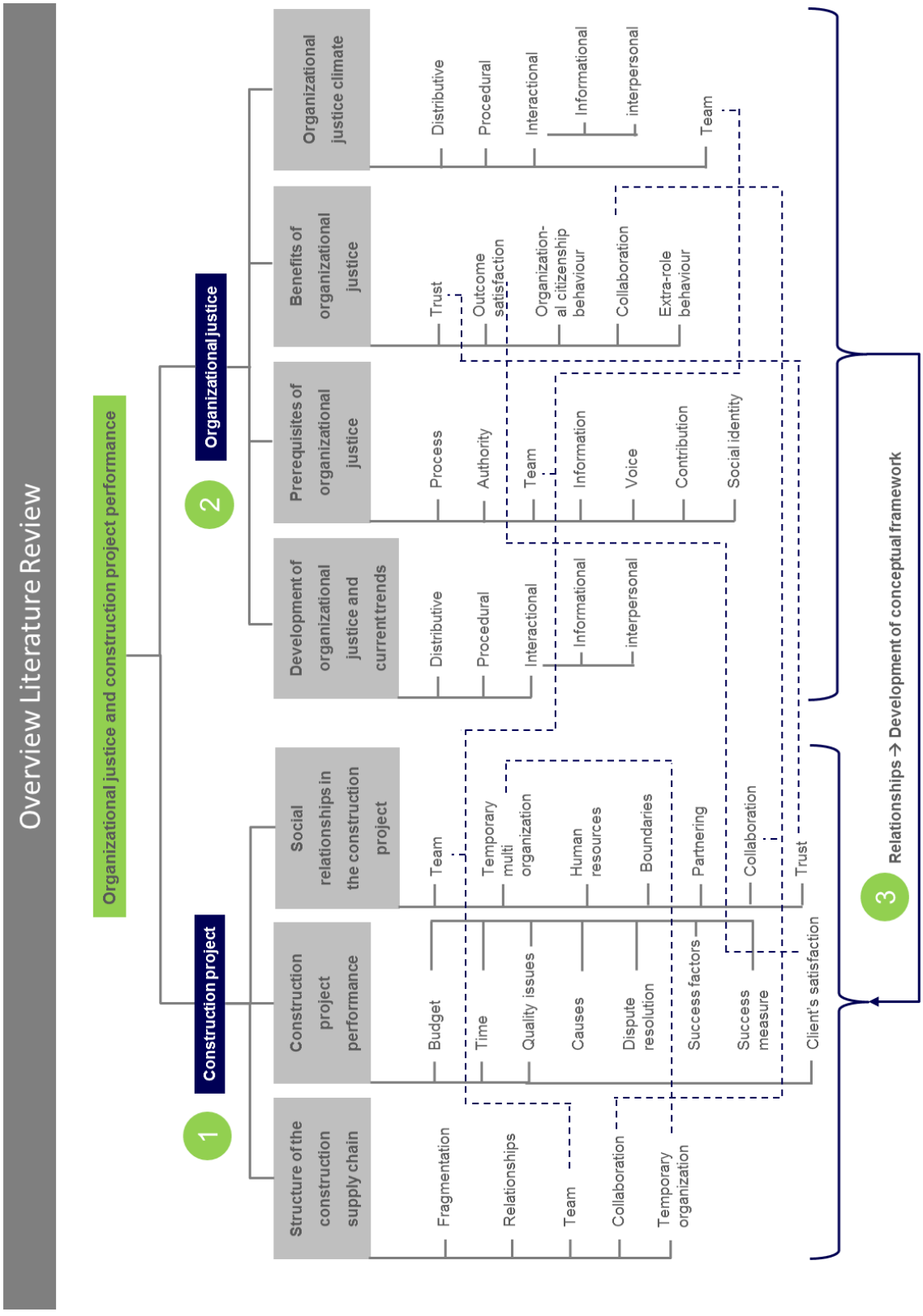

Figure 2.1 – Overview literature review

2.2 Structure of the construction industry

The construction industry is in many countries one of the most important industries regarding its contribution to the GDP and the number of people employed (GCP, 2016). Within the construction industry work, including general and special trade construction for building and civil engineering works from new work, repair, additions and alterations, to the erection of prefabricated buildings and temporary constructions, is undertaken (United Nations, 2008).

The industry is based on one of the oldest disciplines of humanity (Ritz, 1994) and it is regarded as important to know its development in order to understand its current situation. Not much documentation of early project structures and procurement processes exists. However, it is assumed that an administrative and management structure was implemented already in the 1500s for monarchical and clerical projects and in the 1600s and 1700s also for projects for aristocratic clients (Bowley, 1966). Likewise the differentiation between architects and engineers as well as between various surveying functions and craftsmen began in the 1700s. In the 1800s the first forms of general contracting as well as design and build contracting were established (Cooper et al., 2005) whereas in the early 1900s the hierarchy architect – surveyor/engineer – builder was the only respectable form of organization (Bowley, 1966). From the beginning of the 19th century till today many different forms of alternative procurement have been in use. Nowadays it is argued that there is no standard project process in construction anymore and that there is no clear definition of roles and responsibilities of the participants within the process (Cooper et al., 2005). These predispositions make it especially difficult to analyse the structure as well as the opportunities and weaknesses of the industry.

For several years now there has been a general tendency that the construction industry is criticised for its low performance and inefficiency (e.g. Atkin et al., 2003; Doloi, 2013; Egan, 1998; Latham, 1994; Meng, 2012). An analysis of the attributes of the industry points out that the difficulties of the industry can be summarized under five topics (Morledge et al., 2009):

- Fragmentation
- Adversarial relationship
- Project uniqueness
- Separation of design and production
- Competitive tendering

Cooper et al. (2005 p. 1) share this view and specify the main reasons for the weak performance as follows: “fragmented nature of the industry, the lack of co-ordination and communication between parties, the informal and unstructured learning process, adversarial contractual relationships and the lack of customer focus.” Further Alshawi and Faraj (2002, p. 33) describe that currently “many practitioners, including designers, engineers and suppliers, are involved in one-of-a-kind projects that require a tremendous level of co-ordination.”

The general economic situation is crucial for the development and growth of the industry, but the economic cycles of the recent years and decades have made the industry struggle and concentrate more on survival rather than innovation (Egan, 1998; Farmer, 2016). Therefore the traditional building process with a group of architects and engineers designing the project and a group of contractors building the project is still common (Cooper et al., 2005). The construction group is often dominated by the main contractors who have adopted subcontracting as the principal approach due to the economic uncertainties regarding the future (Cox and Townsend, 1997) or due to the attempt to minimise production cost by using the efficiencies of specialisation and economies of scale (Winch, 2010). The design and construction groups often do not work together and therefore have increased the fragmentation and adversarial relationships within the industry (Moshini and Davidson, 1992). The growing assignment of subcontractors leads to a high number of contractual relationships at lower average values and unavoidably higher levels of opportunism, especially regarding low barriers of entry (Broft et al., 2016; Morledge et al., 2009; Tennant and Fernie, 2014). Additionally the contractual relationships are affected by the effort of all parties to minimise their own risk and to transfer it to contracting parties which leads to an industry structure with various interfaces, potential of

conflicts and presumably to cost increase and inefficiency (Cox and Townsend, 1997). Cox and Townsend (1997 p. 149) describe the structure of the industry as illustrated in Figure 2.2:

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Figure 2.2 – Existing industry structure
(Cox and Townsend, 1997, p. 149)

This industry is based on one-of-a-kind products which differ in their degree of uniqueness (Ball, 1988; Morledge et al., 2009). The range varies from commodity projects which can be performed by almost every professional firm to highly specialised services which can only be executed by qualified and experienced businesses (Cox and Ireland, 2002). Due to different requirements regarding technology and knowledge, construction projects are often tailor-made (Morledge et al., 2009) and their procurement strategies range from purely price-based to highly interdependent relationships (Cox and Ireland, 2002). These procurement strategies also influence the separation or integration of design and construction. It is a characteristic of the industry that these two important parts of the process are separated which leads to another form of fragmentation within the industry. This fragmentation has been criticised widely e.g. by Latham (1994)

or Egan (1998) because it leads to inefficiencies, lack of knowledge and a contractual and confrontational culture.

In addition the separation of design and construction is reinforced by the traditional competitive tendering with the design-bid-build approach. This low-bid-wins-approach is by far the most dominant method adopted which supports a number of adverse outcomes like lowest cost rather than best value, opportunism or failure and aversion to cooperate (Morledge et al., 2009).

It is argued by Hanák and Muchová (2015) that this approach of competitive tendering makes the construction industry itself one of the most competitive industries with low barriers of entry and a scattered structure. However, the structure of the industry is complex and so is also its input structure. It would be an oversimplification to reduce the structural problems of the industry to the approach of competitive tendering but nevertheless the different input types are worth a closer look to gain a better understanding of the relationships within the industry. Primary inputs are defined as constituting value added by construction through the two inputs of labour and capital (Lowe, 2011). The intermediate inputs are represented by seven groups (Lowe, 2011, p. 233):

- *Materials and components:* This covers the main raw materials and manufactured components used in the construction of buildings and works.
- *Industrial self-input:* This covers inputs to construction from construction itself. Most of this is accounted for by subcontracting.
- *Professional consultancy:* This covers for architectural, planning, surveying and professional engineering consultancies.
- *Plant and equipment:* This covers vehicles and plant use in construction.
- *Real estate:* This will include payments to companies who own and deal in real estate.
- *Transport and other services:* This will cover transport services plus distribution of materials, communication, hotels and restaurants, banking and finance etc.

- *Energy and other supplies:* This includes the purchase of consumable supplies by construction including energy used on the site and in contractors' offices.

These intermediate inputs vary highly in their degree of concentration and competition. The construction industry itself is very much dependent on inputs from some of the most concentrated sectors within the economy as well as from sectors with low concentration (McCloughan, 2004). Although this leads altogether to a balanced competitive industry, the degree of competition of each input type or group influences the appearance of adverse outcomes like late completion, overspends on client budgets or defects (Morledge et al., 2009). Because of this expansive impact the characteristics and the structure of the construction supply chain will be ascertained in more detail.

2.3 Construction supply chain

2.3.1 Characteristics of the supply chain

The input structures as well as the above described characteristics of the industry highly influence the supply chain of the construction industry. There exists a wide variance of definitions of the term supply chain and especially in the construction literature there is a high degree of definitional vagueness and a low degree of maturity (Gosling et al., 2012; Green, 2006). Christopher (1992, p. 15) defines supply chain in general as:

"The network of organizations that are involved through upstream and downstream linkages, in the different processes and activities that produce value in the form of products and services in the hands of the ultimate customer."

London and Kenley (1999, cited in London, 2002, p. 191) suggest the following working definition for construction supply chain procurement:

"Supply chain procurement is the strategic identification, creation and management of critical project supply chains and the key resources, within the

contextual fabric of the construction supply and demand system, to achieve value for clients."

And Winch (2002, p. 165) defines the construction supply chain as *"the set of firms engaged in external transactions commencing with a principal contractor and terminating when external transactions switch to internal ones in the employment relationship."*

The definition by Winch (2002) is based on Christopher`s (1992) and adapted to the specific situation in the construction industry. Based on these definitions common attributes of the supply chain are that it is viewed as a value creating network which is based on external transactions in the context of a construction project. These attributes serve as a basis for the subsequent examinations of the characteristics of the construction supply chain.

The construction supply chain is characterised as being traditionally unmanaged, complex and temporary. As mentioned above it is highly fragmented with a short-term focus, adversarial relationships, emphasis on low price rather than added value and little interest in sharing risks (Morledge et al., 2009). There is a multitude of supply chains within the construction supply chain and each of these supply chains has different properties regarding the supply and demand as well as regarding commerce and operation which need to be understood and the relationships which need to be managed correspondingly (Cox and Ireland, 2006). According to a general maturity model of supply chains these characteristics define a supply chain which is on the 'ad-hoc' level (Lockamy and McCormack, 2004). The 'ad-hoc' level is the most basic level with unstructured and ill-defined processes, unpredictable process performance, high costs, low customer satisfaction and low functional cooperation. Morledge et al. (2009) argue that a supply chain at this level is unlikely to maximize value for the involved parties. On the contrary it is necessary to develop the construction supply chain further to the 'extended' level where competition takes place amongst supply chains and not amongst single firms (Lockamy and McCormack, 2004). But the development from the basic 'ad-hoc' level to the 'extended' most mature level contains three more stages in between, which the construction

supply chain needs to go through. These stages differ in the degree of predictability, capability, control, effectiveness and efficiency which is displayed in Figure 2.3.

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Figure 2.3 – Supply chain management maturity model
(Lockamy and McCormack, 2004, p. 276)

But this is still a far way to go for the construction industry. Therefore, to enhance the integration within the construction supply chain various research has been undertaken. Nicolini et al. (2001) e.g. suggest using clusters to support concurrency and collaboration within the supply chain. Cooper et al. (2005) developed the Generic Design and Construction Process Protocol by adopting

the new development process in manufacturing to the construction process, Winch (2001) explored the application of the transaction cost economics to construction supply chains and Meng et al. (2011) developed a maturity model for construction supply chain relationships to measure and achieve relationship improvements. But so far the construction supply chains are still regarded to be predominantly on the most basic level and further research especially in the field of identification and exploration of the essential social, economic, technical, political and legal environment of supply chains and its influence on the supply chain actors as well as the impact of strategic supply chain procurement is necessary (London, 2008). This is underpinned by the fact that there is still - especially from the subcontractors' perspective - a general mistrust regarding supply chain alliances as well as a lack of belief that there are mutual benefits from such alliances (Dainty et al., 2001). Furthermore the biggest barriers for a successful implementation of supply chain management in construction are from a contractor`s perspective, the missing commitment of top management, the poor understanding of the supply chain concept and the absence of appropriate organizational structures (Akintoye et al., 2000).

Based on the considerations above it can be concluded that the construction supply chain is still under development until it reaches a state of full integration and cooperation. Even a common generic understanding of the term construction supply chain has not been achieved so far. Therefore it is still not unambiguously clear what the construction supply chain really is and further research – especially in the field of the social environment – needs to be undertaken to clarify the relationships within the construction supply chain. This social environment will be analysed in greater detail in this work which contributes to a more holistic understanding of the construction supply chain.

2.3.2 Structure of the supply chain

The social environment of the supply chain is highly affected by the structure of the supply chain. The structure as well as the numbers of construction supply chains depend on the procurement method and therefore vary extremely from project to project.

London (2008) points out that each construction supply chain is based on a chain of contractual relationships of firms responding to one construction project. This contractual chain consists of firms which deliver services or goods (= commodities) along the chain. According to London (2008, p. 190) any construction supply chain:

- forms in response to a construction project which has particular characteristics,
- has firms with various qualities which provide commodities that may or may not be homogenous and that reside within different types of markets, and
- has firms that are linked through relationships that have certain attributes.

These elements or characteristics of a construction supply chain complement the previous definition by Winch (2002) and emphasise the complex and often temporary nature of construction supply chains. For a better understanding, a generic construction supply chain model was developed by London (2002) which is shown in Figure 2.4:

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Figure 2.4 – Construction industry supply chains
(London, 2002, p. 192)

The structure of a supply chain can be characterised by its entities which are project features, firms, the firms' commodities and the firms' market structure as

well as elements of firm – firm relationships (London, 2008). Due to the multiplicity of projects, firms, commodities, markets and relationships and the complex and fragmented nature of the industry with its various procurement models the construction supply chain is considered as being the future driver for innovation and value creation (Pryke, 2009).

Meng (2012) suggests distinguishing between three distinct forms of supply chains in construction:

- Traditionally adversarial relationships which are characterised by a focus on win-lose, mutual distrust, suppression or manipulation of information, one-sided risk allocation, confrontation, meagre communication and insufficient problem solving or even problem escalation (Larson, 1997; Thomas and Thomas, 2005).
- Short-term collaborative relationships, also project partnering, which are focused on collaboration for a single project (Bennett and Jayes, 1995) and
- Long-term collaborative relationships, also strategic partnering, which are focused on collaboration for multiple projects (Bennett and Jayes, 1995).

The differentiation of supply chains regarding their relationships draws special attention to social settings within the construction supply chain and its impact on the project. The social settings are affected by members and roles in the construction project team and their generic responsibilities.

2.3.3 Roles in the construction project team

The construction supply chain involves a large number of key participants which usually form the construction project team. Key participants are e.g. the project client, consultants, the main contractor, specialist contractors and various suppliers (Meng, 2012). In a general construction supply chain the client is regarded as being the end customer, whereas the main contractor is regarded as supplier of the client as well as customer of the specialist contractors. The end suppliers usually provide labour, materials and equipment (Meng, 2012). The

client – main contractor relationship is regarded as most important relationship in the construction supply chain (Cox and Ireland, 2002).

In a construction project team there are different responsibilities dedicated to the roles within a team. These roles and responsibilities can vary depending on the project organization therefore no standard definition is available as they rather develop endogenously (Cooper et al., 2005; Georg and Tryggestad, 2009). However there are core roles and responsibilities for which a common understanding exists and which set the initial position for the collaboration within a construction project team. This generic understanding is important to comprehend the relationships within the team:

The client or end customer is often not just one person but a complex system of interest groups within one organization which might even be in conflict (Cherns and Bryant, 1984). These differing interests within the client organization can critically influence a project`s performance (ibid). Therefore the client has to take part actively in the construction process with the following responsibilities (Winch, 2010, p. 417):

- Promoter – defining the need for the project and ensuring that it meets the need;
- Financier – obtaining the capital required to finance the project;
- Decision-maker – making those decisions required to push the project through the life cycle;
- Recruiter – mobilising the most appropriate and capable firms to realise the project.

Often the client is not willing or not capable to fulfil these responsibilities and therefore assigns external specialists as “executive project managers” (Winch, 2010, p. 417) to help and manage the client. Due to increasing pressure for accountability in clients’ organizations two new roles emerged in recent years: the project sponsor as the interface between the client organization and the project organization, and the project board to direct the project (Winch, 2010).

Amongst others it belongs to the project board`s responsibilities to ensure the successful completion of the project, to provide a general direction and leadership to the project and to make the necessary decisions.

In addition the client authorizes external specialists as consultants to provide in-depth knowledge to the project. These external specialists are e.g. project managers, construction managers, architects, engineers or surveyors. The construction and project management often has a hybrid role within the project by acting as a mediator having qualitative effects on the project on the one hand and by acting as an arbitrator merely forwarding the concerns of others but not intervening in the project on the other hand (Georg and Tryggestad, 2009). In general the construction and project management`s role is to ensure that the client`s predefined needs are met by managing relationships (ibid). The architects and engineers are in general responsible for designing the building and for ensuring that their holistic design concept meets the project and client requirements (Cornick and Mather, 1999).

Subcontractors are usually specialist trade contractors which are experts in the production of specific construction elements and are even often consigned with the detailed design of these elements (Cornick and Mather, 1999). The role and influence of subcontractors in the construction supply chain as well as in the construction project team has largely been disregarded and not much attention has been paid to them within literature (Bemelmans et al., 2012; Dainty et al., 2001).

The role of the suppliers within the construction project team and supply chain is also often underestimated or not considered. But a closer view points out that the supplier`s role within the team and the supply chain can be crucial for the project success. Especially when they are involved in the process at an early design stage they are able to recommend new and better products and therefore improve the design and construction process which leads almost certainly to reduced costs (Agapiou et al., 1998). Depending on their size and the goods they produce, materials and component manufacturers either sell directly to the customer, or interconnect via a specialist stockist or a builders' merchant (ibid).

As a builders' merchant the supplier's major role is often described as the industry's bank because they also act as a channel for credit to the construction industry (ibid).

In summary the key participants of the construction project team are the client, the consultants, the main and subcontractors as well as the suppliers. Their roles and responsibilities are defined in general above but, as mentioned previously, they may vary from project to project depending on the project organization and the structure of the supply chain. However they can only perform as a successful and effective team when there is a social contract that binds them to a common purpose and attitude and a mutual liability for their performance, otherwise they do not act as a team but merely as a workgroup (Anvuur et al., 2012). This widely acknowledged definition emphasises once more the importance of social relationships within the construction project team and its potential impact on the project success as teams are characterized as being effective when they are prosperous in reaching their task-related objectives (Kumaraswamy and Rahman, 2006). The construction project team usually does not work in isolation, it is rather influenced by its social, economic and political environment and various determining factors, on which basis the project organization is formed.

2.3.4 Project organization and complexity

The project organization is characterized by the above described construction project team or workgroup which can differ in every project. The construction project team or workgroup is a complex and temporary organization which is only set up for the purpose of developing a single building or construction work. Therefore the term project team or workgroup may be even misleading and it is better defined as temporary multi-organization (TMO) as its members do not only differ in their roles and responsibilities but also in their affiliation to different firms (Cherns and Bryant, 1984). Nevertheless in construction project management research the terms construction project team and TMO are often used interchangeably as they both refer to the same participants.

Key indicators for complex project settings are, amongst others, the quantity of custom-made components and sub-systems and the degree of technological novelty or uniqueness (Hobday, 1998). Many large construction projects can therefore be categorised as high cost, complex products and systems (CoPS) whose natural form of organization is project-based and multi-firm. This is underpinned by the more recently identified dimensions of complexity: structural complexity, uncertainty, dynamic, pace and socio-political complexity (Geraldi et al., 2011), which suggest as well that large scale construction projects should be categorised as complex projects. There is still a lack of research in the field of management of CoPSs and especially in its distinct features compared to mass produced commodities regarding coordination and project management (Geraldi et al., 2011; Hobday, 1998).

Complex organizations like TMOs and CoPSs can be described by their number of participants or sub-organizations and their complexity can be measured in four dimensions: horizontal (number of organizations), spatial (number of geographical locations), temporal (duration) and vertical (number of levels in hierarchy) (Fellows and Liu, 2012). These dimensions of complexity reflect the dimensions of fragmentation of the construction industry and therefore the boundaries which need to be managed in a project.

The management of boundaries within construction project teams needs special attention as the temporary character of the team as well as its independent members lead to deviating behaviours of the members compared to conventional organizational theory (Shirazi et al., 1996). Due to the social nature of services, construction projects are intrinsically social and therefore the social relationships in projects are just as important as all other complementary approaches as the success of projects also depends on relationships within the project as well as the wider social environment (Pryke and Smyth, 2006b).

This environment of a project is a crucial factor which influences amongst others the behaviour, knowledge and goals of all project team members. The positioning in the pre-project phase, experiences from the past, events during the project execution phase, norms, values and routines within the project`s organization

and visions for the future after project completion are contingency factors which highly influence the processes and boundaries of a project and make its organization even more complex (Engwall, 2003).

This temporary and complex organization of construction projects is still an open field of research which is proven once more by the fact that especially the highly important social relationships and boundaries have just in recent years found their way into construction project management research. It is their impact on project performance which makes them interesting for researchers as the construction industry has been widely criticised for its low performance for many years. Because of that project success, its measurement and its adverse outcomes will be appraised in the next section followed by the detailed review on social relationships within construction projects.

2.4 Project performance

2.4.1 Construction project performance

Project performance is traditionally measured with the three criteria of cost, time and quality which are considered to be the iron triangle of projects (Jha and Iyer, 2007; Winch, 2010). The performance of cost and time is usually measured by the percentage deviation from the initial plan whereas the performance of quality is usually measured regarding the compliance with contractual agreements and technical standards (Tabish and Jha, 2012). The limitation of project performance to the criteria of cost, time and quality is sometimes considered to be inadequate as the different stakeholders might have different interests in the project and therefore different performance criteria (Winch, 2010). Hence a complementary way to measure project performance is to quantify the client's satisfaction or expand it even to the participants' satisfaction (Lehtiranta et al., 2012). These intangible criteria which focus on perceptions and attitudes are regarded as a valuable enhancement of project performance measurement although they are still at an initial stage of development.

The project performance is influenced by so called critical success factors which are in general defined as the “few key areas of activity in which favourable results are absolutely necessary for a particular manager to reach his or her goals” (Rockart, 1982, p. 4). For construction, 43 critical success factors have been identified based on an intense literature review and a conceptual framework with five main categories has been developed (Chan et al., 2004). These critical success factors shall be viewed as antecedents for project performance for this work in the following chapters. They are displayed in Figure 2.5.

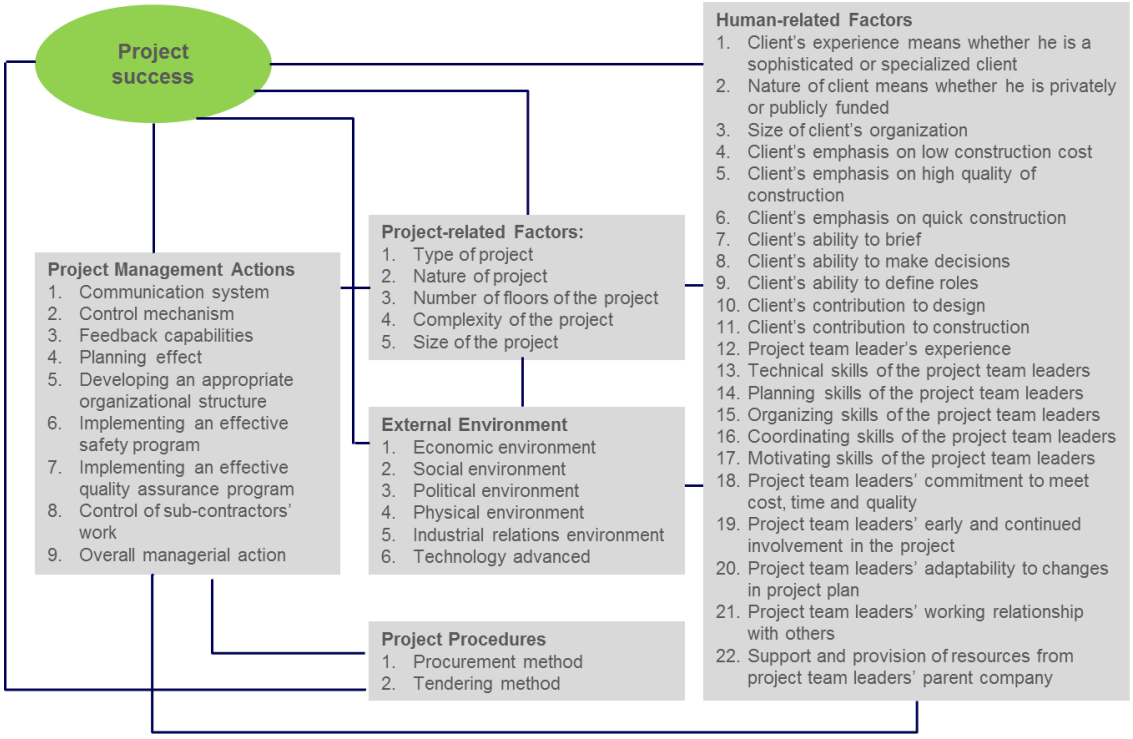

Figure 2.5 – New conceptual framework for factors affecting project success
(Chan et al., 2004, p. 154; Permission to reproduce this has been granted by ASCE)

It is stated by Chan et al. (2004, p. 155) that “project success is a function of project-related factors, project procedures, project management actions, human-related factors and external environment and they are interrelated and intrarelated.” This means that all five factors are essential for project performance and none of them can guarantee it on its own. Nonetheless on closer examination it is visible that more than half of the antecedents of project performance in construction are human-related factors. This is underpinned by a more recent study which identifies that human-related factors play a crucial role in the project

performance followed by management actions (Tabish and Jha, 2012). Especially the three components of coordination, commitment and competence are viewed to be the key factors for successful projects (Jha and Iyer, 2007). This relates to the coordination amongst the project team members as well as to external stakeholders primarily regarding the criterion of cost, whereas the commitment of all participants is particularly decisive regarding the criterion of time. However the project manager's as well as the owner's competence appears to be especially important regarding the criterion of quality.

Construction project performance is the variable on which every intervention on the construction process is measured and there are various reasons and drivers for dysfunctionalities during the construction process which hinder the maximum performance of a construction project.

2.4.2 Cost overruns, delays and defects in construction

As cost, time and quality are, next to client's satisfaction, the key performance criteria for construction projects, these criteria and especially their potentially negative drivers will be analysed in more detail in the following.

Project cost performance and its influencing factors have been intensely researched in the last 20 years (Doloi, 2013, p. 270f for an extensive review). Within this past research primary factors to influence project costs were project related, contract related, project management team related, quality related, planning related, market related or contractor related. In contrast the latest research shows that the most significant factors for the overall project cost performance are (Doloi, 2013, p. 278):

- Accurate project planning and monitoring
- Design efficiency
- Effective site management
- Communication
- Contractor's efficiency
- Project characteristics

- Due diligence
- Market competition

These factors preponderate the above mentioned more traditional factors such as project size, type or complexity (Akintoye, 2000) and show that there is a shift from hard to soft or rather social factors like communication and effective site management which are consistent with the coordination factor explicated above (Jha and Iyer, 2007).

This shift is also observable regarding the causes of delay in construction projects as poor communication and coordination with other parties, poor site management and supervision, slowness in decision making as well as unreliable subcontractors are amongst the current 15 most important factors causing delays in construction (Gündüz et al., 2013) which is again at least in parts concurrent with the commitment factor mentioned above (Jha and Iyer, 2007).

Research on causes of defects in construction has proven that these are complex and again heavily related to the human or rather social factors like communication and managerial qualities which are referred to as the two most important ones (Aljassmi and Han, 2013; Atkinson, 1999). The competence factor (Jha and Iyer, 2007) is in this case a logical amendment to the specified factors.

Client satisfaction in turn is, amongst other factors, influenced by the compliance to the client's expectations regarding the constructed facility and the construction process (Lehtiranta et al., 2012). It is therefore more about subjective factors which are measured on the basis of comparisons between the quality of the constructed facility, the client's expectations, the adjusted goals for the project and the client's experiences (Kaernae, 2004).

The brief literature review on potentially negative drivers of the project performance criteria in construction has shown that in recent years the awareness of the importance of the social factors within the construction project

team and their impact on the construction project has grown. One reason for that is presumably that the industry has been criticised intensely for its adversarial relationships which cause conflict and dispute throughout the construction process.

2.4.3 Conflict and dispute

Due to this criticism conflict and dispute have been explored regarding their impact on construction performance. Conflict is regarded as being unavoidable in situations where human relationships are dominant (Rhys Jones, 1994) and where there is an inconsistency of interests or objectives (Fenn et al., 1997). It can be managed constructively and thereby it can produce beneficial outcomes like improvement in design or construction methods. Dispute in turn arises when a potential conflict topic is rejected and this rejection is not accepted (Eggleston, 2001). Fenn et al. (1997) developed a construction conflict continuum to illustrate the intersection of conflict and dispute in construction (Figure 2.6).

Figure 2.6 – Conflict continuum
(Fenn et al., 1997, p. 514)

Based on this construction conflict continuum it was attempted to identify the sources of dispute on the basis of the intensive research which has been undertaken (e.g. Bristow, 1995; Diekmann and Girard, 1995; Ilter, 2012; Kumaraswamy, 1997; Molenaar et al., 2000; Rhys Jones, 1994; Sykes, 1996). Next to the conditions of contract which are mentioned in almost every source there is a high number of social aspects like people, personality clashes, culture, lack of team spirit, unrealistic expectations, poor communication or misunderstandings which are regarded as being responsible for disputes in construction. These social aspects suggest that especially collaboration and cooperation within the construction project team could minimise conflict and

dispute or at best turn it into a constructive positive tool to improve projects (Loosemore et al., 2000).

Further important aspects which are often associated with conflict and dispute are claims. In construction claims are usually used to enforce the right for extra money or extra time and can be based either on the above mentioned contract terms itself or on non-contractual issues (Kumaraswamy, 1997). Regarding client's changes in the project, claims are adequate to represent the necessary contractual adjustments. But claims are often abused as avoidable or arbitrary issues are claimed and therefore claims can be seen as just another potential source for unhealthy conflicts or dispute.

The research on conflicts and disputes emphasises once again the importance of social relationships within the project team and points out that the cooperation and collaboration of the different project team members can be crucial for project success.

2.5 Construction and project management theories

For a better understanding of the project organization and to enhance project performance there has been a great amount of research been undertaken in the last decades. The quality and the scientific value of this research may differ as well as its approaches (Runeson, 1997; Seymour et al., 1997; Seymour et al., 1998) but the ongoing vital discussion about theories, approaches and perspectives in construction and project management shows that there is still no common understanding of the underlying theories to be applied in this field of research (Koskela and Ballard, 2006; Koskela and Ballard, 2012; Winch, 2006). As the previous sections show it is quite the contrary as research in construction management spreads from theories purely focused on management tools and techniques to research on causes of dysfunctionalities to theories in social relationships. The existing body of knowledge can be categorized into the following four approaches which reflect the different perspectives in construction and project management research (Pryke and Smyth, 2006a):

- Traditional project management approach: the traditional project management approach is grounded in production and assembly and is focused on the development of techniques and tools for efficiency improvement.
- Functional management approach: the functional management approach is based on the traditional project management approach and is focused on the task-driven, strategic and front-end management of projects like lean construction, partnering or supply chain management.
- Information processing approach: the information processing approach is about how the project process is managed by managing the organizational structure of a project and vice versa and is focused on the management of information processing and its uncertainties (Winch, 2010).
- Relationship approach: the relationship approach is concerned with the management of relationships between people, between people and firms and between firms as well as the social environment of projects.

Especially the relationship approach is a rather new approach to construction management which puts the social relationships in the focus of research and which emphasises its influence on the project success (Pryke and Smyth, 2006a). In this context it is not so much about the approach being based on an economic or production perspective (Koskela and Ballard, 2006), it is more about a social science perspective which views a construction project from a different angle.

Söderlund (2011) chooses a different approach to categorize the diverse streams of research in project management and formed seven schools of thought based on a comprehensive literature review:

- Optimization school: the optimization school's main focus is on planning, failure methods and programming of complex tasks with its empirical context mainly in engineering and research and development.

- Factor school: the factor school concentrates on success factors as well as the outcome and performance of projects and has its empirical context mainly in research and development.
- Contingency school: the contingency school is concerned with the project organization structure and design and is investigated mainly in the research and development environment.
- Behaviour school: the behaviour school`s main emphasis is on project organization processes with its empirical context mainly in change and development.
- Governance school: the governance school has its focus on governance of project organizations and transactions and its primary context is construction.
- Relationship school: the relationship school is focused on the management of the early project phase and can be predominantly found in the field of engineering and construction.
- Decision school: the decision school`s main focus is on the cooperation between decision-makers in the early project phases and its empirical context is the public sector and the IT.

This analysis shows clearly that in the context of construction management two schools are dominant: the governance and the relationship school. It needs to be noted that the relationship school is different from the previously described relationship approach which is closer to the behaviour school. The behaviour school is not positioned in the construction management research and this shows once more how important it is to strengthen its position as the social science perspective has long been unattended and the call for a more critical and sophisticated attention on it is still current (Bresnen et al., 2005). Also the conducted literature review suggests that the complex social settings of the temporary multi organization (TMO) of a construction project team needs to be ascertained in more detail from a different perspective. These complex social settings are just one part of project complexity which was discussed in section 2.3.4. Project complexity and the theory of complexity are not part of one of the approaches or schools discussed above, however there is a growing body of

research which tries to clarify different complexity constructs and aspects of complexity (Bakhshi et al., 2016).

A first area of attention in the context of complex social relationships is that a construction project team is not only regarded as a set of different organizations but also as a temporary organization itself which is composed of various single firms (Hobday, 1998). In social psychological research there are several theories about cooperative behaviour in organizations (e.g. Tyler and Blader, 2000) which have not been examined in-depth in terms of their applicability to temporary organizations. As the social settings of the project team members, or, in other words, of the members of the temporary organizations, can be the decisive factor for project success or failure, it would be fruitful to explore in some detail the application of such social-psychological theory to construction project contexts.

2.6 Social relationships in the construction supply chain

2.6.1 Boundaries in temporary multi organizations

Therefore the management of boundaries in construction project teams must be more than just a structural or organizational problem; it also needs to be viewed from a social perspective regarding the organizational behaviour. Because not only the construction project team as a TMO is a complex organization itself, also the social settings within a construction project team are highly complex and often fail to overcome the boundaries of single organizations, i.e. to be fully integrated and to work as a "highly effective and efficient collaborative team responsible for the design and construction of a project" (Baiden et al., 2006, p. 14) with "a single project focus and objectives" (Baiden and Price, 2011, p. 129). Whereupon the full integration can be defined as "the merging of different disciplines or organizations with different goals, needs and cultures into a cohesive and mutually supporting unit" (Baiden et al., 2006, p. 14).

This full integration across a variety of domains of expertise is necessary to successfully conduct a construction project as the required expert knowledge, multiple skills and judgement cannot be developed by one party alone. It is

essential for reaching the mutual project objectives and it supports the significant potential to increase performance, productivity, competitiveness and profitability (Baiden and Price, 2011; Bruns, 2013). Furthermore it is stressed that not only the expert work is necessary but also an integral component of coordination and collaboration work (Bruns, 2013). The increasing specialisation and therefore fragmentation "shifts a significant share of coordination in cross-functional work into individual domains" (Bruns, 2013, p. 78) for enabling learning and innovation.

There are abundant boundaries in a construction project, e.g. the apportionment of cultures, climate, knowledge, fields of expertise, practices, resources, roles, organizational types, group and individual functions etc. The primary aim of overcoming these boundaries must be to foster cooperation, collaboration and commitment in order to improve the processes in a project and to reduce conflict (Fellows and Liu, 2012; Pemsel and Widén, 2011). By doing so the potential to improve the overall project success is high.

This behavioural dimension of problems in the construction sector emphasises the lack of cooperation between the members of the project team (Phua, 2004) as well as the need for a large sub-set of social skills in the context of behaviour, climate and culture for project team members to manage organizational interfaces (Fellows and Liu, 2012).

There are five antecedents for project performance for such cross-functional teams which can also be applied to TMOs (Nicolini, 2002, p. 169): "task design, group composition, organizational context, internal processes and boundary management, and group psychological traits", which means that cross-functional teams perform best in organizations that appreciate them, are aware of their significance and provide the required support. Furthermore the performance of a project team is highly affected by how well the boundaries between the organizations are managed (Fellows and Liu, 2012), by the level of team integration (Baiden et al., 2006) as well as by the implementation of teambuilding and collaboration (Akintoye and Main, 2007).

This shows that boundary management is assumed to be much more than just a structural problem. Boundary management in TMOs – and therefore in construction project teams – is about social relationships, about the enhancement of collaboration and cooperation.

2.6.2 Collaboration and cooperation

To enhance collaboration and cooperation within the construction project team various contractual and non-contractual models have been developed. These include partnering, joint venture, strategic alliancing, long-term contracting, public-private-partnerships and team working. All these models share the common core element of collaboration and cooperation but differ in their degree of integration (Rahman and Kumaraswamy, 2012).

Collaboration and cooperation in construction usually happens only when there is a need for it e.g. pressure on continuity, market opportunities, pressure of time, the number of alternative options like acquisitions (Douma et al., 2000) or it is simply a reaction to customer needs (Akintoye and Main, 2007). Given the contemporary structure of the industry and the fragmented supply chain there is in general a need to cooperate in construction projects.

To create a successful collaboration or cooperation six drivers for a strategic fit have been identified (Douma et al., 2000):

- Shared vision on the future strategic development in the collaboration environment
- Compatibility of the partners' corporate and alliance strategy
- Strategic importance of the cooperation for both partners
- Mutual dependency
- Added value for the partners as well as for the clients due to the mutual activities
- Acceptance of the alliance by the market

These drivers show that collaboration and cooperation in construction can be a tremendous challenge as the project team is often elected by the client and therefore the drivers for strategic fit cannot always be questioned and agreed upon in advance. If the construction supply chain reaches a more mature level and the competition takes place amongst supply chains and not amongst single firms maybe these drivers can be managed more actively. But there are further important factors for collaborative relationships in construction which contribute to project performance and can be influenced by the parties involved (Akintoye and Main, 2007 p. 615):

- high level of commitment and trust
- ability and willingness to share risks amongst partners
- responding to clients' needs
- good communication
- sufficient resources
- improved efficiency
- understanding individual roles of the partners

Five out of these seven factors are soft factors regarding the social relationship within the project team. They are concerned with the respectful, understanding and trustful interaction of the parties involved as well the communication amongst them. These factors facilitate cooperative and collaborative behaviour in which trust plays a major role as it is necessary to ensure that the formal or informal inter-firm relationships perform effectively and efficiently (Lau and Rowlinson, 2009).

2.6.3 Trust

Trust as "the mutual confidence that no party to an exchange will exploit another`s vulnerabilities" (Sabel, 1993, p. 1133) or as the calculated risk valuation in an economic transaction (Williamson, 1993) is essential in building relationships in construction. It has been identified as a key factor for alliance success with a positive effect on alliance performance by a wide number of researchers (Krishnan et al., 2006 for an extensive review). Nevertheless trust is

not simply one-dimensional but more a complex multi-dimensional construct with various drivers.

There is the differentiation between interpersonal and inter-firm trust which is particularly important for construction project teams as they consist of many different individuals from different organizations. Research has shown that in formal inter-firm relationships like partnering, trust on the inter-firm level is more important than on the interpersonal level whereas it is just contrary in informal relationships (Lau and Rowlinson, 2009). Furthermore the acceptance of trust was tested regarding the role within the project team and it was found that clients and consultants are more likely to trust on an individual level while contractors and sub-contractors are more focused on inter-firm trust (ibid).

Another differentiation of types of trust is between goodwill trust and competence trust in which goodwill trust refers to the expectation that a partner aims to fulfil his or her role in a relationship and competence trust refers to the partner's ability to fulfil this role (Lui and Ngo, 2004). This differentiation is especially notable regarding the design of contracts and contractual safeguards in inter-firm relationships as competence trust acts as a complement for contractual coverage and potentially encourages opportunistic behaviour and less cooperation. In contrast goodwill trust substitutes contractual safeguards and vice versa and increases cooperation in project teams (ibid). The construction management research also focused on the relationship between trust and contracts especially regarding the risk allocation through disclaimer clauses. It was found out that this relationship can have a significant influence on the total costs of a project and therefore it is recommended that first a trust relationship should exist between the parties to reach a better risk allocation later on (Zaghloul and Hartman, 2003). Furthermore the relationship of trust and construction contracts was analysed in the context of the principal-agent theory, which supposes that the principal, i.e. the client, assigns the agent, i.e. the manager or contractor, to perform services or undertake tasks on the principal`s behalf including some decision making authorities (Müller and Turner, 2005). Based on this assumption there are doubts that the agent will always act in the principal`s interest because the agent has usually its own economic interests which are followed first and there is usually an

information advance compared to the principal. This situation leads to mistrust in the principal-agent relationship which could be improved through adapted contracts which lead to a more balanced information distribution between principal and agent.

But recent research has shown that trust does not have the assumed overall positive effect. It rather needs to be analysed in depth and with the focus on the special situation and circumstance to do justice to its complex nature. At very high levels of environmental uncertainty the benefits of trust are reduced or can even be counterproductive because overconfidence in the partner's information constrains the critical evaluation of environmental demands whereas at high levels of behavioural uncertainty the benefits of trust are increased because with trust the likelihood of negative interpretations of the partner's actions is reduced (Krishnan et al., 2006).

With the example of trust the complexity and importance of collaboration and cooperation within the construction process is accentuated. It reveals that the influence of these social aspects significantly gains the attention of construction management researchers and that the existing theories in this field need to be developed further to give appropriate justice to this movement.

2.6.4 Justice and fairness

Further evidence of the importance of social relationships is the emerging research on justice and fairness in the construction industry. Aibinu et al. (2011) investigated the contractors' perspective on organizational justice and cooperative behaviour in the claim process and found that especially the contract administration including processes and governance as well as the treatment of the people during the claim process are major influencers of organizational justice perception. However this study is limited as only the contractors' perspective is evaluated and the sample size is very small for the selected method which means that a validation of the results is urgently needed. Another more recent study by Loosemore and Lim (2015) evaluated the inter-organizational unfairness in the construction industry. They argue that different

dimensions of unfairness have been emphasised by various research projects in the construction industry and that new contractual structures and organizational relationships are needed to improve this which is in line with previous research presented in this literature review.

The cooperative behaviour in general has been analysed from an economic, a quasi-economic, a social-legal and political, a transaction cost economics and an organizational justice perspectives in social psychological as well as management and organizational studies (Aibinu et al., 2011). In construction project management theory all of the above perspectives have been addressed more or less broadly except the organizational justice perspective. This is an under-researched area about the influence the perception of fairness of the different participants has on their behaviour throughout the construction process (ibid). Therefore in the following the theory of organizational justice will be depicted in depth.

2.7 Organizational justice

The perception of fairness in the working environment is explained as organizational justice theory, which was developed by Greenberg (1987) and used to “refer to several distinct forms of perceived justice, each of which offers a different answer to the question, “What`s fair?”” (Greenberg, 2009b, p. 182). Organizational justice is defined as “people`s perception of fairness in organizations” (Greenberg and Colquitt, 2005, p. xi) and is concerned with the fair treatment of workers by their supervisors or organizations, of managers to their employees and the subsequent consequences of fair or unfair treatment.

Justice in general has been of interest for many years, even many hundreds of years whereas the focus of research has shifted just recently from a normative to a descriptive approach by examining what people perceive to be fair (Colquitt et al., 2005; Cropanzano et al., 2007). This field of research has developed disproportionately in the last 25 years and the number of publications in this

special field of industrial-organizational psychology has been rising with no end in sight.

The terms fairness and justice have mostly been used interchangeably by social scientists until now, but it is emphasised by Goldman and Cropanzano (2015) that there is good evidence that a distinction is required as they are related but different concepts: justice should therefore refer to whether somebody holds to specific regulations and norms while fairness should refer to how somebody reacts to perceptions of these regulations and norms and the compliance to them. It is furthermore stated that justice is not so much another term for fairness but rather a cause of fairness. For the subsequent work the differing definitions of justice and fairness will be taken into account whereas it is important to note that further research is needed to construct validate the two concepts (ibid).

2.7.1 Development and dimensions of organizational justice

An in-depth literature review about the history of organizational justice can be found in Colquitt et al. (2005). Based on this literature review the four waves of development which also reflect the dimensions of organizational justice are illustrated in Figure 2.7 (Colquitt et al., 2005).

The first wave – which is also called the distributive wave – started in the 1950s and lasted to the mid-1970s. During this time the dimension of distributive justice was developed which focuses on the fairness of distribution of resources. It is mainly based on Adams (1965) equity theory which argues that individuals who sense inequity feel a psychological tension that leads them to want to restore balance. This inequity is measured by the comparison of the individual`s input-outcome-ratio to another individual or to their own (ibid).

The figure originally presented here cannot be made freely available via LJMU Digital Collections because of copyright. The figure was sourced at Colquitt et al., 2005, p. 7.

Figure 2.7 – The four waves of organizational justice theory and research (Colquitt et al., 2005, p. 7)

Therefore distributive justice gauges an individual's perceptions of fairness in the distribution of resources or outcomes, such as payment, knowledge, etc. (e.g. Greenberg, 2009b). But recent research on distributive justice goes further and defines three components or rather allotment rules of distributive justice (Cropanzano et al., 2007):

- Equality → The compensation is allocated equally, i.e. everybody gets roughly the same proportion.
- Equity → The compensation is allocated according to the individual`s contribution.
- Need → The compensation is allocated according to the individual`s requirements and urgency.

The decision about the correct combination and emphasis of the components depends on various factors like one`s strategic goals (Colquitt et al., 2005), the mix and not the exclusion of equity and equality or the type of reward (Cropanzano et al., 2007).

The second wave – which is called the procedural justice wave – lasted from the mid-1970s to the mid-1990s whereas the procedures applied as basis for decisions were in the focus of research. Thibaut and Walker (1975)

instrumentality paradigm is the starting point and the advancement of the concept of distributive justice (e.g. Greenberg, 2009b). They present two different legal systems: an adversarial and an inquisitorial one, which differ mainly in the procedures of how to come to a verdict. They concluded that “a procedure that limits third party control (…) constitutes a just procedure” (Thibaut and Walker, 1975, p. 118). In other words a just process needs to be “applied consistently to all, free of bias, accurate, representative of relevant stakeholders, correctable, and consistent with ethical norms” (Cropanzano et al., 2007, p. 38). Further research by Greenberg and Folger (1983) introduced the instrumentality paradigm to the organizational behaviour subject domain. In this context it is conceptualised as procedural justice and “refers to individuals’ perceptions about fairness of the formal procedures governing decisions involving their treatment and benefits” (Luo, 2007, p. 646).

The third wave –the interactional justice wave – started in the mid-1990s and is still ongoing. Bies and Moag (1986, p. 44) introduced this new perspective by stating that “people are sensitive to the quality of interpersonal treatment they receive during the enactment of organizational procedures”. They derived four rules which administer the fairness of interpersonal behaviour: 1) truthfulness, 2) justification, 3) respect and 4) propriety. Interactional justice describes an individual’s perception of interpersonal treatment during decision-making processes and focuses on the social issues (e.g. Greenberg, 2009b; Luo, 2007). Based on these considerations two facets of interactional justice have been identified: the informational justice facet which refers to truthfulness and justification and therefore the appropriate share of information and the interpersonal justice facet which refers to respect, propriety and dignity (Colquitt et al., 2001).

To summarize the development of organizational justice a short definition for each of the three dimensions is given which serves as basis for the subsequent examinations:

- Distributive Justice: This dimension “is assessing the fairness of distribution of resources between parties to a social exchange as he or she perceives it.” (Greenberg, 2009b, p. 182)
- Procedural Justice: This dimension is “defined as the perceived fairness of the procedures used as the basis for making decisions.” (Greenberg, 2009b, p. 182)
- Interactional Justice: This dimensions refers “to the notion that people`s perceptions take into account the manner in which outcomes and procedures are communicated.” (Greenberg, 2009b, p. 182)

Research has shown that the three dimensions of organizational justice interact (Cropanzano et al., 2005b), and that even the application of one dimension of organizational justice reduces the negative effects of injustice (Goldman, 2003). These positions reflect the current approach in literature which emanates from a multiplicative impact of the different dimensions of organizational justice on performance (Cropanzano et al., 2005b; Luo, 2007). This multiplicative impact is divided into two conceptions: first there is the compensatory conception which argues that distributive, procedural and interactional justice can substitute one another and that the one dimension can compensate for the absence of the other dimensions (Goldman, 2003; Skarlicki and Folger, 1997); second there is the synergetic conception which argues that pushing one dimension while pushing another one will lead to a greater impact on performance than pushing just one dimension as the dimensions complement one another (Arino and Ring, 2010; Luo, 2007). But the mentioned studies produce in parts contradictory results in how the dimensions influence each other. Therefore the rather new constraining-factor model (CFM) which suggests that the factor which is the bottleneck obstructs all other factors (Siemsen et al., 2008) was applied to the dimensions of organizational justice (Narasimhan et al., 2013). This application is promising as the focus on the constraining dimension appears to be important and a focus on the non-constraining dimension might even be wasted investment, but research regarding CFM in organizational justice is right at the beginning and further research on this topic is necessary.

2.7.2 Theories and models in organizational justice

Due to the more and more advanced status of organizational justice research several theories, models and approaches have been developed over the years to combine and integrate the different dimensions and to gain a better understanding of the goals of organizational justice as well as of the mechanisms of how justice perceptions are formed. The most important and influential theories will be explained briefly in the following:

- **Referent cognitions theory** (RCT): this theory suggests that "in a situation involving outcomes allocated by a decision maker, resentment is maximized when people believe they *would* have obtained better outcomes if the decision maker had used other procedures that *should* have been implemented." (Cropanzano and Folger, 1989, p. 293). These thoughts are referent cognitions and are an enhancement of the equity theory as it combines distributive and procedural justice and, although undefined at that time, interactional justice (Folger, 1986a; Folger, 1986b). The RCT has some limitations like the inadequate distinction of causal responsibility and moral obligation in the case of alleviating effects and the necessary justification (Folger, 1993).
- **Fairness theory**: this theory is a successor of the RCT and it is focused on the cognitive processes by which authorities are called to account for events that have a negative effect on justice (Folger and Cropanzano, 1998; Folger and Cropanzano, 2001). It is guided by three judgements – would, could and should – to categorize actions as fair or unfair. In primary studies fairness theory gained support in different contexts of injustice and was used as a basis to ground predictions but there are still limitations regarding its applicability as there have been only a couple of independent tests of its main propositions and of contextual factors (Colquitt et al., 2005; Nicklin and Williams, 2009).
- **Fairness heuristic theory (FHT)**: this theory suggests as enhancement of the relational model that individuals face the contingency that an authority will exploit or discard them and therefore they need to search for evidence if they can trust the authority or not (Lind, 2001; van den Bos, 2001a; van

den Bos et al., 2001). For this evaluation individuals use whatever information or data is available to form psychological shortcuts, also called fairness heuristics, which assist in the decision to accept or reject, i.e. to trust, the verdict made by the authority. This theory aims to explain why individuals respond to perceived justice and not why they decide to cooperate because of perceived justice (Blader and Tyler, 2005).

- **Uncertainty management theory (UMT)**: this theory is an advancement of the FHT as it considers as sources of uncertainty not only trust but also other factors (Lind and Van den Bos, 2002; van den Bos and Lind, 2002). It suggests that individuals "use fairness to manage their reactions to uncertainty, finding comfort in related or even unrelated fair experiences" (Lind and Van den Bos, 2002, p. 216)
- **Social exchange theory (SET)**: this theory is based on Homans (1958) concept of social behaviour which is based on exchange and is originally a multidisciplinary theory. Its essence is that "social exchange comprises actions contingent on the rewarding reactions of others, which over time provide for mutually and rewarding transactions and relationships" (Cropanzano and Mitchell, 2005, p. 890). Today SET is viewed as the most predictive framework to explicate justice reactions (Colquitt et al., 2013)

The first four theories mentioned above build on each other and represent the development over time. The two most recent ones, the fairness heuristic theory and the uncertainty management theory, seem to be of particular relevance regarding the motivation why to respond to justice perceptions. In contrast to that the social exchange theory focuses on the reactions to just or unjust treatment.

In addition to the theories discussed above various models have been developed which try to explain organizational justice perceptions:

- **Self-interest model**: this model suggests that fair procedures will lead to concrete interpersonal remunerations whereas unfair procedures will eventually lead to the opposite and that justice serves the self-directed target to belong to social groups (Gillespie and Greenberg, 2005; Lind and

Tyler, 1988). The self-interest model discussed is controversial as it was already noted by Lind and Tyler (1988) that it does not explain sufficiently all the predictions observed in justice research but it has been reflated by Gillespie and Greenberg (2005) with the argument that all goals of organizational justice are self-interested or rather psychologically egoistic.

- **Instrumental approach**: this approach treats organizational justice as an instrument to control outcomes and therefore to maximize the desired outcome (Greenberg and Folger, 1983). It is sometimes equated with the self-interest model (Lind and Tyler, 1988) and sometimes seen as part of it (Gillespie and Greenberg, 2005). In the current research this approach does not play a decisive role anymore.
- **Group-value model**: this model was developed on the basis of the self-interest model as this one was viewed as insufficient (Lind and Tyler, 1988). It emphasises that individuals focus on their belonging to a group and that the status within the group is important for them. They are concerned about processes which inform them about the group and their status (Tyler and Blader, 2000). Three justice criteria are highlighted as especially relevant to the membership of a group and fairness perceptions: neutrality (or bias suppression), trust (or benevolence) and standing (or status recognition) (Tyler, 1989).
- **Relational model**: this model can be viewed as an amendment to the group-value model. It was developed under the leading question of what authorities need to function effectively and originally named the “relational model of authority in groups” (Tyler and Lind, 1992b, p. 115). The only difference to the group-value model is the relational model’s focus on authority legitimacy, therefore the terms have often been used interchangeably (Colquitt et al., 2005).
- **Group engagement model**: this model “argues that our focus needs to be directed beyond people`s willingness to perform specified group tasks and follow group rules” (Tyler and Blader, 2000, p. 189). In contrast to the group-value or the relational model, the group engagement model is less concerned with the effects on fairness perceptions but more on behavioural effects, i.e. with the effects of justice on the psychological and behavioural

engagement (mandatory and discretionary behaviour). According to this model the identity information from the group is especially influential on the individual's willingness to cooperate with the group and to show discretionary cooperative behaviour (Tyler and Blader, 2003).

These models are again discussed in a chronological order and the first two models are not relevant anymore in today's research. However, they served as the basis for the development of the group-value and the relational models which both argue that the belonging to a group and the processes to identify this influence fairness perceptions. Contrary to these models the group engagement model is more focused on the effects fairness has on the behaviour of individuals.

Colquitt et al. (2005) developed a tripartite conceptualization to structure some of the theories, models and approaches: The counterfactual conceptualization is mainly based on the question *what might have been* and the comparison of a favoured outcome, process or treatment which has not been achieved and includes the referent cognitions theory and the fairness theory. The group-oriented conceptualization is focused on the perception of justice in the context of the acceptance by and identification of the group and includes the group-value model, the relational model and the group engagement model. And the heuristic conceptualization is concentrated on mental shortcuts which are used for judging justice and includes the fairness heuristic theory and the uncertainty management theory.

The integration of the exemplified theories, models or approaches is difficult as they have different foci and goals to explain. Some of them try to answer the question why individuals care about fairness, others why individuals show reactions on fairness perceptions and yet others why fairness fosters cooperation. This does not mean that these theories are contradictory they rather complement one another (Blader and Tyler, 2005). The different perspectives on organizational justice are important as they support to enhance it on a more mature level but for the future it is necessary to develop some kind of framework for the theories, models and approaches to achieve an orderly advancement of organizational justice.

As the work at hand tries to connect organizational justice with the construction process where generally temporary teams work together especially the group-oriented as well as the heuristic theories will be relevant for a more detailed research. This covers the group-value model including the relational model which has been developed on the basis of the self-interest model and its enhancement to the fairness heuristic theory and to the uncertainty management theory. These models and theories are mostly concerned with the perception of fairness. Furthermore the group engagement model deserves attention as it is concerned with the behavioural effects of organizational justice.

2.7.3 Current trends in organizational justice research

Looking back, organizational justice apparently developed straightforwardly without struggle and established a well-grounded basis for further evolution, but so far the focus has been on understanding organizational justice and generating knowledge about it. In turn the application of organizational justice is a field which has been mostly neglected and which hinders organizational justice from becoming more popular (Greenberg, 2009b), also over the boundaries of industrial-organizational psychology to general management or specialist disciplines like construction project management.

Therefore it is worth the effort to contemplate exactly previous research and to deduce the current and future trends. In general the organizational justice research can be categorized into four types of studies (Greenberg, 2009b).

- Basic research: The basic research examines what justice is and which interrelationships various variables have.
- Implication research: The implication research observes justice perceptions in respect of their implication to organizational functioning. This research usually suggests potential application but does not go further.
- Intervention research: The intervention research introduces organizational practices and then gauges the usefulness of these practices.

- Case study research: The case study research pictures applications of organizational justice with the focus of informing business leaders rather than contributing to knowledge and theory.

Based on this categorization the published organizational justice journal articles of the years from 1994 to 2009 have been analysed by Bauer et al. (2009) and the results underpin the previously mentioned trend of research: there are hardly any intervention studies which focus on the application of organizational justice and there is no increase observable; in addition there is a low number of basic research and case studies which increases slowly but steadily. But the most obvious trend which can be derived from the data analysed is, that implication research increases exponentially and contributes the highest number of articles of all. These facts allow the conclusion that fairness in organizations becomes more and more important and that the high and increasing number of implication studies might be developed further to intervention research. Greenberg (2009a) also recommends to continue to conduct implication studies as they have gained dominance in the field and add valuable contribution to the current knowledge and theory. But he also emphasises that the current body of knowledge should be augmented by conducting applied studies. Theoretical research is potentially applied by laying out arguments for application and henceforth testing the arguments (Calder et al., 1981). Based on these tests the actual applicability of the theories can and should be tested. The work at hand can also be categorized as an implication study as it will analyse the implications of organizational justice and building on that it will suggest potential applications. In future research the application of the suggestions needs to be tested.

There is a common understanding amongst the organizational justice researchers that the existing theories need to be promoted and that the application of organizational justice needs to be taken more into account. Nevertheless there are different opinions about the point of departure as well as the approaches how to reach these goals (Byrne, 2009; Greenberg, 2009a; Lopez, 2009; Rupp and Aquino, 2009; Somers, 2009). It goes beyond the scope of this work to analyse the different points of view, but it is important to state that the theories of organizational justice need to be promoted and opened to other

disciplines. And this is where the work at hand starts as it connects the theories of organizational justice with the temporary multi organizations (TMO) of construction project teams and the impact on construction performance. But before the interdependencies of organizational justice and the construction project performance are analysed in detail the impact and benefits shall be displayed and the prerequisites of organizational justice shall be evaluated.

2.7.4 Benefits of organizational justice

Applying organizational justice in a workplace environment has positive effects on the organization itself as well as on its employees. As mentioned previously this has been proven by a remarkable number of studies and research articles which are summarized by three different meta-analytic reviews (Cohen-Charash and Spector, 2001; Colquitt et al., 2001; Viswesvaran and Ones, 2002). These reviews have in common that they emphasise the potential favourable impact but focus on different aspects of justice. Based on the review of Colquitt et al. (2001) the potential benefits as well as the corresponding most dominant justice dimension will be explained in the following. The insights will be complemented by and opposed to the review of Cohen-Charash and Spector (2001).

The outcome satisfaction has been proven as a benefit of organizational justice by many studies in which e.g. pay satisfaction, performance processes and promotion evaluations have been tested (e.g. Folger and Konovsky, 1989; Sweeney and McFarlin, 1993). Therefore outcome satisfaction is primarily predicted by distributive justice as it is focused on the distribution of resources or outcomes (Colquitt et al., 2001). In contrary job satisfaction as a more general and versatile benefit of organizational justice than outcome satisfaction is primarily predicted by procedural justice as the vast majority of published studies verify (Colquitt et al., 2001). Nevertheless some authors come to the conclusion that all satisfaction measures are equally forecasted by all three dimensions of organizational justice (Cohen-Charash and Spector, 2001).

Organizational commitment, which is often equalized with affective commitment, is defined as the extent to which employees relate to the organization and adopt

its goals as their own (Allen and Meyer, 1990). This potential beneficial outcome of organizational justice is dominated by the predictor of procedural justice which has been proven in various studies (e.g. Folger and Konovsky, 1989; McFarlin and Sweeney, 1992). However a number of other studies comes to the conclusion that organizational commitment is also predicted by distributive or interactional justice (e.g. Greenberg, 1994) for which reason the current corresponding understanding is that organizational or affective commitment is predicted by all three dimensions of organizational justice, but best by procedural justice (Cohen-Charash and Spector, 2001; Colquitt et al., 2001).

For the organization itself organizational justice can be interrelated to beneficial outcomes like low staff turnover (Dailey and Kirk, 1992), high levels of customer satisfaction (Simons and Roberson, 2003), low levels of absenteeism (Lam et al., 2002), high levels of organizational commitment (Folger and Konovsky, 1989), high levels of organizational citizenship behaviour (Fassina et al., 2008), and low levels of employee theft (Greenberg, 1990). Thereby it is always essential to consider that as previously mentioned the different dimensions of organizational justice have different implications on the perception of justice and the outcomes. To reduce staff turnover it is e.g. essential to pay attention to distributive and procedural justice as they play a central role to job contentment and purposes to quit (Dailey and Kirk, 1992), whereas for high levels of organizational citizenship behaviour procedural and interactional justice are most influential depending on benefiting individuals or the organization (Fassina et al., 2008).

Another benefit of organizational justice has been the focus of very recent research: the way of communicating bad news. Lavelle et al. (2016) found that adopting unfair procedures while delivering bad news makes the messenger, usually the supervisor, more distant towards the employee and leads to almost no explanations for the decisions made. However, bad news training, which improves the messenger's performance in delivering bad news, can enhance the fair performance of these procedures and shows also positive responses from the employees (Richter et al., 2016).

In addition the perception of fair procedures supports the willingness to become vulnerable to other people and builds a serious basis for trust (Colquitt et al., 2001) as well as emotional commitment (Cohen-Charash and Spector, 2001). As explained previously trust has in general positive effects on the cooperation of teams (Lui and Ngo, 2004; Zaghloul and Hartman, 2003) and commitment is one of the key factors to successful projects (Akintoye and Main, 2007; Fellows and Liu, 2012). Because of this the relationship between justice and trust shall be examined in more detail in the following excursus.

In contrast to previous research most recent studies have proven that only interactional justice and especially the informational justice facet predicts trust, whereas the other dimensions of justice, distributive and procedural justice, seem to have no significant influence (Colquitt and Rodell, 2011). The reason for that might be that in earlier research the other dimensions were overemphasised by misleading measures or that differing definitions of trust were applied. To clarify this issue the definition of trust which formed the basis of the above mentioned study will be exposed and used for the work at hand: Trust is “the willingness of a party to be vulnerable to the actions of another party based on the expectation that the other party will perform a particular action important to the trustor, irrespective of the ability to monitor or control that other party.” (Mayer et al., 1995, p. 712).

In addition another important differentiation was carried out by Mayer et al. (1995) in creating their model of trust with the differentiation between trust and trustworthiness which is defined by three characteristics of a trustee: ability, benevolence and integrity. The relationship between justice and trustworthiness has been studied in consideration of the three characteristics (Colquitt and Rodell, 2011): in this context neither one of the justice dimensions was a significant forecaster for ability nor vice versa, which means that applying organizational justice has no noteworthy influence on the skills, competencies and characteristics that empower a party influencing a particular field of expertise. In contrast benevolence and integrity showed a reciprocal relationship with organizational justice which means that both influence each other. Especially the interpersonal justice facet of interactional justice has a positive effect on

perceived benevolence as well as on perceived integrity which is also positively influenced by procedural justice. But as they are reciprocal, benevolence and integrity also influence all three dimensions of organizational justice and therefore they co-develop each other.

This recessed consideration of the relationship of the three dimensions of organizational justice and trust shows the highly complex structure of organizational justice and its potential benefits.

Furthermore the exemplarily contemplated benefits like outcome and job satisfaction, organizational commitment, organizational citizenship behaviour or trust emphasise the potential positive influence of organizational justice on the individuals and the organization as well as its growing importance.

2.7.5 Prerequisites of organizational justice

There are several prerequisites which encourage the perception of justice and fairness in organizations. These prerequisites vary from social to hierarchical to process issues as well as regarding their importance for the different dimensions of organizational justice.

Cropanzano et al. (2007) investigated how perceptions of justice can be created in organizations and describe exemplary workplace situations to illustrate how organizational justice affects real life situations:

- Application and selection process: During the application and selection process it is especially important to treat applicants fairly by using adequate questions and criteria and by giving a suitable opportunity to perform to set the basis for a relationship of fairness and trust.
- Reward systems: Reward systems need to fulfil various goals like motivation of individual performances and maintenance of team spirit which are required to be balanced justly. Multiple surveys show that if the processes of pay allocation or the communication of pay cuts are viewed as fair, the decisions will mostly be accepted by the employees.

- Conflict management: In conflicts usually not all parties can get the outcome they want but by giving them a fair process with just decisions the overall assessment of the situation will be enhanced.
- Layoffs: Especially when layoffs are necessary in an organization the application of procedural and interactional justice leads to less compromisation of the former employer from the laid off persons and less survivor guilt from the ones which are still employed.
- Performance appraisals: Performance reviews have been perceived as fairer when employees are able to communicate their point of view and especially when three core elements are considered: adequate notice, just hearing and judgement based hearing.

All of these exemplary workplace situations involve tough and difficult decisions from managers and organizations. In considering the principles of organizational justice and laying the groundwork for its application the decisions can be made more smoothly and justly and a greater acceptance can be reached.

The application of justice in the workplace situation, which is the adherence of managers to justice rules, is in contrast to the previous fields, an under-researched area which gains only slow attention. But as the managers are the ones who are in the position to create the prerequisites of organizational justice it is an area of great importance. Scott et al. (2009) developed an actor-focused model of justice rule adherence and violation to explore the motives of managers regarding the application of justice. There are on the one hand cognitive motives like effecting compliance in subordinates, creating and maintaining a certain social identity and maintaining a just world by establishing fairness and on the other hand affective motives which are rooted in short-term experiences or emotions. A more recent study revealed that amongst the cognitive motives, the creation or maintenance of a just world is the least influential motive which is an ironic fact (Scott et al., 2015). The deeper examination of the managers' motives to apply organizational justice is beyond the scope of the work at hand.

The conducted review on organizational justice indicates that the impact of considering it for construction projects could potentially be of high value. But the social environment and social settings of construction project teams have not been investigated so far. Therefore in the first step a theoretical approximation via organizational justice in workgroups, teams and alliances is carried out in the following.

2.8 Organizational justice from a multi-level perspective

Almost all of the discussed studies were conducted on an individual level. Especially for procedural justice it is highlighted by Mossholder et al. (1998) that organizational justice research almost entirely lacks higher-order or multi-level analyses where also contextual effects are taken into account. These contextual effects are e.g. workgroups, teams or alliances which influence the perception of organizational justice in different ways (e.g. Colquitt et al., 2002; Konovsky, 2000; Luo, 2007; Naumann and Bennett, 2000).

This circumstance is particularly important regarding the connection of organizational justice and the construction project. As pointed out previously a construction project team is a complex and temporary organization which consists of diverse members who not only differ in their roles and responsibilities but also in their affiliation to different firms. Against this background the current stage of research on organizational justice in the context of workgroups, teams and alliances will be depicted in the following.

2.8.1 Organizational justice climate in workgroups and teams

The absence of context related research on organizational justice disregards the early findings that group members may evolve not only individual but also higher level perceptions and norms of how they are treated and of what is fair (Naumann and Bennett, 2000; Tyler and Lind, 1992a). This set of shared perceptions which are developed through group interactions in general can be summarised under the term of organizational climate (James et al., 1988) whereas many different workgroup climates may exist in a single organization (Naumann and Bennett,

2000). Based on the wide variance of organizational climates which are discussed in literature it seems to be reasonable that there also exists a justice climate which is defined for the procedural dimension by Naumann and Bennett (2000, p. 882) “as a distinct group-level cognition about how a work group as a whole is treated.” They conclude that workgroup cohesion as well as supervisors who demonstrate procedural justice are substantial prerequisites for the evolvement of a procedural justice climate and that the procedural justice climate in turn supports helping behaviours.

The approach of evaluating justice not only at an individual level but also at higher or rather unit levels is justified by Li and Cropanzano (2009) who refer to a framework developed by Morgeson and Hofmann (1999). According to this framework it is necessary to examine the structure as well as the function of collective constructs to scholarly authorize a unit-level approach. For organizational justice climate the studies conducted so far suggest the justification of this approach (Li and Cropanzano, 2009).

Additionally two general theoretical frameworks have been used in studies on justice climate to explain the influence of workgroups or teams on the perception of fairness:

- Social information processing theory (SIP; Salancik and Pfeffer, 1978): according to this theory employees are able to perceive and interpret their social environment as well as their own previous activities and use these insights to direct their own future activities.
- Attraction-selection-attrition model (ASA; Schneider, 1987; Schneider and Reichers, 1983): according to this model it is the people who make organizations more homogenous as people who share similar attributes and characteristics are attracted to particular groups, as groups select people with many common attitudes and as people who do not fit the group leave.

These frameworks contribute to a more homogenous perception of fairness in teams or workgroups as they take into account the social environment and guide

the individual`s perception to a common direction (Li and Cropanzano, 2009). Based on these more general considerations a couple of studies have been conducted to examine the implications on organizational justice on the unit-level and there is evidence to suggest that social influence on justice perceptions is existent (ibid). There is e.g. the third-party perception of fairness which suggests that one`s own perception of fairness is partly conditioned by the treatment that others experience (Cropanzano et al., 2003; Cropanzano et al., 2005a; Folger and Salvador, 2008) or the justice contagion which proposes that perspectives on justice can be based on the acquaintance of others` thoughts and feelings as well as social relations which spread like a virus (Degoey, 2000) or the fairness heuristic theory which embraces the social context as a heuristic influence on fairness perceptions (Lind, 2001).

The justice climate research to date is mainly focused on procedural justice climate with little attention paid to the other dimensions of organizational justice, namely distributive and interactional justice. But there are some important findings regarding the prerequisites and benefits of procedural justice climate which are worth to mention. Further research suggests that there is a significant positive relationship between procedural justice climate and team effectiveness expressed by higher job performance and less absenteeism (Colquitt et al., 2002) and procedural justice climate and role performance as well as conflict perception of the team members (Colquitt, 2004). In addition it was found that the team size as well as age diversity are important influencers of the procedural justice climate as larger and less collective teams showed weaker climates and vice versa (Colquitt et al., 2002). But the most important finding is that there is a significant effect in considering the impact of others' procedural justice on the reactions to treatment in teams. The benefit of organizational justice climate is highest when the individual's treatment is consistent with the treatment within the team as the interaction of the individuals and the team allows contextual comparisons before reacting to treatment, whereas this interaction is even stronger when the interdependencies of the members are higher (Colquitt, 2004). In addition significant relationships between servant leadership and procedural justice climate as well as between organizational citizenship behaviour and procedural justice climate have been detected (Ehrhart, 2004). This implies that leaders who

recognize their responsibility for their team and act accordingly improve the justice climate within the team and that teams who perceive themselves to be treated fairly show higher overall levels of helping and conscientious behaviour. Furthermore it is proposed that organization-focused procedural and interactional (especially the informational facet) justice climate as well as supervisor-focused procedural and interactional (especially the interpersonal facet) justice climate are significantly related to positive work outcomes like supervisory commitment and satisfaction or organizational commitment and citizenship behaviour (Liao and Rupp, 2005).

A recently conducted meta-analytic review examining the relationship of organizational justice climate and unit-level effectiveness updated and generalized the definition of justice climate "as a distinct unit-level cognition regarding shared fairness perceptions of treatment by organizational authorities" (Whitman et al., 2012, p. 777) and suggests that all three dimensions of organizational justice climate are significantly related to unit-level effectiveness, although in varying strength.

Another approach to investigate organizational justice climate in more detail is trickle-down effects. The trickle-down effects were first examined by Masterson (2001) and they are concerned with the influence of the manager's behaviour and perceptions on the supervisor's behaviour and perceptions, which then influence the employee's behaviour and perceptions. The research on trickle-down effects is mainly focused on the interactional justice dimension and it shows that the supervisor's treatment influences the interactional justice climate of the work group (Ambrose et al., 2013). It furthermore suggests that the interpersonal aspect of interactional justice seems to be passed on through an affective route and the informational aspect seems to be passed on through a cognitive route (Wo et al., 2015).

Related to organizational justice climate is also how individuals respond to fair or unfair treatment of others. The vicarious experience of injustice affects employees independently of how the employees themselves are treated (Huang et al., 2015). This is especially applicable for the interpersonal aspect of

interactional justice when the employees have a strong moral identity (O'Reilly et al., 2016).

All the above explained studies support the idea that the social environment is important to be considered in the organizational justice research as it can have important implications. The studies discussed so far are limited to the focus of organizational justice climate which is defined as the team`s collective perception regarding the treatment by others, especially organizational authorities (Allen and Meyer, 1990). But it is assumed that the mutual treatment of team members influences the fairness perceptions as well.

2.8.2 Peer justice

Peer justice climate is defined as the "shared perception regarding how individuals who work together within the same unit and who do not have formal authority over each other judge the fairness with which they treat one another" (Cropanzano et al., 2011, p. 568) and was in previous research also known as intra-unit justice climate (e.g. Li and Cropanzano, 2009). It is distinct from justice climate as it is not concerned with fairness coming from an authority like the organization or the supervisor but with fairness coming from co-workers. As it has been suggested in research that individuals can differentiate the sources of justice (Liao and Rupp, 2005) it is a worthwhile enhancement of justice research to test the influence of peer justice climate.

There have been only a few studies on peer justice climate published so far. One study is limited to peer procedural and interpersonal justice and suggests that individuals make up their own opinion on these dimensions and that both dimensions predict teamwork processes like effective work behaviours (Cropanzano et al., 2011). Another study considers all three dimensions of justice and implies that peer justice is better evaluated as a composite structure than a dimensional structure as the co-workers tend to judge fairness at an overall level (Li et al., 2013).

These studies form the starting point for peer justice climate research and can currently not be generalized due to limitations regarding sample, sample size and variables used.

2.8.3 Organizational justice in the supply chain

Organizational climate and peer justice are two rather new directions in justice research which focus on the higher or multi-level analysis of justice. But research in recent years has even gone further and analysed the utilisation of organizational justice in strategic alliances and supply chains. This development is especially interesting regarding the importance of inter-firm cooperation and supply chain in the construction industry which was discussed earlier.

So far there is only a small number of studies which has addressed organizational justice in a multilevel context (e.g. Arino et al., 2001; Johnson et al., 2002; Luo, 2007; Luo, 2009; Narasimhan et al., 2013; Ring and Van de Ven, 1994). It has been found that justice in alliances is a powerful element in fostering cooperation and its outcomes and that especially procedural and interactional justice are important regarding the performance outcome of asset turnover (Luo, 2007). Furthermore the three dimensions of organizational justice are integrated in the context of alliances and it is argued that “distributive justice improves alliance performance through the equity effect, which reduces relational risk; interactional justice improves alliance performance through the social exchange effect, which enhances relational attachment; and procedural justice improves alliance performance through the instrumentality effect, which fortifies relational value” (Luo, 2007, p. 658 f). Altogether it is suggested that the presence of fairness in alliances concerning profit sharing, decision-making procedures and intercultural teamwork is the foundation for a successful alliance and that it is less likely with these prerequisites that adverse behaviour occurs amongst the partners.

The dimension of procedural justice was separately analysed in the context of international joint ventures and the results suggest that the responsible executives of the partners often exhibit differing notions regarding the perception of procedural justice and that their sharing of procedural justice perceptions can

be a crucial factor regarding alliance success (Luo, 2009). In line with this distributive and procedural justice policies are assumed to support long-term relationships and relational behaviour in supply chains which implies that next to economic results of collaboration also social factors, i.e. the treatment during the relationship, is important for potential future collaboration (Griffith et al., 2006).

The dimension of interactional justice has long been ignored in inter-organizational research and sometimes even consciously excluded (Poppo and Zhou, 2013) but it has rather been suggested recently that all dimensions of organizational justice play a part in creating a fair and just atmosphere in buyer-supplier relationships (Liu et al., 2012). This atmosphere encourages firms to get involved in the relationship improvement which in turn leads to enhanced relationship performance. It is furthermore emphasised that mutual justice perceptions of the parties involved are required to form an economic and continual inter-organizational relationship. As these inter-organizational relationships in supply chains are usually formalised by written contracts the role of fairness in contracting might also play a vital role. Therefore Poppo and Zhou (2013) suggest that the dimension of procedural justice influences the effectiveness of contractual complexity and that the dimension of distributive justice influences the impact of contractual repetition on exchange performance. These findings indicate that the functions of contracts should be expanded from safeguarding and coordinating to an integrative approach including the aspects of fairness perceptions as they highly impact the relationship performance.

Although only a limited amount of research from a multilevel perspective exists so far the results presented are promising. Especially in the field of fairness perceptions in supply chains the number of published articles increased in recent years which suggests that this is a field with potential and need for additional research. The work at hand will contribute to this field as the social relationships and especially the implications of organizational justice in the construction supply chain are analysed.

2.9 Development of the conceptual framework

Based on the literature review conducted and the considerations explained above, a conceptual framework of organizational justice and construction project performance is developed in this section. As a “conceptual framework explains, either graphically or in narrative form, the main things to be studied – the key factors, concepts, or variables – and the presumed relationships among them.” (Miles and Huberman, 1994, p. 18) it seems to be appropriate to structure the high number of variables for the work at hand and to bring them into relation with each other in a conceptual framework. The conceptual framework is created out of the knowledge regarding previous research, critical analysis of the problems with previous research and an understanding of how the current work can contribute originally to knowledge. It is nothing that is simply found in the existing body of literature, it rather needs to be constructed and ideally connects different approaches or theories which haven`t been integrated before (Maxwell, 2013). This is the case for the work at hand as the field of organizational justice has not been integrated with construction management in general and therefore it carries potential to give new insights in the social relationships within the construction project team and its impact on project success.

As explained previously the construction supply chain or rather the construction project team is a temporary multi organization (TMO) with members which have different roles and responsibilities and which usually belong to different firms (Cherns and Bryant, 1984). These prerequisites lead to complex social settings within the project team, which are assumed to have a great impact on construction project performance. Against this background the impact of organizational justice and organizational justice climate on the previously explained antecedents and crucial factors of construction project performance (e.g. Chan et al., 2004; Jha and Iyer, 2007; Tabish and Jha, 2012) shall be investigated. It has been proven in various studies (ibid) that these factors have a direct impact on construction project performance. Therefore it is assumed that if there is a positive impact of organizational justice and/or organizational justice climate on one or more of these factors, there is also a positive impact on construction project performance. This in turn leads to the assumption that the

antecedents of project performance are mediators in the relationship of organizational justice/organizational justice climate and project performance.

As discussed in section 2.4 a wide variety of antecedents was identified by previous research (e.g. Chan et al., 2004; Jha and Iyer, 2007; Tabish and Jha, 2012). Out of this pool of almost 50 factors ten human, behaviour and structure related were chosen as mediators. The focus on human, behaviour and structure related factors was chosen because of the potential positive impact of the social relationships, and in particular organizational justice. They are as follows:

- Organizational commitment
- Communication
- Client's competence and managerial qualities
- Conflict management
- Coordination
- Decision making
- Compliance to client's expectations
- Efficacy of organizational structures
- Efficacy of procurement method and contract
- Trust

Organizational justice shall be classified in the three traditional dimensions of distributive, procedural and interactional justice as different meta-analytics have shown, that each dimension influences different outcomes or benefits (Cohen-Charash and Spector, 2001; Colquitt et al., 2001; Viswesvaran and Ones, 2002). It is important to know which dimension of organizational justice promotes which antecedent of project performance to be able to purposefully select the required steps.

Furthermore the research on alliances or joint ventures (Liu et al., 2012; Luo, 2007; Poppo and Zhou, 2013) as well as on organizational justice climate (see e.g. Colquitt, 2004; Colquitt et al., 2002; Liao and Rupp, 2005; Whitman et al., 2012) suggests promising results regarding the impact of the application of

organizational justice. Hence the impact of organizational justice climate on the selected antecedents of project performance shall be investigated as well. As previously mentioned the justice climate research has so far been mainly focused on procedural justice climate. However it is regarded as necessary to integrate the other dimensions in the research as well to obtain a holistic picture of the impact of organizational justice climate on the antecedents of project performance.

Project performance in this context shall be measured with the traditional project performance criteria of cost, time and quality (Jha and Iyer, 2007; Winch, 2010) and expanded with the intangible criterion of client`s satisfaction (Lehtiranta et al., 2012). Additionally the perceived overall performance of the project shall be taken into account. There are other criteria which could be considered, but for the work at hand it is decided to limit the criteria to these five as they are widely established and give a good impression if a project can overall be classified as successful.

Supplementary to the exploration of the impact of organizational justice and organizational justice climate on project performance through the antecedents of construction project performance the impact of the benefits of organizational justice and organizational justice climate on project performance shall be investigated. This second step represents another view on the relationship of organizational justice and construction project performance and it shall serve as a validation of the previous results.

Benefits of organizational justice to be tested regarding their impact on project performance are: outcome satisfaction, trust, customer satisfaction, organizational commitment and organizational citizenship behaviour (e.g. Allen and Meyer, 1990; Cohen-Charash and Spector, 2001; Colquitt et al., 2001; Fassina et al., 2008; Folger and Konovsky, 1989; Simons and Roberson, 2003). They are complemented with performance outcome and contracting which are positive outcomes of organizational justice in the supply chain (Luo, 2007; Poppo and Zhou, 2013). These benefits were chosen based on the conducted literature review.

Regarding organizational justice climate the benefits unit-level effectiveness, role performance, conflict perception, servant leadership, organizational citizenship behaviour, supervisory commitment and organizational commitment which are positive outcomes of organizational justice climate shall be explored (Colquitt, 2004; Ehrhart, 2004; Liao and Rupp, 2005; Whitman et al., 2012).

Within the conceptual framework a certain causality between the variables is assumed. This assumption is necessary to be able to create a valid model. It can be made on the basis that prior research has demonstrated that trust, organizational commitment, conflict perception as well as outcome satisfaction and performance outcomes are benefits of organizational justice and/or organizational justice climate (see Cohen-Charash and Spector, 2001; Colquitt et al., 2001; Viswesvaran and Ones, 2002 for extensive reviews). These benefits bear close similarities with the antecedents of project performance proposed in our framework i.e. trust, commitment, conflict management or compliance to client's expectations. Therefore the causality between organizational justice (climate) and the antecedents of project performance is well-founded in current theory. Regarding the causal relationship between the antecedents of project performance and the different aspects of project success, the 10 selected items have been identified in previous research as predecessors and important factors of project success (Chan et al., 2004). Therefore the theoretical foundation for this relationship is grounded in our extant knowledge of the topic.

Through this two-component conceptual framework the impact of organizational justice and organizational justice climate on the overall project performance shall be examined and validated.

The relationship between all of the above exemplified aspects is illustrated in the conceptual framework for organizational justice and construction project performance in Figure 2.8.

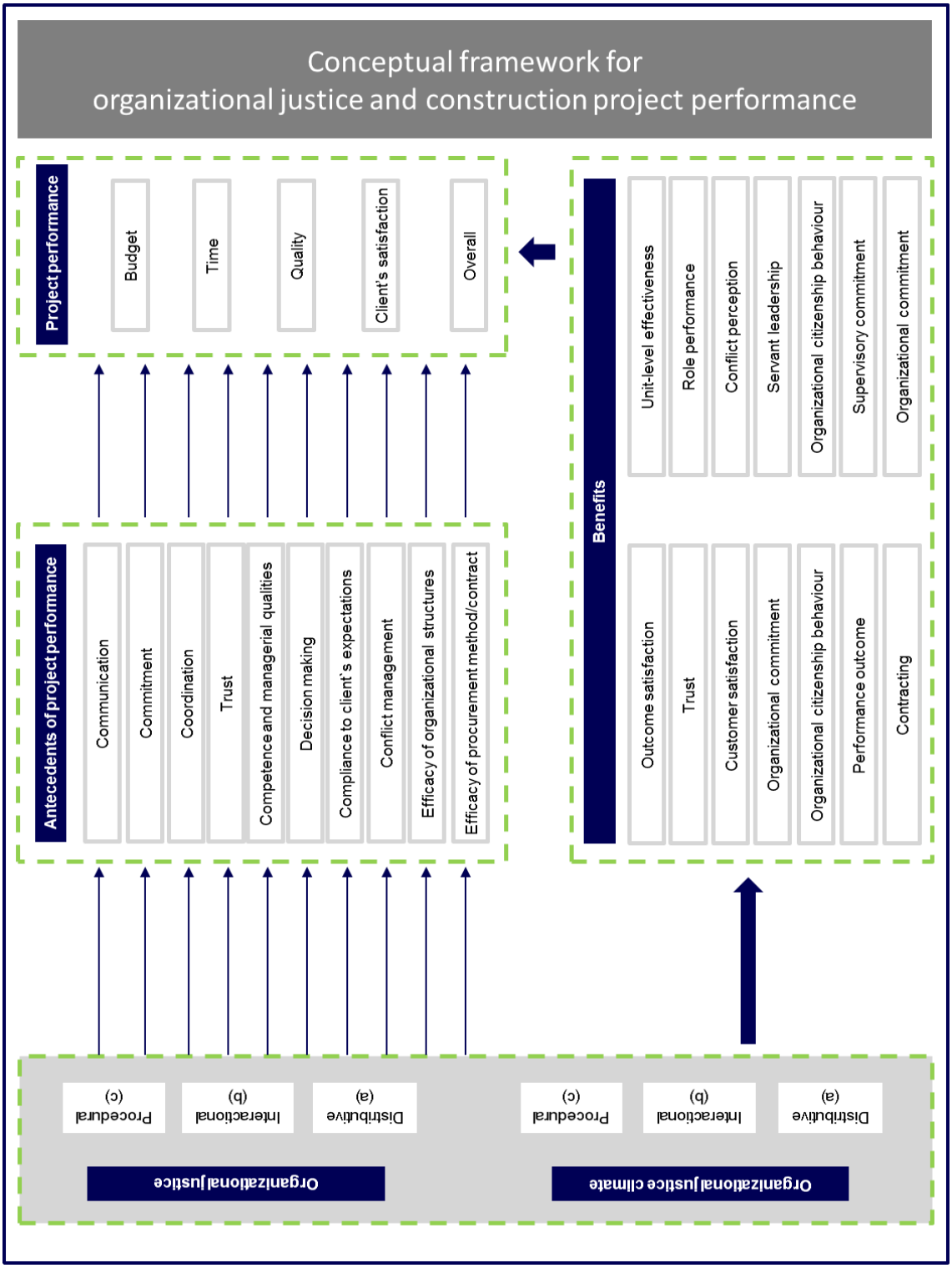

Figure 2.8 – Conceptual framework

2.10 Summary

This chapter presented an in-depth literature review on the two fields of expertise which are the focus of this work, namely construction project performance and organizational justice (climate).

It was found that the performance of construction projects has been criticised for decades and that despite different initiatives no significant improvement has been achieved. It was suggested that a focus on social relationships in order to overcome the multiple boundaries in TMOs could provide an alternative approach to improve project performance. Organizational justice, which is the perception of fairness in organizations, has been identified as one aspect of these social relationships. The three dimensions of organizational justice, i.e. distributive, procedural and interactional justice, on the individual and the team level are therefore assumed to have an impact on project performance. Additionally antecedents of project performance were identified and the impact of organizational justice on these antecedents shall also be investigated.

Based on the theoretical justification of the research provided in this chapter a conceptual framework was developed which illustrates the potential relationships.

3 Research methodology

3.1	Introduction	The purpose of the subsequent methodological considerations is explained.
3.2	Research philosophy	The ontological, epistemological, axiological, rhetorical and methodological considerations for research in general are explained and their application in the context of this research is elaborated.
3.3	Research approach	The different research approaches are contrasted and the one applicable for the work at hand is identified.
3.4	Research design	The characteristics of a qualitative, quantitative and mixed-methods research design are analysed and the most suitable design for the work at hand is developed.
3.5	Research strategy	The research strategy as the link between philosophy and the subsequent methods is developed based on the considerations made in the previous sections.
3.6	Time horizon	The reasoning for the chosen cross-sectional research design is given.
3.7	Summary	A summary of the methodological considerations is provided.

3 Research methodology

3.1 Introduction

Creswell (2009) compared the process of conducting research with the creation of a mandala, a Hindu or Buddhist symbol of the universe: you need to look at the surrounding parameters, at the overall design but also at every little detail which is involved. Furthermore, in a mandala all components are interrelated and cannot be viewed in isolation as they contribute to and influence the overall shape of the study. Therefore this chapter will be dedicated to the processes and assumptions which are underlying for the research at hand.

3.2 Research philosophy

In general there is no right or wrong way of doing research, though the adopted research philosophy influences significantly the relationship between knowledge and the process by which it is developed. In simple terms the research philosophy is the way the world is viewed by the researcher (Saunders et al., 2012). Therefore there are multiple reasons to give attention to research philosophy. Gaining an understanding of research philosophy in general can assist in elucidating the research design, in recognizing the appropriate and applicable research design and in identifying or even creating a new research design (Easterby-Smith et al., 2013). Furthermore it is crucial to be capable of reflecting the chosen philosophical approach and justifying it in relation to potential alternative approaches (Saunders et al., 2012).

The research philosophy is generally dominated by two major assumptions, which are ontology and epistemology and complemented by axiological, rhetorical and methodological assumptions (Collis and Hussey, 2009; Saunders et al., 2012). These terms are defined briefly below:

- Ontology “is concerned with the nature of reality.” (Saunders et al., 2012, p. 130).
- Epistemology “concerns what constitutes acceptable knowledge in a field of study.” (Saunders et al., 2012, p. 132).

- Axiology “is a branch of philosophy that studies judgements about value.” (Saunders et al., 2012, p. 137).
- Rhetoric “is concerned with the language of research.” (Collis and Hussey, 2009, p. 60).
- Methodology “is concerned with the process of research.” (Collis and Hussey, 2009, p. 60)

Ontology, epistemology and axiology are characterised as being interrelated which means that the features of each assumption cannot be adopted freely but are given in relation to the other assumptions (Collis and Hussey, 2009). The characteristics of the five philosophical assumptions will be outlined below and afterwards the philosophy for the work at hand will be developed.

3.2.1 Ontological considerations

As mentioned before “ontology is concerned with the nature of reality” (Saunders et al., 2012, p. 130), which means that ontology gives a general orientation about a researcher’s view of the world and nature of research (Creswell, 2009). There are different approaches in literature how to classify ontological considerations, therefore only the most important ones will be explicated in the following.

According to Saunders et al. (2012) there are two aspects of ontology: objectivism and subjectivism. Objectivism argues that social entities or phenomena occur outside and independent of social actors. Opposed to that subjectivism argues that social entities or phenomena originate from social actors and that they are highly influenced by the awareness and understanding of the social actors. Subjectivism is sometimes also referred to as social constructionism, as it assumes that the reality is socially constructed (Bryman, 2012).

A different approach has been developed by Easterby-Smith et al. (2013) who differentiate four categories of ontological aspects: realism, internal realism, relativism and nominalism. Realism assumes that there is only one truth and that the world is concrete and external. Internal realism goes one step further and

argues that there is only one truth or reality but there is no direct access to this reality, therefore indirect proof is necessary. In contrast to that relativism assumes that there are many truths or realities which are highly influenced by scientific laws depending on the viewpoint of the researcher. And nominalism represents the most contrary position to realism as it argues that there is no truth or reality and therefore all facts are created by humans which try to set up different realities based on their experiences.

3.2.2 Epistemological considerations

Epistemology is about the question of what is considered acceptable knowledge in a certain field of expertise (Bryman, 2012; Saunders et al., 2012), about different ways of questioning the nature of research (Easterby-Smith et al., 2013) and about the relationship between the research and the field of research (Collis and Hussey, 2009). As for ontology there are also different approaches for epistemology of how to classify the considerations, but it is worth mentioning that almost every researcher combines attributes from different views. The most important approaches will be discussed in the following.

Saunders et al. (2012) as well as Bryman (2012) differentiate four epistemological approaches: positivism, realism, interpretivism and pragmatism. Positivism asserts that only phenomena which are observable can establish plausible data and facts with the aim to create law-like generalizations. The positivist stance is the one of a natural scientist. Realism is a similar approach as it assumes “that there is a reality quite independent of the mind” (Saunders et al., 2012, p. 136). There are two sub-approaches of realism which mainly differ in the perception of reality: the direct realist assumes that the reality is comparatively unalterable and that what we see is the real world whereas the critical realist argues that depending on the perspective the understanding of what is studied might change. Interpretivism is contrasts with positivism and argues that the researcher needs to comprehend differences in the interpretation of humans and their social roles which leads to the necessity to adopt an empathetic stance in order to understand details of situations and the reality behind these details. Finally pragmatism where “the most important determinant of the epistemology,

ontology and axiology you adopt is the research question" (Saunders et al., 2009, p. 109).

Easterby-Smith et al. (2013) use quite similar approaches as they distinguish between positivism and social constructionism whereupon social constructionism can be also referred to as interpretivism which corresponds with the previous annotations.

3.2.3 Axiological considerations

Axiology is "concerned with the role of values" (Collis and Hussey, 2009, p. 59), especially the process of social investigation (Saunders et al., 2012) and the personal persuasion and feelings of a researcher (Bryman, 2012). It is emphasised that only with the awareness of the role of values in research can credible research results be produced and that it is necessary to be able to enunciate one's own values as they serve as foundation for the way of conducting research, drawing conclusions and delivering judgements (Heron, 1996; Saunders et al., 2012).

In general there is the assumption that no research can be conducted completely value free, but there is still some research based on the positivist research philosophy which argues that research can be undertaken value free because of the principle of objectivity (Bryman, 2012). Excepting the positivist philosophy all other philosophies are value driven to different degrees from the value laden realism to the value bound interpretivism (Saunders et al., 2012).

3.2.4 Rhetorical considerations

Rhetoric, i.e. the language used in research, is especially significant for the written documentation of research (Collis and Hussey, 2009). The language needs to be adequate for the philosophy chosen and needs to reflect the degree of objectivity and values involved in the research.

For positivist research usually a formal style with passive wording is appropriate as this reflects the objective, external and value free position of the researcher.

In contrast interpretive studies are more variable regarding the style but usually a first person wording is used (Collis and Hussey, 2009)

3.2.5 Methodological considerations

The methodology is about how research is undertaken and the underlying assumptions (Saunders et al., 2012). The methodological considerations which need to be carried out are concerned with the research method or methods, the research design and the time horizon. These considerations will be reviewed in more detail in the next sections.

But it is worth noting at this point that the philosophies discussed above have a direct impact on the method(s) chosen and therefore it is e.g. more appropriate for a positivist approach to use concepts which can be operationalized with predominantly large samples compared to an interpretive approach for which smaller samples with different methods are more suitable (Collis and Hussey, 2009)

3.2.6 Philosophical research framework

In order to sum up the previous sections a philosophical research framework is developed. This framework sets the different considerations into context, integrates and shows the interrelations between them based on some main philosophical researchers (Collis and Hussey, 2009; Easterby-Smith et al., 2013; Saunders et al., 2012). They are organized in four categories respectively four philosophies as shown in Figure 3.1.

The positivist philosophy is dominated by an external and objective view of the nature of reality and accepts only identifiable phenomena for the creation of valid data in order to produce law-like generalizations. The researcher is independent of the data, value free and unbiased. A formal and passive wording is used and generally a deductive approach with large samples is chosen.

Philosophy	Positivist	Realist	Interpretivist	Pragmatist
View of nature of reality	External and objective	Objective and independent	Subjective and changing	External and multiple
Valid data	Identifiable phenomena	Identifiable phenomena may be insufficient and misinterpreted	Social phenomena and subjective meanings	Either or both: identifiable and social phenomena
Role of researcher	Independent, value free and unbiased	Value laden and biased	Subjective, value bound and biased	Subjective and objective points of view
Wording	Formal and passive wording	Less formal, but passive wording	Informal and personal wording	Informal and personal wording
Research approach	Deductive	Deductive	Inductive	Deductive and inductive
Sample size	Large samples	Large samples	Small samples	Mixed or multiple methods

Figure 3.1 – Philosophical research framework

The realist philosophy shares the objective view of the nature of reality and is independent regarding human influences though acknowledges the social context of reality. Identifiable phenomena are regarded as the basis for valid data, but it is accepted that these data can be insufficient and misinterpreted. The researcher is value laden and biased by their world view and cultural background. A less formal but still passive wording is used and generally a deductive approach with large samples is chosen.

The interpretive philosophy is affected by the subjective and changing way of viewing the nature of reality with socially constructed and multiple views. Social phenomena and subjective meanings are accepted as well as details of situations with their background. The researcher is subjective, value bound and biased as it is part of the study. An informal and personal wording is used and generally an inductive approach with small samples is chosen.

Pragmatism allows the researcher to interpret the world in many different ways and to choose the most appropriate view of the world for every single situation. Different perspectives are accepted for interpreting data depending on the research question. The researcher can take on either subjective or objective

points of view, but is always driven by values. An informal and personal wording is used and usually mixed methods are applied.

Although over 90% of the authors who published an article in the International Journal of Project Management in 2005 did not explicitly define their methodology (Smyth and Morris, 2007) it seems necessary for the work at hand to develop or rather choose the appropriate philosophy based on the explanations above.

There has been a debate for more than 15 years about what is viewed to be the appropriate philosophy for construction and project management research. The dominant philosophy for construction project management has been positivism for a long time but it is suggested to concentrate more on interpretive approaches as they better do justice to the reality of construction project management (Seymour et al., 1997). The construction project is highly dependent on humans and individuals and therefore the topics being studied differ clearly from natural scientists who preferably use the positivist approach. This stance is supported by Smyth and Morris (2007) who argue that positivism is incompatible to many questions which occur in projects because it does not consider the contextual nature of projects.

For the work at hand neither interpretivism nor positivism nor realism seems to be unambiguously the most suitable philosophy. Positivism does not embrace the social context of construction management, interpretivism contradicts the quantitative data which will be gathered on the basis of observable phenomena, with the researcher being independent and realism does not cover the qualitative data which will be collected.

Hence in this study a pragmatist stance, which matches the approach to the specific objective of the research, is adopted. The research question is “how do the three dimensions of organizational justice (climate) influence construction project performance” and it is the most important determinant of the research. Due to this question and the aims stated in section 1.3 it is necessary for the researcher to adopt different views of the world depending on the stage and context of the research.

3.3 Research approach

Based on the research philosophy the appropriate research approach, i.e. “the reasoning to draw conclusions on matters of importance” (Mantere and Ketokivi, 2013, p. 71) needs to be identified. Reasoning or the research approach is particularly concerned with the role theory plays in research and how conclusions are drawn. In general three forms of reasoning are distinguished (ibid):

- Deduction: For deduction a conclusion is drawn logically from a set of prerequisites and the conclusion is assumed to be true when all prerequisites are true. The particular patterns are drawn from general inferences.
- Induction: For induction multiple observations are carried out to empirically generalize a conclusion which is assessed to be supported by evidence. The general inferences are drawn from particular patterns.
- Abduction**:** For abduction a surprising fact is observed and then a set of potential prerequisites is determined to explain the conclusion. The conclusion is assumed to be true as a matter of course if the set of potential prerequisites is true. The general inferences interact with the particular patterns.

Deduction and induction have been viewed as the traditional forms of reasoning but the use of abduction is just as widespread as of the other ones (Ketokivi and Mantere, 2010). All three forms are used for all types of research traditions and therefore it is deceptive to assume that the research approach can be described by one single form. It is rather recommended to study and define the connection and interrelationship of the three forms within the research and thereby identify the unique characteristics of the research approach for the work at hand (ibid). For this purpose the three forms will be analysed in greater detail in the following sections.

3.3.1 Deductive reasoning

As mentioned previously deduction is a “form of reasoning where a conclusion is logically derived from a set of premises” (Ketokivi and Mantere, 2010, p. 330).

The basis for deduction forms a defined process of sequential steps which leads form theory to hypothesis to data collection to findings to hypothesis confirmed or rejected and finally to revision of theory (Bryman, 2012). But it is emphasised that this process, although it appears to be very straight and logical, is often not applied in its pure form but rather used as a general orientation for predominantly deductive approaches. This is verified by the last step – revision of theory – which is not a deductive but an inductive implication.

There are several attributes which characterise deduction (Saunders et al., 2012):

- Deduction attempts to explain causal relationships between concepts and variables and uses a highly structured methodology.
- Deduction asks for operationalised concepts to ensure measurability.
- Deduction demands a carefully selected sample to allow generalisation.

For a predominantly deductive approach data are used to assess propositions which are related to an existing theory. The goal of deduction is to verify or falsify theory (Saunders et al., 2012).

3.3.2 Inductive reasoning

Induction in its traditional form “is simply an enumeration – a one-step empirical generalization based on multiple observations” (Ketokivi and Mantere, 2010, p. 330). For induction, theory follows data, i.e. observations provide a basis for drawing generalizable conclusions out of which theory is developed (Bryman, 2012).

The inductive reasoning is viewed as being generally incomplete and therefore leading to the so called practical reasoning dilemma which sounds as follows (Ketokivi and Mantere, 2010, p. 316):

> “Given that several alternative theoretical generalizations are logically coherent with my data and my primary form of reasoning – induction – does

not provide the logical means to unambiguously select one over the others, how do I convince my audience of the choices I make?"

The dilemma of induction is grounded in the fact that only particular events can be observed but no generalities and that all events which are observed occurred in the past. This leads to the previously mentioned general incompleteness of induction as the solid normative foundations of generalization and prediction are shaken (Ketokivi and Mantere, 2010).

Nevertheless the inductive approach has its right to exist as its strength is to take into account the context of events and to develop an understanding of how humans interpret their social environment (Saunders et al., 2012).

But it is important to mention, that many studies with an inductive approach fail to develop a theory and rather generate interesting findings whose scientific importance is questionable. To improve theoretical significance inductive studies are rarely applied in their pure form and rather used in combination with other approaches in iterative processes (Bryman, 2012).

For the so called predominantly inductive approach data is used to explore phenomena and develop conceptual frameworks. The goal of induction is to generate and build theory (Saunders et al., 2012).

3.3.3 Abductive reasoning

"Instead of moving from theory to data (as in deduction) or data to theory (as in induction) an abductive approach moves back and forth, in effect combining deduction and induction" (Saunders et al., 2012, p. 147). With this iterative process which can also be viewed as a "path of critical reasoning" (Van Maanen et al., 2007, p. 1149), assumptions which explain the observations better than others can help to reveal more assumptions and surprising facts.

For an abductive approach an active researcher, who phrases through partly peculiar findings numerous superordinate statements which explain or interpret

the data is needed. It is important to note that every research might develop different statements and therefore might come to different conclusions (Mantere and Ketokivi, 2013). This is also the reason why abduction is classified as the logically weakest form of reasoning (Ketokivi and Mantere, 2010).

For an abductive approach data is used to explore phenomena and develop conceptual frameworks and then to test these with succeeding data collection. The goal of abduction is to generate or modify theory and to incorporate existing theory for modification or building theory (Saunders et al., 2012).

3.3.4 Choice for the work at hand

The unique characteristics of the research approach for this work can be briefly defined by the connections and interrelationships of the different approaches used in this work (Mantere and Ketokivi, 2013).

Based on the definitions and explanations above the dominant research approach for the work at hand is abduction as it combines deduction and induction. By applying deductive reasoning first the conceptual framework is developed which serves as the basis for developing hypotheses, collecting and analysing data and testing hypotheses. Afterwards inductive reasoning is applied by collecting additional data and developing a strategic framework. With this approach an existing theory can be extended and modified which is the case by utilizing organizational justice for construction projects.

In a predominantly abductive research approach deduction and induction are present as well as a matter of course but they serve only in supporting the reasoning regarding logic and generalizability.

3.4 Research design

The research design which is the “general plan of how you will go about answering your research question(s)” (Saunders et al., 2012, p. 159) is dominated by the methodological choice regarding using a mono method or

multiple methods design. In general there is the differentiation between two mono methods (Bryman, 2012; Saunders et al., 2012):

- Quantitative research design: In a quantitative research design usually numeric data are generated on the basis of a deductive research approach and a positivist research philosophy.
- Qualitative research design: In a qualitative research design usually non-numeric data are generated on the basis of an inductive research approach and an interpretivist research philosophy.

Although these definitions are not unproblematic and universally valid they give a general idea about the distinction between quantitative and qualitative research design. The main points of criticism regarding these definitions are that there are in reality a high number of studies which combine characteristics of both designs and that the differentiation between numeric and non-numeric data is too simple (Bryman, 2012). In addition also the conscious combination of the two mono methods gained in importance and the so called mixed methods have come to the fore.

Against this background the two mono methods as well as the mixed methods will be discussed in greater detail in the following sub-sections.

3.4.1 Quantitative research design

Based on the above described definition it seems rather obvious that the quantitative research is a clearly and narrowly defined way of undertaking research. But as mentioned previously the simplified definition does not embrace the complexity of undertaking research. For this reason a more detailed definition for quantitative research design is introduced for this work (Creswell, 2009, p. 4):

> *"Quantitative research is a means for testing objective theories by examining the relationship among variables. These variables, in turn, can be measured, typically on instruments so that numbered data can be analysed using statistical procedures. The final written report has a set*

> *structure consisting of introduction, literature and theory, methods, results, and discussion (Cresswell, 2008). Like qualitative researchers, those who engage in this form of inquiry have assumptions about testing theories deductively, building in protections against bias, controlling for alternative explanations, and being able to generalize and replicate the findings."*

This underpins that most quantitative research is based on a positivist philosophy, but there may also exist studies which have at least partly an interpretivist philosophy. In combination with qualitative research quantitative research designs might also be used for realist or pragmatist philosophies (Saunders et al., 2012). Data are usually collected in a standardized way by using experiments, surveys or case studies and analysed using different statistical techniques (ibid).

The main challenges of a quantitative researcher are that the data are measureable in a reliable and valid way, that the causality between things can be explained by using dependent and independent variables, that the findings can be generalized by using an appropriate sample and that the results of the research can be replicated by reproduction (Bryman, 2012).

There is also some critique regarding quantitative research which is based in epistemological and ontological foundations, specific data collection methods as well as in the design in general. Therefore four examples will be briefly outlined (Bryman, 2012):

- Quantitative researchers fail to differentiate between people and the social environment and the natural world.
- The measurement of data provides a simulated impression of accuracy and precision.
- The trust in tools and processes obstructs the conjunction of research and daily routine.
- In analysing the connection between variables a static notion of social life which is independent of people`s real lives is created.

These criticisms clearly reflect the qualitative researcher`s perspective as they focus on an interpretivist philosophy. Hence, these criticisms are not necessarily indications that the qualitative research design is not an appropriate choice for a specific research, they rather show that every research design has its strengths and weaknesses and that it is therefore important to choose the suitable research design consciously. Neither the quantitative nor the qualitative research design is per se better than the other one (Silverman, 2013).

3.4.2 Qualitative research design

As for quantitative research design also for qualitative research design the previously given definition seems insufficient and a more detailed one is introduced (Creswell, 2009, p. 4):

> *"Qualitative research is a means for exploring and understanding the meaning individuals or groups ascribe to a social or human problem. The process of research involves emerging questions and procedures, data typically collected in the participant`s setting, data analysis inductively building from particulars to general themes, and the researcher making interpretations of the meaning of the data. The final written report has a flexible structure. Those who engage in this form on inquiry support a way of looking at research that honours an inductive style, a focus on individual meaning and the importance of rendering the complexity of a situation (adapted from Creswell, 2007)"*.

The predominantly interpretivist philosophy for qualitative research is underpinned by this detailed definition. It is sometimes alluded to as naturalistic as the data collection takes place in a natural environment and the researcher needs to become part of this environment. In combination with qualitative research quantitative research designs might also be used for realist or pragmatist philosophies (Saunders et al., 2012). Data are usually collected in a non-standardized way by using action research, case studies, ethnography, grounded theory or narrative research and analysed using various techniques and procedures (ibid).

Also qualitative researchers have main challenges which inevitably differ from the quantitative researcher's challenges. For a qualitative researcher the main challenges are that it is suggested to view the social world through the eyes of the people being studied which potentially leads to demarcation problems, that there is a focus on the contextual understanding of the social behaviour of the people being studied which induces a high number of descriptive details, that the social life is often viewed with regard to process which makes it particularly difficult to investigate, that there is very high flexibility and only a limited structure which potentially leads to unspecific wording of the research question and that concepts and theories are usually developed inductively based on the data collected (Bryman, 2012).

As for quantitative research also for qualitative research some critique has been expressed which can be summed up by the four most common arguments (Bryman, 2012):

- Qualitative research is affected by the relationship between the researcher and the people studied and by the unstructured researcher`s view of what is or is not important which leads to too subjective results.
- Qualitative studies can hardly be replicated because of missing standard procedures, the unstructured way of conducting the research and the great influence of the researcher on the interpretation of data and findings.
- The findings are difficult to generalize because only a small sample is investigated.
- Due to insufficient description of how the study was conducted and what the researcher really did a lack of transparency is produced.

The first three concerns are mainly raised by quantitative researchers whereas the last one is a critique which is mainly expressed by the qualitative researchers themselves (Bryman, 2012). As mentioned previously the critique regarding qualitative research is not a fundamental one, it is rather about the appropriateness of qualitative or quantitative research design for a specific research question as well as the general application of the design in the specific

field of research and region (Silverman, 2013). Furthermore qualitative research has made progress and more and more structured approaches are available of which two will be applied in this work later on.

As a matter of principle it is important to emphasise that the borders between quantitative and qualitative research design are not as strict as they may seem on the first glance. The research design usually expresses a tendency under which the research is undertaken but the epistemological and ontological commitments are not deterministic (Bryman, 2012; Bryman and Bell, 2011).

3.4.3 Multiple methods research design

There has been a long tradition in trying to combine qualitative and quantitative research even before the term of multiple methods was developed. It started at the beginning of the 20th century and made different evolutionary steps from multiple operationalism, triangulation and critical multiplism to the slow development of mixed methods in the 1990s (Johnson and Gray, 2010). There are two different types of multiple methods research which differ in their degree of integration, mixing of methods and the point in time of application of multiple methods (Saunders et al., 2012): In a multi-method study different data collection techniques within one mono method are applied whereas in mixed methods both mono methods are combined. The focus in the following is on mixed methods as the mono methods were exemplified in the previous sections.

Amongst many other terms the term mixed methods research has become the most popular one for this kind of research and therefore it was necessary to develop a definition for it to gain a common understanding (Johnson et al., 2007, p. 123):

> *"Mixed methods research is the type of research in which a researcher or team of researchers combines elements of qualitative and quantitative research approaches (e.g. use of qualitative and quantitative viewpoints, data collection, analysis, inference techniques) for the broad purposes of breadth and depth of understanding and corroboration."*

This definition seems to be rather general but it is the outcome of a study amongst 21 mixed methods researchers and therefore currently the most reliable one. But mixed methods research design “is more than simply collecting and analysing both kinds of data; it also involves the use of both approaches in tandem so that the overall strength of a study is greater than either qualitative or quantitative research” (Creswell, 2009, p. 4). A mixed methods research usually does not consist of two or more studies which use different methods, it rather consists of one core study, which is a comprehensive study itself and a supplemental study, which is incomplete and only exhaustive in combination with the core study (Morse, 2010).

These considerations support the previously mentioned preferred philosophies for mixed methods research design which are realism and pragmatism. For realism it is necessary to combine an external and objective reality with a socially conditioned interpretation of data which is potentially better understood by the combination of research designs; and for pragmatism the research question as well the research context are the essential factors by valuing both mono methods (Saunders et al., 2012). The philosophy of pragmatism was enhanced for mixed methods to the so called dialectical pragmatism which means that both perspectives, the qualitative as well as the quantitative, need to be carefully taken into account, interacted and communicated with to live up to the expectations of mixed methods research (Johnson, 2009).

But the mixed methods researcher must bear in mind that also a mixed methods research has the same or equal sorrows as the previously explained mono methods. It must be taken into account, also that mixed methods need to be planned and structured carefully, that they must be appropriate to the specific field of research, that the choice of mixed methods must be made explicit, that the relationship and integration of the mono methods is necessary, that both mono methods need to be considered methodologically, that supposably additional resources for conducting two studies are required and that finally the researcher needs to possess the skills to carry out two different research designs (Bryman, 2012).

Due to the complexity of mixed methods research it is worth taking a closer look at potential approaches of conducting a mixed methods study. There are several aspects by which the different approaches can be distinguished. The four main aspects are briefly described in the following (Creswell, 2009):

- Timing: the data collection can be conducted in one phase, i.e. at the same time (concurrent) or in more than one phase (sequential).
- Weighting: one mono method can be dominant over the other or the different methods can be weighted equally.
- Mixing: the data can be mixed at different stages of research and in different depth. By connecting data the analysis of the first phase is connected with the collection in the second phase, by integrating data the data are merged and by embedding data the data of the supplementary study are supporting the core study.
- Theorizing: the research design might be guided by a larger, theoretical perspective which can be made explicit (theorizing) or used implicitly (transforming).

Based on this distinction and given the assumption that there is a core study and a supplemental study there are multiple ways in combining the qualitative and quantitative research. A common notation of the relationships consists of labels and symbols wherein arrows indicate sequence and + signs indicate simultaneousness and capitals priority over lowercase letters (Bryman, 2012; Creswell, 2009; Morse, 2010; Saunders et al., 2012):

- QUAN → qual = sequential explanatory design
- QUAL → quan = sequential exploratory design
- QUAN + qual = concurrent embedded design
- QUAL + quan = concurrent embedded design
- QUAL + QUAN = concurrent triangulation design

It is supremely important to be aware of the priority and sequence of the methods applied in a study to ensure that the overall direction or theoretical drive of the

research project, i.e. the integration of the results of the supplemental study with the results of the core study as a theoretical basis, is maintained consistently throughout the study (Morse, 2010).

But it is also important to mention that these approaches are not exclusive as recent research has shown that the designs which are de facto used are often far more complex with multiple phases and the combination of sequential and concurrent studies (Creswell, 2010). One example for this is the sequential transformative design which is based on the transformative paradigm and arose because of the need of how to address more clearly problems of social justice (Mertens et al., 2010). It is a two phase design with a theoretical perspective which guides the research and has the aim to be of best use to this theoretical perspective (Creswell, 2009). Therefore the purpose of this theoretical perspective, which can be e.g. a conceptual framework or a specific ideology, "is more important in guiding the study than the use of methods alone." (Creswell, 2009, p. 212). This design enables the researcher to take into account different perspectives and to better understand phenomena or processes which are modifying during the study. But so far not much literature exists on this topic and therefore little guidance on how to conduct a sequential transformative research study is available.

3.4.4 Choice for the work at hand

Based on the considerations above regarding the research design in general the suitable research design for the work at hand needs to be identified. Due to the mentioned weaknesses of each of the mono methods and the chances mixed methods can provide, a mixed method research design shall be applied for the work at hand. This is further justified by the following reasons (Saunders et al., 2012):

- Complementarity: mixed methods allow the elaboration, enhancement, clarification, confirmation, illustration or link of meanings and findings
- Interpretation: one method helps to explain and interpret the results from the other method

- Generalizability: mixed methods create a higher degree of generalizability and credibility of a study and facilitate in the creation of more comprehensive knowledge
- Diversity: mixed methods enable a greater diversity of views
- Focus: one method focuses on one feature, the other method focuses on another feature
- Triangulation: mixed methods allow for the combination of data to find out if the findings of the different methods corroborate
- Confidence: mixed methods support the avoidance of the method effect and give therefore greater confidence in the conclusion about the findings

Furthermore the mixed methods research design is the preferred research design for pragmatist researchers as for them the emphasis is on the research question, the contextual conditions as well as the potential research consequences (Nastasi et al., 2010) and not so much on a specific method. It is more important to choose the appropriate methods to reach the research aim.

Regarding the different approaches at first sight the sequential explanatory design is the most suitable one as it typically explains and interprets quantitative data with the results of the subsequent qualitative data analysis and creates causal relationships between variables (Saunders et al., 2012). It has the focus on the observation of a situation or problem for the purpose of explaining relationships between variables. But at second sight the hardly researched sequential transformative design seems to be even more appropriate as it is driven by the theoretical perspective, i.e. the conceptual framework of organizational justice and construction project performance, and aims to best serve this framework by using diverse perspectives on the subject of the study (Creswell, 2009).

Therefore for the work at hand the mixed methods sequential transformative research design shall be applied. The process of this research design is displayed in Figure 3.2. It therefore supports the research to answer the research questions and to meet the objectives which were stated in section 1.2 and 1.3.

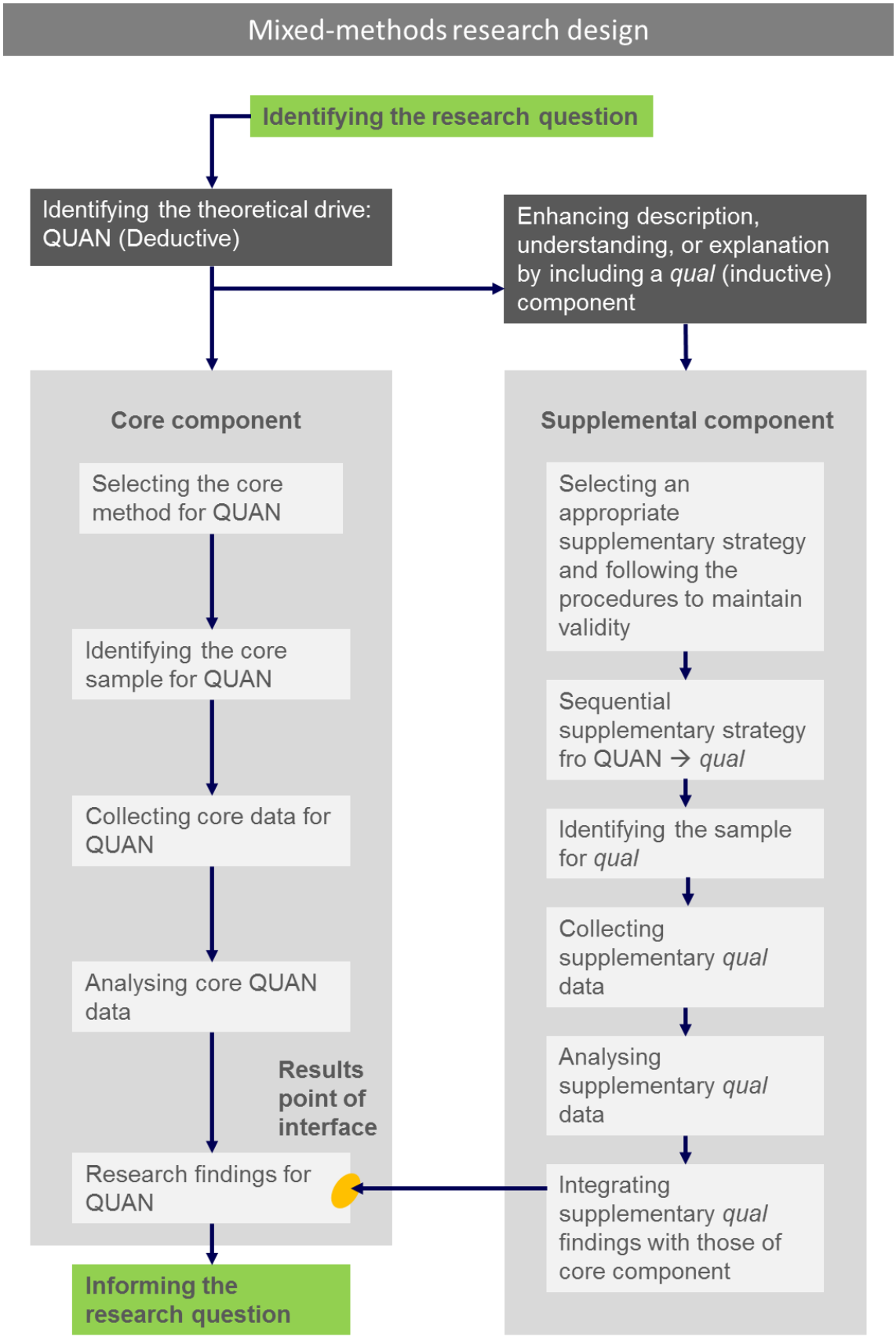

Figure 3.2 – Mixed-methods research design
(based on Morse, 2010)

3.5 Research strategy

The research strategy is “the methodological link between your philosophy and subsequent choice of methods to collect and analyse data” (Saunders et al., 2012, p. 173). The strategy of inquiry needs to be coherent with the research design and shall enable the researcher to answer the research question(s). Therefore each strategy is usually linked to a quantitative, qualitative or mixed-methods research design as well as the approach and purpose (Saunders et al., 2012). The variety of strategies has grown significantly over the last few years due to the technologies available e.g. for data analysis (Creswell, 2009), therefore only a selection of the most common ones will be explained briefly in the following:

- Experiment: An experimental study is carried out in a systematic manner in a natural or laboratory setting in order to explore the relationship between variables, while the independent variable is intentionally manipulated to study the effect on the dependent variable (Collis and Hussey, 2009).
- Survey: A survey study is conceived to collect primary or secondary data from a sample in order to analyse them statistically and to generalize the results to a population (Collis and Hussey, 2009).
- Archival research: An archival research focuses on textual information like administrative records and documents as the major source of data and its analysis (Easterby-Smith et al., 2013; Saunders et al., 2012).
- Case study: A case study investigates in depth a program, event, activity, process or individual(s) within its context or a variety of real-life contexts (Creswell, 2009; Saunders et al., 2012).
- Ethnography: Ethnography is used to study groups, preferably intact cultural groups, in their natural setting over a defined period of time wherein the researcher uses socially gained and shared knowledge to understand the studied patterns of human activity (Collis and Hussey, 2009; Creswell, 2009; Saunders et al., 2012).
- Action research: An action research has the main goal to enter into a situation in order to bring change and monitor the results, whereat the focus is on the development of solutions for real organizational problems with

implications beyond the research project (Collis and Hussey, 2009; Saunders et al., 2012)

- Grounded theory: Grounded theory is a “process to analyse, interpret and explain the meanings that social actors construct to make sense of their everyday experiences in specific situations” (Saunders et al., 2012, p. 185).
- Narrative inquiry: A narrative inquiry studies the lives of individuals and asks them to provide stories about their lives as the experiences of the individuals can best be accessed by collecting and analysing complete stories (Creswell, 2009; Saunders et al., 2012).
- Phenomenological research: A phenomenological research views social phenomena as socially constructed and has its focus on generating meanings and gaining insights into those phenomena (Saunders et al., 2012)

As for this work a mixed methods sequential transformative research design shall be applied, and one or more quantitative and qualitative research strategies shall be combined in the overall research strategy. Therefore these strategies will be explained in more detail in the following and it will be justified why these strategies have been chosen.

3.5.1 Survey

Survey research is characterised by the form of data and the method of analysing them (De Vaus, 2002): In surveys usually a highly structured set of data will be collected and causes will be analysed by comparing cases and variations of variables across cases.

Surveys are often equated with the use of questionnaires during a research as questionnaires are the most popular data collection methods within survey research (Saunders et al., 2012), but also other techniques like structured interviews can be used. It is important not to equate a research strategy with a data collection method.

Surveys are popular and widely used in business and management as well as social research (Bryman, 2012; Saunders et al., 2012). They allow the collection of a high number of data with comparatively little effort and a simple comparison of the structured data. Moreover possible relationships between variables can be identified and models can be developed out of these relationships. By choosing an appropriate sample, representative findings for the whole population can be generated. These features of surveys suggest a good fit to the research question for the work at hand and the mixed methods sequential transformative research design which has been chosen. Therefore a survey research strategy shall be applied for the quantitative part of the research design.

3.5.2 Phenomenological research

As mentioned above a phenomenological research has its focus on describing the joint meaning of a lived experience of a concept or phenomenon for various individuals (Creswell, 2013). It is the main object "to reduce individual experiences with a phenomenon to a description of the universal essence" (Creswell, 2013, p. 76).

There are two general schools of phenomenology which have been developed in the 1990s and still serve as basis for phenomenological research:

- Hermeneutic phenomenology has been developed by Van Manen (1990) and is based on the model that textual reflection on lived experience and practical behaviour can increase one`s reflectiveness and inventiveness. It characterises research as oriented towards lived experience and as an interpretation of the lyrics of life.
- Transcendental phenomenology has been developed by Moustakas (1994) and tries to eliminate all kinds of prejudgment and interpretation with the aim to perceive and describe a phenomenon in its completeness with openness and freshness. A transcendental researcher is asked to set aside his or her individual experience as far as possible to enable an unburdened view on the phenomenon.

Phenomenology is not popular at all in project or construction management research but it is widespread in social and health sciences, amongst others especially in psychology and sociology (Creswell, 2013). Considering the research question for the work at hand a transcendental phenomenological research strategy seems to be appropriate for the qualitative part of the research. This is justified by several characteristics of (transcendental) phenomenology which are applicable to the work at hand (Moustakas, 1994; Van Manen, 1990): There is an emphasis on the phenomenon of organizational justice and construction project performance which is intended to be studied. The study shall be undertaken with a group of individuals who all have practical knowledge on the phenomenon and who shall participate in focus groups to collect the data. The following data analysis shall follow a structured process and answer the two questions: What have the individuals experienced and how have they experienced it? The study shall then be summarized in an essence.

3.5.3 Case study

In general a case study is a study which examines one or more cases in order to answer particular research questions by collecting evidence which is present in the setting and needs to be prescinded (Gillham, 2000). Case study research is sometimes defined as a methodology, but also as a method, a strategy of inquiry or a choice of what is to be studied (Creswell, 2013). In the context of the work at hand it shall be viewed as a research strategy following Saunders et al. (2012) but also as a main method following Gillham (2000) in the next chapter.

Conducting a case study is regarded as “one of the most challenging of all social science endeavours” (Yin, 2014, p. 3) as it combines a number of different sources of information or data collection methods (Creswell, 2013). These can be qualitative or quantitative methods, but most likely it is a combination of both and the data are triangulated during data analysis. A case study enables the researcher to obtain an in-depth understanding of the context and the processes involved and provides answers to ‘why?’, ‘what?’ and ‘how?’ questions (Saunders et al., 2012).

In general there is a differentiation between a single case design, which is used if a critical, unusual, common, revelatory or longitudinal case is chosen, and a multiple case design, which is used in order to replicate the findings from two or more cases (Yin, 2014). An additional differentiation is undertaken with regards to the unit of analysis, i.e. if it is a holistic design with a single-unit of analysis or an embedded design with multiple units of analysis.

In consideration of the research question for the work at hand a single case holistic case study research strategy with a common case shall be undertaken.

3.5.4 Choice for the work at hand

The mixed methods sequential transformative research design for this work shall be implemented by three different research strategies which complement each other regarding the method, population and focus (Figure 3.3):

Figure 3.3 – Methodological choice

In the first step a survey will be conducted to collect quantitative data as the primary or core component. This is undertaken to meet objective 2 and 3 as stated in section 1.3. In the second step a phenomenological research will be applied and in the third step a case study will be conducted, both to collect qualitative data as supplementary components. This supplementary data collection will ensure that objective 4 can be achieved.

3.6 Time horizon

Another part of the research design is the time horizon which is available for data collection. Usually two time horizons are differentiated:

- Cross-sectional studies: A cross-sectional study gathers data in different contexts to obtain cases of variety at a single point in time more or less simultaneously. Therefore this time horizon is chosen when there are time constraints and/or limited resources. But there are some challenges inherent with this kind of study as it is difficult to select an appropriate and representative sample size, to isolate the phenomena under study from all other factors and to explain the reasons for correlation. On the other hand cross-sectional studies are rather inexpensive and only a limited time frame is required (Bryman, 2012; Collis and Hussey, 2009; Saunders et al., 2012).
- Longitudinal studies: A longitudinal study gathers data of the same variables or group of individuals several times or continuously over a long period of time. This time horizon is chosen when no limitations are present and the change and development of phenomena shall be investigated. Also with this kind of study there are some challenges as e.g. the problem of sample attrition which means that subjects leave the study over the long period of time. Additionally there are hardly any guidelines for the sequence of data collection and it has been proven, that this kind of study is often poorly planned. Moreover the so called panel conditioning effect might have an impact on the behaviour of the individuals studied. Longitudinal studies are usually expensive and time consuming to conduct (Bryman, 2012; Collis and Hussey, 2009; Saunders et al., 2012).

Considering the time and resourced available for the work at hand a cross-sectional study needs to be conducted. The data collection will take place more or less at the same time therefore no development or change will be deducible. As various variables will be tested throughout the study the aim of variety will be achieved.

3.7 Summary

The considerations outlined in this chapter define the methodological point of origin for the research at hand. First of all the research philosophy was identified by considering amongst others the ontological and epistemological assumptions. Based on these considerations a pragmatist research philosophy was viewed as the most appropriate for this research as it allows the research to adopt a view of the world most suitable to the research question and change it during the research and to collect data with mixed or multiple methods. Second, it was identified that a predominantly abductive research approach is most suitable for this work because it moves back and forth from data to theory and from theory to data. Third, the mixed methods sequential transformative research design was viewed to be most appropriate because of its drive by the theoretical perspective and its aim to best serve the study by using diverse perspectives. Fourth, a research strategy consisting of a survey for the collection of quantiative data and phenomenology for the collection of qualitative data was chosen. This research strategy supports the previously explained research design and allows to collect the necessary data and analyse them appropriately. And finally the time horizon for this study was defined as a cross sectional study where the data are collected at a single point of time.

This can be summarised as a research with the following characteristics:

- a pragmatist research philosophy with
- a predominantly abductive research approach,
- a mixed methods sequential transformative research design with
- a research strategy consisting of a survey for the collection of quantitative data and a phenomenology for the collection of qualitative data and
- a cross-sectional study regarding the time horizon.

4 Research method

4.1	Introduction	The selected data collection methods are outlined.
4.2	Questionnaire	The details, motivations and necessary steps for the data collection for the questionnaire are explained and the background to the data analysis using Structural Equation Modelling is provided.
4.3	Focus groups	The data collection for the focus groups is set into context with the phenomenological research and the data analysis is explained with a step-by-step guide.
4.4	Case study	Background information to the data collection for the case study is provided and the important considerations for data analysis are discussed.
4.5	Research framework	The research methods are summarised and opposed to the research objectives.
4.6	Summary	A summary of the key points of the chapter is provided.

4 Research method

4.1 Introduction

The techniques and procedures of data collection and analysis, which provide guidance and step by step instructions to bring a study into action, are also called research method (Moustakas, 1994; Saunders et al., 2012). “A method offers a systematic way of accomplishing something orderly and disciplined with care and rigor” (Moustakas, 1994, p. 104). The techniques and procedures are the most obvious and apparent characteristics of a research, but they are based on considerations and methodological choices regarding research philosophy, research approach, research design, research strategy and time horizon, which are much more in the background and less visible (Easterby-Smith et al., 2013). The considerations undertaken in the previous chapters are therefore the point of origin for the work at hand. Based on these methodological choices the utilised and adopted research methods within this work will be outlined. These include the following three methods (Saunders et al., 2012):

- Questionnaire: a questionnaire is a data collection technique in which each person is requested to respond to the same questions in a defined order.
- Focus group: a focus group is a group interview with an exactly and accurately defined topic and a focus on facilitating and audio-taping an interactive discussion between people.
- Case study: a case study utilises multiple sources of evidence in order to conduct an empirical investigation of a phenomenon in a real-life context.

These methods will be presented in the next sections in more detail.

4.2 Questionnaire

4.2.1 Data collection

For the survey research strategy four types of data collection are conceivable (Creswell, 2009): self-administered questionnaires, interviews, structured reviews to collect financial, medical or school information and structured observations. Out of these, questionnaires are the most common method of data

collection (De Vaus, 2002). They have a number of advantages but also disadvantages compared to the other types (Bryman, 2012). Disadvantages are e.g. that no additional questions can be asked, that the number of questions is limited, that the response rates are lower and that it is not verifiable who answered the questionnaire. But the advantages like e.g. the usually quicker administration, the non-appearance of interviewer effects or variability and the high convenience for respondents argue for the use of questionnaires as a data collection method for the work at hand.

There are different types of questionnaires which vary mainly in the administration and the delivery of the questionnaire. These different types are illustrated in Figure 4.1

Figure 4.1 – Types of questionnaires
(Saunders et al., 2012, p. 420)

The choice amongst these types is dominated by a selection of factors and attributes which are related to the research question. For the work at hand the self-administered, internet mediated questionnaire will be utilised to collect the quantitative data. This choice is rooted in the following reasons (Saunders et al., 2012):

- The population is computer-literate and can be contacted via email.
- The confidence that the right person has responded is high if using email.
- The probability of contamination of the respondent`s answer is low.
- The size of the sample can be large.

- The length of the questionnaire can be equivalent to six to eight A4 pages.
- Closed and not too complex questions, which must be of interest to the respondent are suitable.
- The data input is automated.
- There is no field work for the interviewer.

4.2.1.1 Sampling strategy

For conducting a survey it is essentially important to select an appropriate sample which allows the generalization from the sample to a wider population as generalizability is the elementary goal of quantitative research (De Vaus, 2002). This is usually done with probability sampling as with these sampling techniques for each entity the chance of being selected from the population is known (Fowler, 2014; Saunders et al., 2012). But for probability sampling a sampling frame for the population needs to be accessible from which the sample can be taken. As the research question for the work at hand is concerned with the construction project team in general (chapter 2) a sampling frame cannot be created and if it could it would be almost certainly incorrect as the construction project team in general is under constant change depending on the project.

Therefore a non-probability sampling technique will be utilised for the work at hand. These techniques are considered to be appropriate for business research although they can never provide the same level of generalizability from the sample to the population as probability sampling techniques do (Easterby-Smith et al., 2013; Saunders et al., 2012). Nevertheless it is not necessary for the work at hand to know exactly what proportion of the population gives a particular response, it is much more important to receive a notion of the range of responses and the ideas the respondents have. For this case it is absolutely appropriate to utilise a non-probability sampling technique while having a focus on getting a wide variety of people involved (De Vaus, 2002). The suitable sampling technique is a combination of purposive sampling which allows the researcher to select cases which will best answer the research questions and objectives based on predefined criteria and volunteer sampling, where the survey is published and participants are asked to distribute the questionnaire to colleagues (Collis and

Hussey, 2009; Saunders et al., 2012). With a heterogeneous purposive and volunteer sampling strategy, cases with varying characteristics are selected to obtain a maximum variation in the collected data which enables the researcher to describe and explain the most significant themes which can be observed (Patton, 2002).

To ensure that the data quality is high although a non-probability sampling is applied, criteria for the sample are defined before the survey is conducted. As the research addresses a very broad population only one criterion needs to be defined prior to data collection. This criterion is developed based on the literature review and the personal experience of the researcher and defined as follows: Each participant must be employed in the construction industry or must have fundamental experience as a client to a construction project.

Prior to completing the questionnaire, each potential participant will be required to confirm their eligibility to take part in this research. Furthermore additional information like position within the organization or work experience will be requested to ensure the data are consistent. With this tool it can be ensured that unsuitable participants can be separated.

4.2.1.2 Questionnaire development

The aim of the questionnaire is to collect the data that are required to answer the research question and to achieve the research objectives (Saunders et al., 2012). For this reason the conceptual framework, which was introduced in chapter 2, has been developed. Building on one part of this conceptual framework hypotheses are generated to serve as a basis for the development of the questionnaire (Figure 4.2).

The impact of organizational justice on the different aspects of project performance shall be examined. It has been stated in the previous chapter that ten human, behaviour and structure related antecedents of project performance have been chosen out of a pool of almost 50 (Chan et al., 2004; Jha and Iyer, 2007; Tabish and Jha, 2012), as they seem to fit best for the research at hand to

act as mediators. Additionally it has been explained that organizational justice needs to be differentiated in its three traditional dimensions (distributive, procedural and interactional) as each of them promotes different benefits (Cohen-Charash and Spector, 2001; Colquitt et al., 2001; Viswesvaran and Ones, 2002). Moreover the aspects of project success have been defined as cost, time and quality as well as client's satisfaction and the overall project performance. In the following the costs are referred to as compliance to the budget and the quality is referred to as compliance to specifications. Hence the following hypotheses have been developed:

Hypothesis 1
Organizational justice will be related to each antecedent of project performance.

Hypothesis 2
Each antecedent of project performance will be related to project performance.

Hypothesis 3
Organizational justice will be related to project performance.

Hypothesis 4
Organizational justice will be related to project performance net-mediated through the antecedents of project performance

Additionally the relationship between organizational justice climate and the aspects of project success shall be investigated. As exemplified in the previous chapter research on organizational justice climate has suggested promising results regarding its application (e.g. Colquitt, 2004; Colquitt et al., 2002; Liao and Rupp, 2005). Therefore the following hypotheses have been developed applying the same principles as before:

Hypothesis 5
Organizational justice climate will be related to each antecedent of project performance.

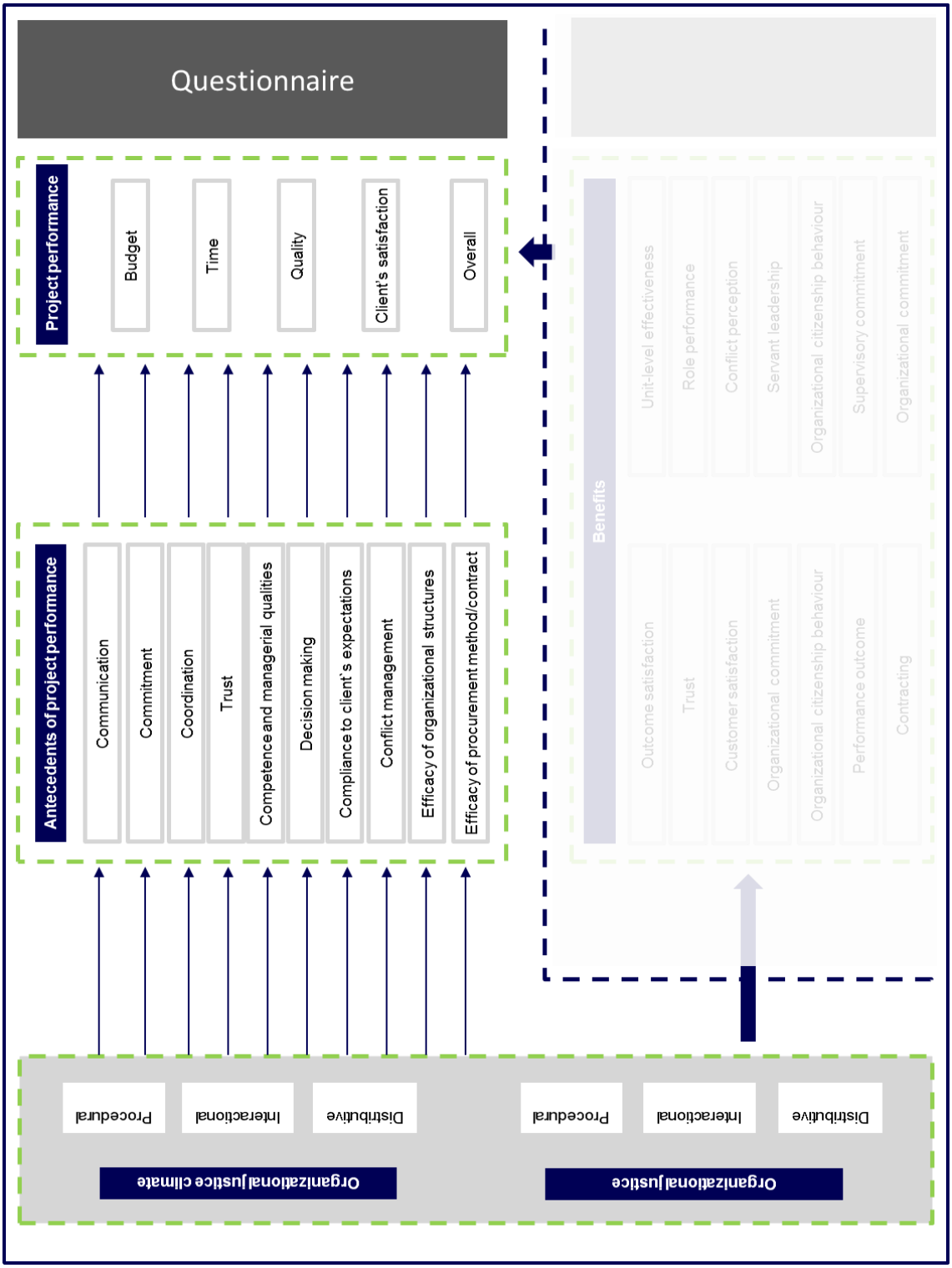

Figure 4.2 – Conceptual framework – Questionnaire

Hypothesis 6

Each antecedent of project performance will be related to project performance.

Hypothesis 7

Organizational justice climate will be related to project performance.

Hypothesis 8

Organizational justice climate will be related to project performance net-mediated through the antecedents of project performance

The hypotheses 1 to 8 serve as a framework for the data requirements table which helps to ensure that the necessary data for answering the research question will be collected (Saunders et al., 2012). Within the data requirements table the investigative questions, which are supposed to be the questions which are needed to answer the research question and to confirm or reject the hypotheses, are classified regarding the type of data they intend to collect (Dillman et al., 2009): opinion (what to respondents think? how do they feel about something?), behavioural (what do, did or will people do?) or attribute (what are a respondent's characteristics?) data.

Complementary to that the variables which shall be tested need to be defined and classified according the relationships among themselves (Bryman, 2012; Saunders et al., 2012):

- dependent variable (IV) → modifies in answer to changes in other variables
- independent variable (DV) → has a causal effect on dependent variable
- mediating variable (MeV) → is inbetween the dependent and independent variable and explains their relationship
- moderating variable (MoV) → influences the relationship of the dependent and independent variable

And finally the details of measurement of the collected data shall be described in the table. There are three main levels of measurement which can be differentiated (Collis and Hussey, 2009; De Vaus, 2002):

- interval level → sections can be ranked from high to low and the difference between the sections can be quantified
- ordinal level → sections can be ranked from high to low, but the difference between the sections cannot be quantified
- nominal level → sections cannot be ranked

The measurement level of data depends on the way the questions are asked or the kind of response alternatives which are provided (De Vaus, 2002). Therefore also the response alternatives shall be included in the data requirements table.

In the following the data requirements table for the work at hand will be presented (Table 4.1).

Investigative question	Variable required	Data measurement
Is there perceived distributive fairness from the client to the project team member?	Distributive fairness (IV, opinion)	Colquitt (2001), ordinal
Is there perceived procedural fairness from the client to the project team member?	Procedural fairness (IV, opinion)	Ibid
Is there perceived interactional fairness from the client to the project team member?	Interactional fairness (IV, opinion)	Ibid
Is there perceived distributive fairness from the client to the project team as a whole?	Distributive fairness climate (IV, opinion)	Colquitt (2001), ordinal
Is there perceived procedural fairness from the client to the project team as a whole?	Procedural fairness climate (IV, opinion)	Ibid
Is there perceived interactional fairness from the client to the project team as a whole?	Interactional fairness climate (IV, opinion)	Ibid

Investigative question	Variable required	Data measurement
Is there a clear, open, timely and direct communication in the project?	Communication (DV, behaviour)	5-point Likert scale, ordinal
Is there commitment within the project team?	Commitment (DV, attribute)	Allen and Meyer (1990), ordinal
How does the coordination work within the project?	Coordination (DV, behaviour)	5-pint Likert scale, ordinal
Is there a trustful relationship between the project team and the client?	Trust (DV, opinion)	Colquitt and Rodell (2011), ordinal
Does the client have competence and managerial qualities?	Competence and managerial qualities (DV, attribute)	5-point Likert scale, ordinal
How are the decision making procedures defined in the project?	Decision making (DV, behaviour)	5-point Likert scale , ordinal
Do the project team members comply with the client's expectations?	Compliance to client's expectations (DV, behaviour)	5-point Likert scale, ordinal
How are the conflict management procedures defined in the project?	Conflict management (DV, behaviour)	5-point Likert scale, ordinal
How are the organizational structures defined in the project?	Organizational structures (DV, behaviour)	5-point Likert scale, ordinal
Are the procurement method and wording of contract according to the client's doing?	Procurement method and contract (DV, behaviour)	5-point Likert scale, ordinal
Was the project completed within the budget?	Cost (DV, attribute)	5-point Likert scale, ordinal
Was the project completed on time?	Time (DV, attribute)	5-point Likert scale, ordinal
Was the project completed with the required quality/low level of defects?	Quality (DV, attribute)	5-point Likert scale, ordinal
Was the client satisfied after project completion?	Client's satisfaction (DV, attribute)	5-point Likert scale, ordinal

Table 4.1 – Questionnaire – Requirements table

In general an indirect measure is used for the questionnaire at hand, i.e. it does not directly ask e.g. how fair something is or how well someone communicates, it rather assess criteria which explain the variables (De Vaus, 2002; Lind and Tyler, 1988). An indirect measure is superior to a direct measure as it shows

higher correlations with the outcome and provides more information regarding beneficial criteria (Colquitt, 2001). For the subsequent data analysis it is important to have a sufficient number of items to create reliable new variables and it is recommended by Hoyle (2011) to have four items per variable.

For some of the variables used in this work well-established measures exist. It is recommended to use these well-established measures rather than developing new ones as they ensure a certain level of validity and reliability as well as the opportunity to compare the study to other studies which have used the same measure (De Vaus, 2002; Hansen et al., 2013).

Especially for the dimensions of organizational justice the measure developed by Colquitt (2001) is used very widely in the organizational justice research. Therefore this 20-item measure shall also be used for the work at hand. Additionally it shall also be used in a modified way to measure organizational justice climate. This approach was used by Li et al. (2013) and seems to be appropriate for the work at hand. Additionally there are well-established measures for commitment (Allen and Meyer, 1990) as well as for trust (Colquitt and Rodell, 2011) which will also be applied. For all other variables no well-established measures exist, therefore new measures need to be developed. The details of how the data are measured are displayed in the data requirements table above.

4.2.1.3 Reliability and validity

During the development of the questionnaire it is necessary to pay attention to the reliability and validity of the data which will be collected.

“Reliability refers to consistency of a measure of a concept” (Bryman, 2012, p. 169) which means that it is especially concerned if the questionnaire will produce consistent results on repeated occasions (Saunders et al., 2012). Sources of unreliability are e.g. bad wording which means that the question is not distinctly formulated or different coding which can occur when more than one person codes

the data (De Vaus, 2002). There are different ways of testing the reliability of a questionnaire (Bryman, 2012; De Vaus, 2002; Saunders et al., 2012):

- Test re-test method: a questionnaire is administered on one occasion and the same sample is later on required to re-answer the questionnaire under equal conditions. As there are a number of problems with this test, e.g. likelihood to answer the same questionnaire twice, change of circumstances, etc. it is recommended to use this test, if at all, only in combination with other tests.
- Internal consistency: the responses to questions in the questionnaire are correlated with each other. It is mostly measured with Cronbach's alpha which values vary between 0 (no correlation) to 1 (perfect correlation). Amongst researchers it is a common understanding that values of 0.7 and higher represent a good and acceptable indication that the questions tested measure the same thing.
- Alternative form: check questions are included in the questionnaire which means that some questions are used twice with different wordings to compare the responses.

For the work at hand the internal consistency will be tested with Cronbach's α during the evaluation of data. The test re-test method will not be applied as it is not possible to know the exact sample due to an internet survey. Furthermore the check questions will not be added to the questionnaire as it would become too long. It is assumed that with this measure, with a careful wording of the questions and with the application of methods during coding, the reliability of the questionnaire will be increased to an acceptable to good level (De Vaus, 2002).

"A valid measure is one which measures what it is intended to measure" (De Vaus, 2002, p. 53) which means that the suitable measure for the concepts needs to be identified and applied as a function of the definition of the concept. There are different approaches to assess the topic of validity (De Vaus, 2002; Saunders et al., 2012):

- Criterion validity: is a correlation test of how a new measure is answered compared to a well-established measure. This validity can only be tested for concepts where a well-established measure already exists which is often not the case.
- Content validity: is concerned with the extent to which the questions measure the concept. The suitable coverage can be judged e.g. through a clearly defined research or through the discussion with a panel to identify the useful and essential questions.
- Construct validity: refers to the extent to which a measure adapts with an existing theory and the ability for generalization. It is often not applicable due to the non-existence of theories.

None of the above described approaches is without problems as sometimes the prerequisites for none of them are given. Therefore a fourth approach can be adapted (Bryman, 2012; De Vaus, 2002): the face validity is set up by asking other people whether the question or the measure is the suitable one for the defined concept. For the work at hand the face validity approach will be chosen and the supervisors will act as judges whether the measures are appropriate or not in case they are not well-established.

4.2.1.4 Design of the questionnaire

The design of the questionnaire is crucial for a successful survey as it is not only about designing a good looking layout, it is also about how to motivate someone to become a respondent and how to obviate measurement problems like unintentional order effects or needlessly high nonresponse rates (Dillman et al., 2009). Therefore the established online survey system BOS was used to design the questionnaire. Bristol Online Surveys (BOS) is a survey tool which is designed to conduct surveys for academic research, education and public sector organizations (Bristol, 2015). It allows the user to choose an appropriate layout, to create an unrestricted number of questions for a limitless number of respondents as well as different types of questions and to differentiate between obligatory and non-obligatory questions (ibid).

The final questionnaire designed in BOS can be found in Appendix A1.1. The following paragraphs will describe the design and structure of the questionnaire.

The first step in designing the questionnaire is to draft a covering letter or a cover page. It is supposed to explain the aim of the survey including information about the issuing institution or organization, expected time needed to complete the questionnaire, usage of the results as well as notes regarding confidentiality and anonymity (Dillman et al., 2009). This is an important step in survey design as Dillman et al. (2009) demonstrate that the cover page is for many respondents the point of decision whether to complete the questionnaire or not. Therefore the cover page has a high influence on the response rate.

The second step in designing the questionnaire is the actual wording and the order of questions. The wording of questions clearly influences how the question is answered, therefore it is required to consider particularly the following factors (De Vaus, 2002; Dillman et al., 2009):

- The language used should be simple and clear.
- The question should be as short as possible.
- Only one question should be asked at a time.
- The question should not lead to a specific answer.
- The negation in questions should be avoided.
- The question should be answerable for the respondent.

The order of questions should be in a logical flow and if necessary a consciously chosen number of filter questions should be included (Saunders et al., 2012). Therefore questions should be grouped according to their topic and the visual presentation should be according to the topics, i.e. it should be decided e.g. how many questions shall be presented on one web page (Dillman et al., 2009).
For the work at hand the questionnaire is divided into five sections according to the topics examined in the questions:

- The first section is concerned with general information about the underlying project.
- The second section is concerned with the antecedents of construction project performance. This order is chosen as the participants need to be employed in the construction industry or client for a construction project and will therefore feel familiar with the factors which is positive regarding the response rate. As explained previously for the antecedents of construction project performance no well-established measures exist in general. Therefore only the already mentioned measures by Allen and Meyer (1990) for commitment and by Colquitt and Rodell (2011) for trust will be adapted and applied. The antecedents are measured as follows:

  Commitment is measured with three adapted items: "I really feel this project's goals are my own.", "I feel emotionally attached to this project." and "I feel a sense of belonging to this project team.".

  Communication is measured with four items, e.g. "The client or his/her representative communicates in an open and honest way." or "I receive the information I need from the client or his/her representative."

  Competence and managerial skills are measured with four items, e.g. "The client or his/her representative show integrity and reliability." or "The client or his/her representative are highly capable in their field of expertise.".

  Conflict management is measured with four items, e.g. "In case conflicts arise, the process of dealing with conflicts are clearly defined." or "I have the feeling that in case of a conflict I can talk to the client or his/her representative faithfully.".

  Coordination is measured with two items: "The coordination between the different parties in the project works sufficient." and "It is clearly defined who is responsible for the coordination."

  Decision making is measured with three items: "The process of decision making is clearly defined.", "The process of decision making considers short ways." and "Decisions are being made as soon as all necessary information is available.".

Compliance to client's expectations is measured with four items, e.g. "The aim of the project has been clearly defined." or "The project team members always intend to fulfil the project specification."

Organizational structures is measured with two measures: "Everybody in the project teams knows his/her role." and "If I have a question to a specific topic during the project I know immediately whom to talk to.".

Procurement method and contract is measured with five items, e.g. "The procurement method is suitable for the client." or "The rights and duties are equally distributed between the contract parties.".

Trust is measured with four adapted items, e.g. "I would be comfortable giving the client or his/her representative a task or problem that was critical to me, even if I could not monitor his/her actions." or "If I had my way, I wouldn't let the client have any influence over issues that are important to me.".

The measures will be assessed with a 5-point Likert scale where 5 = strongly agree and 1 = strongly disagree.

- The third section is concerned with organizational justice. For this purpose the well-established measure of organizational justice developed by Colquitt (2001) will be used. It suggests the differentiation into four dimensions of organizational justice, but for the work at hand interpersonal and informational justice will be grouped to interactional justice as suggested e.g. by Greenberg et al. (2005). Items are e.g. "Have you been able to express your views and feelings during those procedures?" or "Has (he/she) treated you in a polite manner?" (Colquitt, 2001, p. 389) and they will be measured with a 5-point Likert scale where 5 = to a large extent and 1 = to a small extent.
- The fourth section is concerned with organizational justice climate. As mentioned before the Colquitt (2001) measure will also be applied to measure organizational justice as suggested by Li et al. (2013). But the items need to be adapted to measure organizational justice climate therefore items are e.g. "Has the project team been able to express their

views and feelings during those procedures?" or "Has (he/she) treated the project team in a polite manner?" (adapted from Colquitt, 2001, p. 389). The 5-point Likert scale will be identical to the previous part.

- The fifth section is concerned with the collection of personal data of the respondent and the conclusion. This is to ensure that the respondent complies with the criterion defined above and if not the answers can be rejected during data analysis. Additionally a profile of the survey participants can be generated out of these information. Furthermore the participants get the opportunity to give additional feedback and request a copy of the survey findings.

The third and final step in designing the questionnaire is to draft a closing page. The closing page should inform the respondent in a friendly manner that the questionnaire has been completed and thank them for their participation (Dillman et al., 2009; Saunders et al., 2012).

For the sections one to four only closed questions will be used. The advantage of this type of question is, that it is faster and more comfortable to answer and that the responses can be collated more easily (Saunders et al., 2012). As all of the questions in these parts will be measured with a 5-item Likert scale all questions can be categorized as rating questions (ibid). In section five the participants will have the opportunity to give feedback and to advance an opinion therefore open questions will be applied.

Furthermore the questionnaire is translated into German as many of the participants will be based in Germany. The translation of a questionnaire needs to be conducted thoroughly as many misinterpretations can arise if the translation is not correct (Saunders et al., 2012). There are different techniques to execute the translation which vary in their degree of accuracy and effort (ibid). The back-translation is a technique which will reveal most of the issues by translating the original English questionnaire into German and the German questionnaire back into English. Based on the two English questionnaires a final German version can be created (ibid). This technique is applied to the questionnaire at hand except for sections three and four. These sections are based on the measure

developed by Colquitt (2001) which has been translated by Maier et al. (2007) and tested by Streicher et al. (2008). This translation is employed as far as possible.

4.2.1.5 Pilot testing of the questionnaire

Before the questionnaire will be administered with the defined sample it is pilot tested with a small group of people to ensure that the questionnaire as a research instrument works well (Bryman, 2012) and that the questions as well as the procedure are appropriate for the purpose (Dillman et al., 2009). It is stated by Dillman et al. (2009, p. 229) that "not doing a pilot study can be disastrous for web surveys in particular." The benefit of pilot testing lies especially in the following factors (Bryman, 2012; De Vaus, 2002; Dillman et al., 2009):

- Appropriateness of instructions can be tested
- Order and flow of questions can be tested
- Not-answered questions become obvious
- Measuring concepts can be tested
- Estimates regarding the response rates can be made
- Required time can be measured

To identify if the questionnaire works appropriately additional questions will be added only for the purpose of the pilot test (Saunders et al., 2012). As suggested by Bell (2014, p. 157) the following questions are included in the pilot test questionnaire:

- How long did it take you to complete?
- Were the instructions clear?
- Were any of the questions unclear or ambiguous? If you selected Yes, would you say which and why?
- Did you object to answering any of the questions?
- In your opinion, has any major topic been omitted?
- Was the layout of the questionnaire clear/attractive?
- Do you have any further comments?

The questionnaire was piloted with the postgraduate research students of the Built Environment and Sustainable Technologies (BEST) Research Institute at the Liverpool John Moores University (LJMU) which covered 40 people. Access to all members of the BEST Research Institute was given by the LJMU.

The link to the pilot questionnaire was distributed via e-mail. The researchers had thirteen days to complete the questionnaire and after eight days a friendly reminder was sent out via e-mail. The pilot survey resulted in a response rate of 27.5 % (11/40 = 0.275) which is appropriate according to Fellows and Liu (2008). The pilot questionnaire is analysed in two steps: at first the additional questions for the pilot test shall be analysed to get an impression about the administration of the questionnaire and second selected reliability, correlation and regression analyses shall be conducted to test the results of the questionnaire.

Administration of pilot questionnaire

With the instructions, the participants got the information that it should take no longer than 20 minutes to complete the questionnaire. The pilot test showed the duration for completing the pilot questionnaire varies strongly (Figure 4.3):

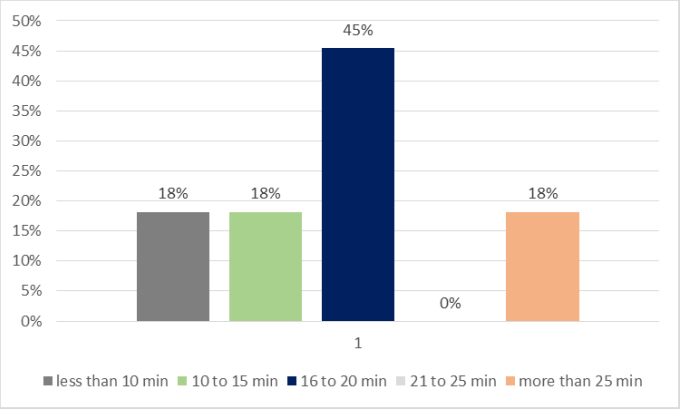

Figure 4.3 – Pilot test – Duration of completing the questionnaire

81% of the respondents were able to complete the questionnaire in 20 minutes or less therefore the length of the questionnaire seems to be appropriate. Furthermore all respondents confirmed that the instructions were clear, 90% found no unclear or ambiguous questions and 90% didn't object to answering any of the questions. In addition the layout of questionnaire was for all

respondents clear and attractive. These results show that the general set up of the questionnaire is adequate and can be used for the survey.

73% of the respondents acknowledged that no major topic has been omitted, 27% suggested to add certain topics. These topics were examined and it was decided that they are beyond the scope of research for the work at hand and that they will not be integrated in the questionnaire.

All feedback which was given during the process of the pilot test and in the open ended questions of the test have been taken into account and will be considered in the further development of the questionnaire.

Selected reliability, correlation and regression analyses

The selected reliability, correlation and regression analyses for the pilot test are based on the responses of the researchers from the BEST Research Institute with a total of eleven participants. This causes a non-representative sample and only restricted conclusions can be drawn from the results. Nevertheless for the purpose of the pilot test a selected number is analysed in the following.

As mentioned previously it is necessary to group the questions or items to the previously defined variables to be able to analyse the collected data (Hoyle, 2011). As the items of the variables of the antecedents of project success are not based on well-established measures their reliability needs to be tested (Saunders et al., 2012). Only with a sufficient reliability will the questions deliver the required data to answer the research question. The reliability is measured with Cronbach's α. There are different statements in the literature about which value indicates an acceptable or good level (Bryman, 2012; Field, 2013; Saunders et al., 2012) and based on these discussions it is assumed that a value of 0.7 indicates a reliable scale. The Cronbach's αs for the antecedents of project performance are displayed in Table 4.2:

Variable	Cronbach's α
Communication	0.633
Commitment	0.859
Coordination	0.721
Trust	0.808
Competence and managerial qualities	0.817
Decision making	0.928
Compliance to client's expectations	0.333
Conflict management	0.795
Efficacy of organizational structures	0.905
Efficacy of procurement method and contract	0.767

Table 4.2 – Questionnaire – Pilot test Cronbach's α

The table shows that for eight out of ten variables Cronbach's α is > 0.7 and therefore the questions can be used as reliable scales for these variables. The Cronbach's α for the variable communication is 0.633 which is slightly below the required number of 0.7.It is assumed that this imprecision is caused by the small, non-representative sample therefore only minor amendments in the wording will be undertaken. The Cronbach's α for the variable compliance to client's expectations is only 0.333 and it is assumed that this imprecision cannot be traced back to the sample but there must rather be deficiencies in the items. Therefore the wording of the questions is revised and two questions are added to obtain a more reliable measure.

The questions for the variables of organizational justice and organizational justice climate are not tested for reliability at this stage of work as they are based on well-established measures.

Additionally the correlation analysis between the dependent variables competence and managerial skills, communication and compliance to client's expectations and the independent variables organizational justice and organizational justice climate with its three dimensions each was conducted:

There is a significant relationship between competence and managerial skills and procedural justice ($r = 0.887$, $p < 0.000$) as well as interactional justice ($r = 0.579$,

p= 0.040), but there is no significant relationship between competence and distributive justice (r = 0.539, p = 0.067). Regarding competence and managerial skills and organizational justice climate there is a significant relationship with all three dimensions (procedural r = 0.579, p = 0.034; distributive r = 0.841, p = 0.002; interactional r = 0.827, p = 0.002).

There is a significant relationship between communication and procedural justice (r = 0.760, p < 0.003) as well as interactional justice (r = 0.595, p= 0.027), but there is no significant relationship between competence and distributive justice (r = 0.503, p = 0.069). Regarding communication and organizational justice climate there is a significant relationship with all three dimensions (procedural r = 0.700, p = 0.008; distributive r = 0.720, p = 0.009; interactional r = 0.733, p = 0.005). Compliance to client's expectations is significantly related only to interactional justice (r = 0.567, p = 0.44) but not to procedural (r = 0.057, p = 0.438) and not to distributive justice (r = 0.117, p = 0.382). Compliance to client's expectations is not at all related to one of the three dimensions of organizational justice climate (procedural r = 0.418, p = 0.115; distributive r = -0.176, p = 0.325; interactional r = 0.202, p = 0.288). These non-significant correlations are probably caused by the weak reliability of the score and will improve after the rewording of the questions.

The test of regression with some of the variables does not deliver useable results as all tests are not significant. This arises probably from the small sample and the resulting mostly not normally distributed data. With the final questionnaire and an appropriate sample these inaccuracies will probably vanish.

The selected analyses of the data of the pilot test show that the questionnaire needs minor amendments. After conducting these changes there is a good chance that the final questionnaire will deliver the required data to test the hypotheses and to answer the research question.

4.2.2 Data analysis

A wide variety of methods is available for data analysis of quantitative data. But the method applied cannot be chosen freely, it needs to be selected carefully based on the complexity of the research question and the type and number of variables (De Vaus, 2002). For the work at hand a two-step approach is chosen to analyse the data: First the data will be analysed with descriptive statistics to "summarise patterns in the responses of cases in a sample" (De Vaus, 2002, p. 207). Second structural equation modelling (SEM) which "uses various types of models to depict relationships among observed variables, with the same basic goal of providing a quantitative test of a theoretical model hypothesized by the researcher" (Schumacker and Lomax, 2010, p. 2) will be applied.

Before the data can be analysed they need to be prepared. The data are exported from the survey tool Bristol Online Survey (BOS) to a data matrix, where the variables are represented in the columns and the different cases in the rows (Saunders et al., 2012). When the questionnaire was designed and set up it was pre-coded by the researcher, i.e. the answers were transformed into numbers or rather numerical codes (De Vaus, 2002), which are now represented in the data matrix. Furthermore short forms were developed for all the variables which facilitate the analysis. The coding table for the short forms can be found in Appendix A1.2. The data matrix forms the basis for the subsequent data analysis.

4.2.2.1 Descriptive statistics

As the name already implies, descriptive statistics are an approach to describe the properties and characteristics of data. They are mostly basic and traditional techniques which allow the accession of the data. The data are calculated and analysed with the software called "IBM SPSS Statistics Version 23", in short SPSS. SPSS is one of the most widely used statistical software packages for social scientists (Bryman, 2012) and therefore a reliable tool to conduct the analyses. The data matrix is exported from BOS and imported into SPSS to analyse the data.

For descriptive statistics univariate analysis is carried out including frequency tables. In this context a data screening for outliers, missing data, normality, collinearity, linearity and homoscedasticity, relative variances as well as reliability and validity are conducted to prepare the data for structural equation modelling. This is necessary as most methods in SEM assume certain attributes of the data (Kline, 2011).

4.2.2.2 Structural equation modelling

SEM is a method which is used to specify and estimate models which possess linear relations amongst variables and the correspondent model is a hypothesized outline of directional and non-directional linear relationships between these observed or measured (MV) and latent (LV) variables (MacCallum and Austin, 2000). It has become a widely used method in psychological and operations management research (MacCallum and Austin, 2000; Shah and Goldstein, 2006) quite in contrast to construction project management research. An online-search in the database of the highest ranked journal in construction management, Construction Management and Economics, showed that this method was applied in at most 18 papers in the whole publication duration of this journal. The leading research methods book in construction management by Fellows and Liu (2008) covers only the basic statistical analysis methods and in the more advanced one by Knight and Ruddock (2008) it is not very widespread. On the contrary in other research fields like psychology or social sciences there is a high number of further books which deepen this topic (e.g. De Vaus, 2002; Hoyle, 2011).

SEM has been chosen as the preferred method for this research as the aim of SEM is to examine the degree of support of the theoretical model by the sample data (Schumacker and Lomax, 2010), which is congruent with the aim of the work at hand. Furthermore SEM enables the researcher to use a high number of observed variables to create latent variables, has got good acceptance regarding validity and reliability because of the consideration of measurement errors and has evolved during the last decades so that more complex models can be analysed with the help of advanced computer programmes (ibid).

In the course of SEM a model needs to be specified, identified, estimated, tested and presumably modified. Some of these steps are repetitive as it might be the case that one model needs to be modified various times to achieve adequate model fit (Gaskin, 2012; Kline, 2011; Schumacker and Lomax, 2010). These tasks are undertaken with the help of the software called “IBM SPSS Amos Version 23”, in short AMOS. The required steps are outlined in the following:

Step 1 – Model specification

In order to convert the hypotheses developed in chapter 4.2.1.2 to a model the specification of a model is the first and most important step in SEM as all the later results assume that the specified model is correct (Kline, 2011). In the course of step 1 a measurement model and a structural model are specified. The measurement model is developed to “define the relationships between the latent variables and the observed variables” (Schumacker and Lomax, 2010, p. 184) whereas the structural model is developed to “indicate how these latent variables are related” (Schumacker and Lomax, 2010p. 187). It is highly recommended to specify the measurement as well as the structural model previous to the actual data collection so that the data collected suit the specified models (Kline, 2011)

The measurement model is developed on the basis of the statements in connection with the development and design of the questionnaire (4.2.1.2. and 4.2.1.4.). As McDonald and Ho (2002) as well as Shah and Goldstein (2006) emphasize the importance of the theoretical justification of the assumed relationships this topic is considered in greater depth. The measurement model is a model which shows how the latent variables are created.

The indicators of both organizational justice and organizational justice climate are based on the well-established measure of Colquitt (2001). It is assumed that the items are each caused by the different factors, i.e. they are reflective indicators (Kline, 2011). Each indicator has got a measurement error term which is a unique variance, that stands for the contingent of the indicator which is not measured by the factor (Schumacker and Lomax, 2010). It represents random errors like score unreliability as well as causes of systematic errors which are not on account of the factor (Kline, 2011). Furthermore the measurement error terms

of the different indicators for organizational justice and organizational justice climate are correlated as it is assumed that each indicator on the dimensions of organizational justice has “something in common” (Kline, 2011, p. 115) with its corresponding indicator on the dimensions of organizational justice climate which is not explained and represented by the model and therefore unknown, whereas for reasons of identification (next section) the error terms of two indicators per pair of factors are not correlated. These assumptions are justified in the fact that the same questions are used as indicators which refer once to the personal experience and once to the experience of the whole team. The correlation of measurement error terms leads to a multidimensional measurement which makes the model more complex (Kline, 2011).

The three factors (LVs) for the dimensions of organizational justice and organizational justice climate respectively are covariant because their relationships are unanalysed in a way that there is no reasoning in the model why they covary. Furthermore each factor has got a variance because they are viewed as exogenous variables and the causes of them are not constituted in model. These assumptions make them free to vary and covary (Kline, 2011).

The indicators of the antecedents of construction project performance are partly based on well-established and partly on newly developed measures. As for the first part of the measurement model it is assumed that the items are each caused by different factors, i.e. they are reflective indicators. Accordingly each indicator has got the previously described measurement error terms (Kline, 2011; Schumacker and Lomax, 2010).

The ten factors (LVs) of antecedents of project performance are again covariant because their relationships are also unanalysed in a way that there is no reasoning in the model why they covary. Furthermore each factor has also got a variance like previously described. These assumptions make them free to vary and covary (Kline, 2011). This initial measurement developed prior to the data collection is shown in Figure 4.4.

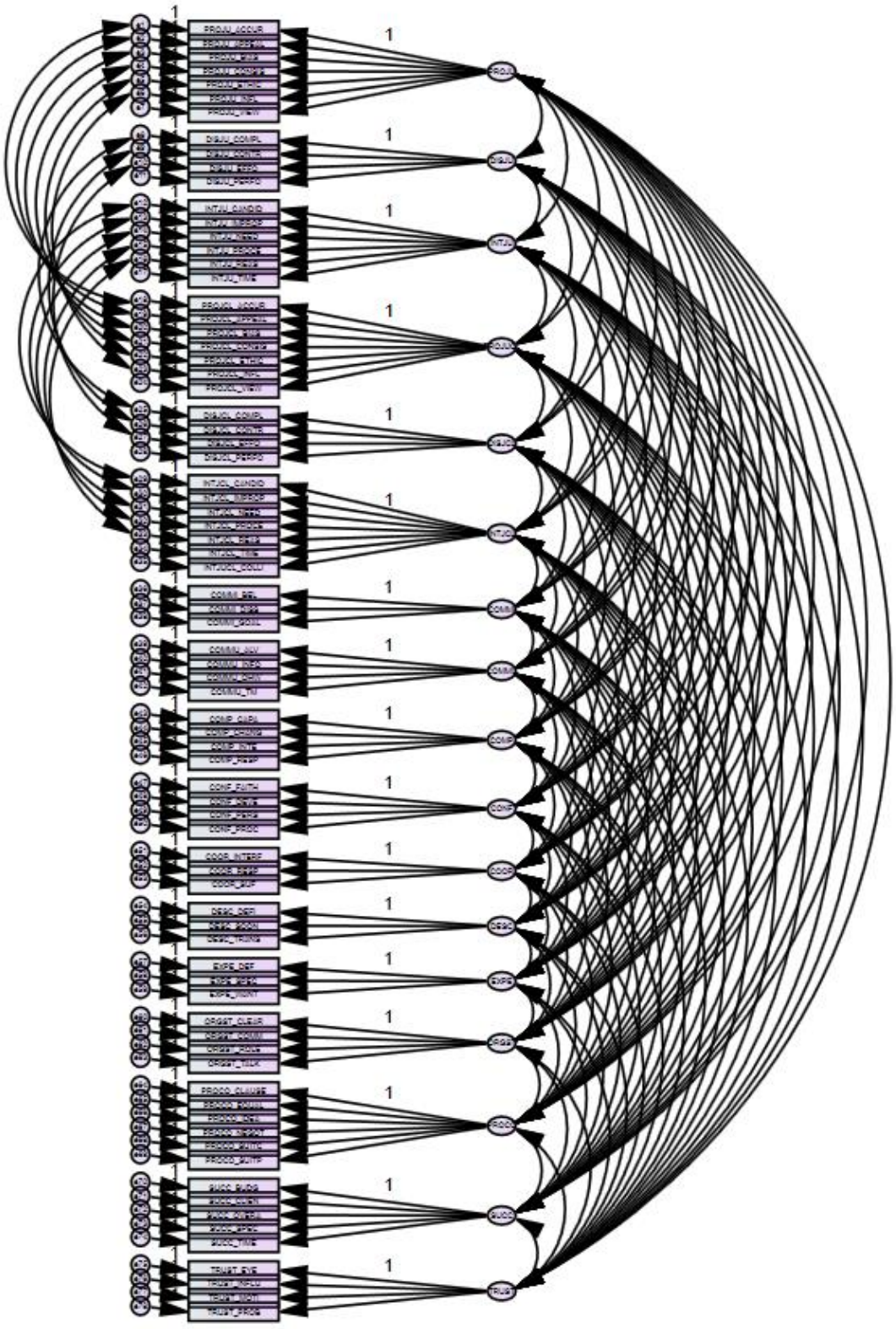

Figure 4.4 – Measurement model – Initial model

This measurement model is a confirmatory factor analysis (CFA) model which is analysed after the data collection is completed. It is a standard CFA model (Kline, 2011). The results of the analysis are reported in the next section.

With the measurement model the latent variables are identified and it is therefore the task of the structural model to show how it is assumed that these latent variables are related to each other. The structural model is just as well based on the statements in connection with the development and design of the questionnaire (4.2.1.2. and 4.2.1.4.). The reasoning for the relationships will be given in more detail in the following as it is really important to explicitly describe the theoretical foundation of the model (McDonald and Ho, 2002).

The structural model is a path model which consists of the latent variables of the measurement model. The variables are differentiated in dependent and independent variables whereas the dependent variables change under the influence of the independent (Saunders et al., 2012). In SEM there is an additional differentiation in exogenous variables, which don't have an arrow pointing at them and which are therefore independent, and endogenous variables, which are mediators or dependent variables (Kline, 2011).

In the model the different dimensions of organizational justice and organizational justice climate are assumed to be the exogenous variables. As extensively discussed in the literature review (chapter 2) organizational justice has positive effects on the organization itself as well as on the employees. These are e.g. outcome satisfaction, trust, customer satisfaction, organizational commitment and organizational citizenship behaviour as well as performance outcome and contracting (e.g. Allen and Meyer, 1990; Cohen-Charash and Spector, 2001; Colquitt et al., 2001; Fassina et al., 2008; Folger and Konovsky, 1989; Luo, 2007; Poppo and Zhou, 2013; Simons and Roberson, 2003). Additionally the benefits of organizational justice climate are e.g. unit-level effectiveness, role performance, conflict perception, servant leadership, organizational citizenship behaviour, supervisory commitment and organizational commitment (Colquitt, 2004; Ehrhart, 2004; Liao and Rupp, 2005; Whitman et al., 2012). Therefore it has been proven by previous research that there is wide variety of positive effects

based on the application of organizational justice and organizational justice climate. Hence, it is assumed that the application of organizational justice and organizational justice climate can positively influence the performance of construction projects.

But it is not only the direct effect on project success that is interesting, it is also the influence of organizational justice and organizational justice climate on and through the antecedents of project performance. The antecedents of project performance have been carefully selected out of a large number of so called critical success factors (e.g. Chan et al., 2004; Jha and Iyer, 2007; Tabish and Jha, 2012). The focus in the selection was on human, behaviour and structure related factors as it is assumed that they can be influenced by the application of organizational justice and organizational justice climate. Therefore the following ten factors have been chosen as endogenous variables: organizational commitment (COMMI), communication (COMMU), competence and managerial qualities (COMP), conflict management (CONF), coordination (COOR), decision making (DESC), compliance to client's expectations (EXPE), efficacy of organizational structures (ORGST), efficacy of procurement method and contract (PROCO) and trust (TRUST).

For the work at hand the antecedents of project performance act as mediators for the relationship between the independent and dependent variables. The mediators are therefore an intervening process of how the independent variable influences the dependent variable (Iacobucci, 2008). Mediation is important as it facilitates the understanding of direct and indirect effects on the dependent variable and allows statements about causality (Kline, 2011). The treatment of causality using mediation models is something of a controversial topic in the field of operations management, as the data are often correlated and there are no statistical techniques which conclusively prove causality. However, in order for the results to be deemed valuable, it is suggested that causality can be assumed if the relationships between variables are well-founded in theory (Iacobucci, 2008; Kline, 2011) – as is the case in our model (see earlier discussion).

The different aspects of project success are the dependent variables. As explained in section 2.4 success can have various different characteristics depending on the perspective. For the work at hand five aspects were chosen to represent the project success. These are the classical iron triangle of cost (SUCC_COST), time (SUCC_TIME) and quality (SUCC_QUAL) (Winch, 2010) and the client's satisfaction (SUCC_CLIENT) (Lehtiranta et al., 2012) as well as the overall project performance as perceived by the participants (SUCC_OVERA).

The lines between the exogenous and endogenous variables represent the direct effects of the different dimensions of organizational justice and organizational justice climate on the antecedents of construction project performance and their direct effects on the aspects of project success which are assumed based on the preceding explanation. Furthermore each endogenous variable has a disturbance D, which is also called prediction error and which stands for the unexplained variance in the endogenous variable (Kline, 2011). This means that the disturbance represents the share of the latent variable which is not accounted for by the other latent variables (Schumacker and Lomax, 2010).

The aspects of project success are single indicator variables as each aspect is viewed individually. With single indicator variables it is necessary to assess the proportion of variance of its measurement error prior to the data analysis to ensure identification of the model (Kline, 2011). The value of the variance can either be estimated based on the researcher's experience or with a sensitivity analysis (ibid). As it is difficult to estimate the variance, it is decided to conduct a sensitivity analysis later on.

The initial structural model developed prior to data collection is shown in Figure 4.5.

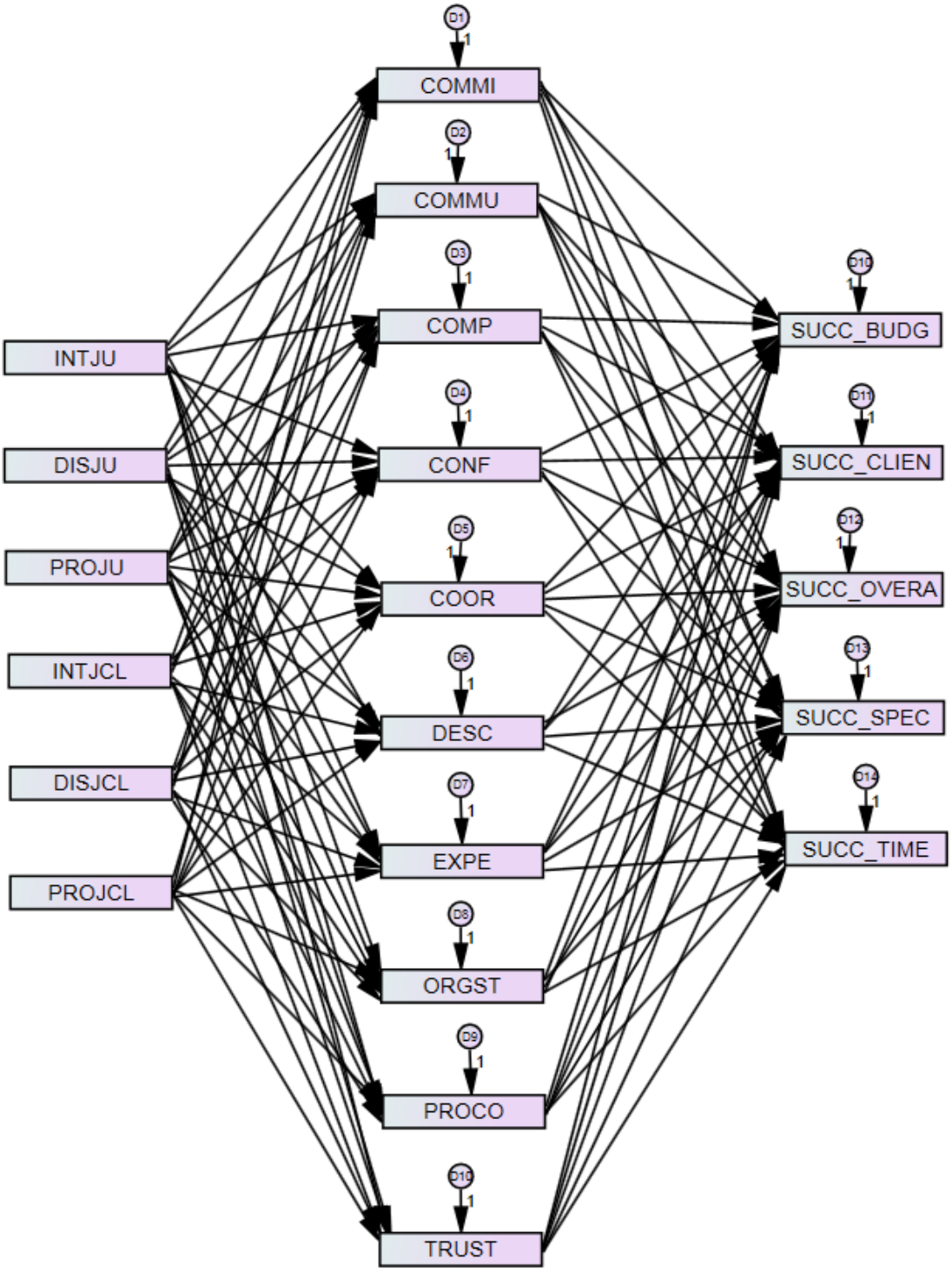

Figure 4.5 – Structural model – Initial model

In addition to the initial structural model an alternative structural model is developed to be tested after data collection. The alternative structural model includes more indirect or rather moderation effects by introducing interaction variables (Gaskin, 2012). In this model it is assumed that the joint effect of each dimension of organizational justice with its corresponding dimension of organizational justice climate is even more positive on the different aspects of project success through the antecedents of project performance than only the single effect of each dimension. Therefore three additional latent exogenous variables are added to the model (INTJU x INTJCL, DISJU x DISJCL and PROJU x PROJCL). The alternative model which was also developed prior to data collection is shown in Figure 4.6.

The third model required for SEM is the structural equation model. It is usually a combination of the two previously described models: the measurement and structural model and often called structural regression model (Kline, 2011). With a structural regression model hypotheses about direct and indirect effects can be tested and latent variables can be integrated, i.e. the advantages of path analysis and confirmatory factor analysis are combined (ibid). As the latent variables can be computed with AMOS the structural regression model looks identical to the structural model.

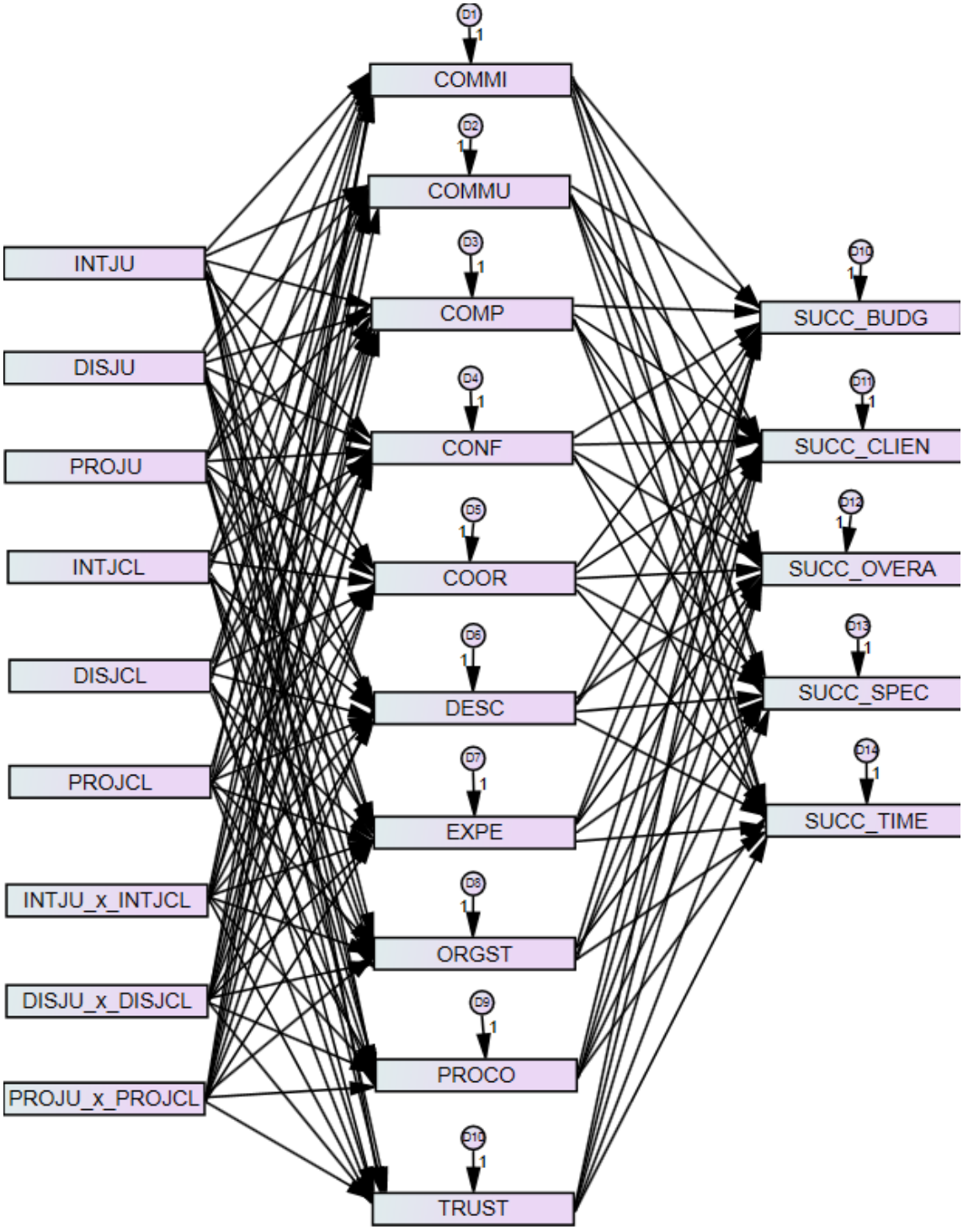

Figure 4.6 – Structural model – Alternative model

Step 2 – Model Identification

After the model estimation it is essential to test if the model is identified, i.e. if it is theoretically feasible to calculate a single set of model parameter estimates for the specified model (Kline, 2011; Schumacker and Lomax, 2010). This task should be carried out before the actual data collection takes place, as in case the model is not identified the survey needs to be adapted (Kline, 2011). There are different kinds of identification which are differentiated by their degree of freedom df_M and explained in the following (Schumacker and Lomax, 2010). The degree of freedom is a term which "relates to the number of observations which are free to vary" (Field, 2013, p. 49).

- Under-identification → there are more parameters than observations and it is impossible to uniquely determine one or more parameters ($df_M<0$).
- Just-identification → there is a unique solution to the model ($df_M=0$).
- Over-identification → there are more observations than parameters and a unique solution can be forced with statistical criteria ($df_M>0$).

There are certain requirements which must be met, so that a model can be identified at all. These requirements are necessary for identification, i.e. they need to be met, so that a model can be identified at all, but they are not sufficient, i.e. it doesn't mean that a model actually is identified because of these criteria (Kline, 2011). These are as follows:

- Order condition: The order condition is satisfied if the model is just- or over-identified. The model degrees of freedom for the research at hand are greater than zero based on the following calculations. (Kline, 2011; Schumacker and Lomax, 2010):

  p=v(v+1)/2 p=81(81+1)/2=3.321

  q=237 (65 factor loadings, 61 measurement error variances and 20 covariances, 6 latent independent variable variances and 15 covariances, 10 equation prediction error variances and 0 covariances, 60 structure coefficients)

df_M=p-q df_M=3.321-237=3.084 > 0

(v=observed variables, p=observations or numbers of values in matrix, q=estimated variables or free parameters)

→ The model is therefore over-identified and the requirement met.

- Rank condition: The rank condition is satisfied, if a scale is assigned to every latent variable including error terms and it is a recursive model. For the research at hand this is appropriate as all error terms and disturbances have got a unit loading identification (ULI) which is constraint to 1.0. Furthermore for each factor a direct effect on any of the indicators is constraint to 1.0 with a ULI.

  → The requirement is therefore met.

Additionally the rules for identification by Kline (2011) are applied:

- The structural model is recursive, therefore it is identified.
- The measurement model is a standard CFA model, therefore it is identified.
- The structural as well as the measurement model are identified, therefore the SEM model is identified.

In summary it can be stated that the model at hand is over-identified as it has got fewer free parameters q than observations p (df_M>0). This is what is interesting for SEM and therefore a good basis for the subsequent model estimation.

Step 3 – Model Estimation

The model estimation is concerned with the calculation of estimates for each parameter in the model (Schumacker and Lomax, 2010). Most often the method of maximum likelihood (ML) estimation is applied in SEM and its aim is “to find a set of estimates for free parameters that maximize the likelihood of the data given the specified model” (Hoyle, 2011, p. 38). ML is an iterative process which requires a suitable start value to be successful, i.e. to deliver converged solutions. The start value is usually set by default in the computer program, but in some cases a start value needs to be provided as otherwise the iteration fails (Kline, 2011). But also when converged solutions are obtained it is important to examine

the data if they are plausible as improper solutions, which are also called Heywood cases, might occur (Hoyle, 2011; Kline, 2011). These contain e.g. negative variance estimates or estimated correlations between factors with values greater than 1.0.

The ML estimation is a scale free as well as a scale invariant method, i.e. a parameter which is estimated based on a linearly transformed scale can be mathematically changed back and the value of the ML fitting function does not change in subject to the scale of the observed variable (Kline, 2011). This is especially applicable for the unstandardized variables which are generally assumed in ML. For this purpose usually a covariance matrix is the basis for analysis whereas a correlation matrix would serve as the basis for standardized variables. However, the drawback with standardized variables is that no standard errors are calculated and therefore the level of significance may deviate (ibid).

Generally the following parameter estimates are analysed and interpreted during ML (Kline, 2011):

- Direct effects of the exogenous variables on the endogenous variables
- Disturbance variances which describe the unexplained variability for each endogenous variable
- Indirect effects through mediator or interaction relationships

Direct effects are either unstandardized or standardized and represent the direct effect of one variable on the other. They are interpreted as regression coefficients (Kline, 2011) and calculated by AMOS.

The indirect effects represent the product of direct effects through one mediator and for the research at hand that means the indirect effect of a dimension of organizational justice or organizational justice climate on the different aspects of success mediated through the antecedents. There are different approaches to identify indirect effects which are all not without criticism. The most widely applied approach was developed by Baron and Kenny (1986) and it states that three tests need to be conducted to conclude for mediation: there must be a significant

direct effect between the independent variable and the mediator, there must be a significant direct effect between the independent variable and the dependent variable and there must be a significant direct effect between the mediator and the dependent variable. The main criticism of this approach is, that it requires a significant direct effect between the independent and dependent variable, because mediation can also exist without this significant direct effect (Hayes, 2009; Zhao et al., 2010). Furthermore this approach as well as most of the others (e.g. causal step approach, product-of-coefficient approach, distribution of the product strategy, bootstrapping) are focused on simple mediation models, i.e. mediation models with only one mediator (Preacher and Hayes, 2008). But the work at hand shows ten mediators and therefore a more advanced approach to determine indirect or mediation effects needs to be applied. There are various benefits in the use of a multiple mediation model compared to a simple one (ibid):

- The total indirect effect is tested similar to a regression analysis with multiple predictors and aims to identify an overall effect. If this one exists it can be deduced that the mediators influence the relationship between the independent and the dependent variable.
- The extent of influence of one mediator in the presence of the others can be detected.
- The probability of parameter bias caused by neglected variables is reduced.
- The relative importance of each mediator compared with the others can be specified and therefore theories can be compared.

Additionally it is also worth noting that with multiple mediators usually the joint effects of the mediators are determined and that these joint effects of each mediator, also called specific indirect effects, always differ from the effect the mediator would have in a simple model with just one mediator (Preacher and Hayes, 2008). The reason for this is that usually the mediators are correlated. This is generally not a problem, it is just important to mention that due to the correlation the abilities to mediate are not compared, “but rather their *unique* abilities” (Preacher and Hayes, 2008, p. 887). Thus, a specific indirect effect stands for the ability of a mediator to mediate the relationship between the

independent and dependent variable while controlling for all other mediators (ibid). For the work at hand it is decided that the specific indirect effects are examined.

According to Preacher and Hayes (2008) the most powerful and reasonable approach in the context of multiple mediator models is the enhanced approach of bootstrapping. They as well as Hayes (2009) emphasise that next to bootstrapping no additional tests like the Baron and Kenny (1986) approach need to be conducted, but Gaskin (2013e) recommends applying a three-step approach and checking first the direct effects between the independent and the dependent variable with and without the mediators, then analysing net-mediated indirect effects with bootstrapping and applying a subsequent Sobel test for the analysis of the specific indirect effects.

The Sobel test allows us to determine the influence of each mediator on each indirect effect, i.e. it provides additional information about the relationships and also their significance. It is calculated with an online calculation tool (Sopper, 2015) using the bootstrapped unstandardized direct effects from the independent to the mediator variable and from the mediator to the dependent variable as well as the corresponding standard errors. The Sobel test has been criticised in the past as bootstrapping is more strict and powerful (Zhao et al., 2010), but to identify the specific contribution of a mediator in multiple mediator models currently no other method is available apart from programming user-defined estimates (Gaskin, 2013e). The Phantom Model Approach by Macho and Ledermann (2011) is also an alternative but it hasn't been used very frequently and is regarded as not suitable for the work at hand. The relationships are first analysed regarding their type of relationship based on Zhao et al. (2010). The following types are differentiated:

- Indirect-only mediation: the Sobel test statistic is significant but the direct effect (with mediator) is not.
- Direct-only mediation: the Sobel test statistic is not significant but the direct effect (with mediator) is.

- No effect non-mediation: neither the Sobel test statistic nor the direct effect (with mediator) are significant.
- Complementary mediation: the Sobel test statistic and the direct effect (with mediator) are significant and they have the same sign.
- Competitive mediation: the Sobel test statistic and the direct effect (with mediator) are significant but they have opposite signs.

Additionally the total effects, which represent the sum of all direct and indirect effects of one variable on another, shall be reported (Kline, 2011). The standardized total effects are just as all the other effects interpreted as regression coefficients.

For the application of ML certain assumptions must be met otherwise it does not deliver robust results. The most important assumption is that the model is specified correctly, but furthermore the data must be normally distributed and only continuous variables can be analysed (Kline, 2011). The work at hand works mainly with ordinal variables (see 4.3.1.2), i.e. an important assumption is not met. There are alternative estimation methods available for ordinal variables like the categorical variables methodology (CVM) or the weighted least square estimates (WLS) but they all have certain restrictions like sample size which are not easily met with the work at hand. Furthermore the quality of results is often not as reliable as with ML estimation (ibid). Therefore in case the data show only minor to moderate non-normality with the ordinal scale the ML method is used anyway for the work at hand as recommended by Schumacker and Lomax (2010). This seems to be the appropriate method as it is also used in published articles with ordinal data (e.g. Liu et al., 2012).

The decision about the estimation method applied for the work at hand is made in the next chapter after the data preparation and screening as it is then obvious if the data are normally distributed or not.

Step 4 – Model Testing

After the data collection the models need to be tested regarding their fit. But it is worth emphasising that the ultimate goal of SEM is not to reach a very good model fit. It is much more about testing a theory "by specifying a model that represents predictions of that theory among plausible constructs measured with the appropriate indicators" (Kline, 2011, p. 189). Therefore it is always important to reason the model with an underlying theory and to evaluate the model fit in connection with the theory. Especially as model fit is a complex question and cannot simply be answered with yes or no. A good fit of a model does not indicate that a model is true or accurate, it only indicates that a model is plausible (MacCallum and Austin, 2000). The guidelines for interpreting fit indices are only rules of thumb and the decision about the most suitable model needs always to be grounded in the underlying theory (Kline, 2011). It is recommended that various model fit indices are always reported as none of the existing ones actually meets the criteria of good fit indices (Schumacker and Lomax, 2010) and as there is hardly any area where there is an agreement regarding the fit index cut-offs (Brown, 2015). The most common fit indices which are used for the work at hand are described in the following:

- Model chi-square $\chi^2_{M:}$ A significant model chi-square χ^2_M rejects the exact fit hypothesis, which means that the model does not represent the sample data exactly (Brown, 2015). It is a badness-of-fit statistic (Kline, 2011). But the χ^2_M received some substantial criticism especially that it is a very strict measure which is only interested in the exact fit in comparison to alternative measures which don't apply such rigorous standards but are more interested in an appropriate fit (ibid). Additionally the proportion of the χ^2_M divided by the df_M is analysed. It is supposed to be between 1.00 and 3.00 to represent a good value (Gaskin, 2013c).
- Root Mean Square Error of Approximation (RMSEA): The RMSEA is a parsimony-adjusted index which theoretically assumes a non-central chi-square distribution and is also a badness-of-fit statistic (Kline, 2011). A value of zero implies the best fit whereas a value of ≤ 0.05 for the lower boundary of the 90% confidence interval (CI) indicates that the close-fit

hypothesis cannot be rejected and a value ≥ 0.10 of the upper boundary of the 90% CI signals that the poor-fit hypothesis cannot be rejected (ibid).

- Goodness-of-Fit Index (GFI) The GFI is an absolute fit index which assesses how much better a researcher's model fits versus no model whatsoever (Kline, 2011). It spreads between 0.00 and 1.00, whereas 1.00 indicates the best fit and a value close to 0.90 or 0.95 indicates good model fit (Schumacker and Lomax, 2010).
- Comparative Fit Index (CFI): The CFI is an incremental fit index which assesses how much the fit of a proposed model improves compared to a null model (Kline, 2011). There are varying opinions which threshold represents a good model fit and no real conclusion can be drawn upon this (see Kline, 2011 for a discussion). But the value of the CFI is usually between 0.00 and 1.00 whereas 1.00 represents the best fit.
- Normed Fit Index (NFI): The NFI compares a restricted model with a full model utilising a null model (Schumacker and Lomax, 2010). It also spreads between 0.00 and 1.00 with 1.00 indicating the best fit, whereas a value close to 0.90 or 0.95 indicates good model fit (ibid).
- Tucker-Lewis Index (TLI): The TLI also compares a proposed model with a null model, but can also be used to compare two alternative models. It is another model fit index with an interval between 0.00 and 1.00 with 1.00 representing the best model fit, whereas a value close to 0.90 or 0.95 indicates good model fit (Schumacker and Lomax, 2010).
- Root-Mean Square Residual (RMR) and Standardized Root-Mean Square Residual (SRMR): The RMR is an index of the mean absolute covariance residual (Kline, 2011). No defined level exists for it, but it can be used to compare two different models (Schumacker and Lomax, 2010). There is a standardized version of the RMR, the SRMR, which uses correlation matrices as basis. It usually has values between 0.00 and 1.00 whereas 0.00 indicates the best fit, i.e. the smaller the value the better the model fit (Brown, 2015). There are different thresholds available in the literature which vary between a value less than 0.05 and less than 0.08 for the indication of a good model fit (Kline, 2011; Schumacker and Lomax, 2010).

The above described interpretation of the fit indices needs to be viewed critically as, as mentioned before, the cut-offs of the indices are not commonly agreed on values (Brown, 2015). Therefore it is recommended to apply additional guidelines regarding a combined evaluation of fit indices. These are the guidelines of Hu and Bentler (1999) as well as the rule of thumb by Browne and Cudeck (1993) as shown in Table 4.3:

Fit statistic	Recommended value for good fit
Hu and Bentler (1999) guidelines	
SRMR	≤0.08
RMSEA (90% CI)	Close to or <0.06
CFI	Close to or >0.95
TLI	Close to or >0.95
Browne and Cudeck (1993) rule of thumb	
RMSEA adequate fit	<0.08
RMSEA good fit	<0.05
RMSEA upper value 90% CI	<0.08

Table 4.3 – Questionnaire – SEM combined fit statistics

The model fit indices can all be generated in AMOS. The evaluation of the model fit is carried out according to the previously described guidelines in the next chapter, first for the measurement model and second for the structural model.

Step 5 – Model modification

As mentioned before it usually is the case that the initial model does not show good or optimal model fit. For this reason step 5 – model modification is conducted. Model modification is usually either model trimming, during which free parameters or paths are deleted, or model building, during which free parameters or paths are added (Kline, 2011). The goal of model modification is to find a model which properly fits the data and is at the same time theoretically feasible and justifiable (ibid).

AMOS supports the model modification process as it suggests modification indices. These modification indices improve the model fit, but they cannot be

simply adopted in the model as they need to be compared with and justifiable by the underlying theory.

The steps 4 and 5 of SEM can be repeated in an iterative process until a satisfactory model fit is reached which is theoretically justifiable. This model is then used as the final model for further analysis and discussion.

Equivalent models

After a final model is obtained it is also important to take into account equivalent models which could fit the data as well as the final model. They produce the same correlations and covariances as well as the same fit indices and it is therefore crucial to acknowledge their existence and to take them into account when making any interpretations otherwise the validity of the study is threatened (Kline, 2011). The recognition of equivalent models in research has been very little over the last 20 to 30 years and although there have been attempts to address this important issue, not much has changed (Brown, 2015; MacCallum and Wegener, 1993). This might be founded in the fact that so far no computer program exists which supports the development of these equivalent models and as more complex models can have more than a thousand equivalent models it is comprehensible that this task has been neglected so far (ibid). Nevertheless Kline (2011) recommends that at least a couple of sensible models are developed and examined.

To do so it is advisable to use the replacement rule developed by Lee and Hershberger (1990), which supports in the development. Based on this replacement rule it is recommended to try to identify some equivalent models for the work at hand. But it is emphasised by Schumacker and Lomax (2010) that the goal of reproducing exactly the same variance-covariance matrix and model-fit indices is rarely achieved. The equivalent models are developed and analysed in the chapter 5.

4.3 Focus groups

4.3.1 Data collection

In a phenomenological research the characteristic method of data collection is the interview. It "involves an informal, interactive process and utilizes open ended comments and questions." (Moustakas, 1994, p. 114). There are twelve key aspects which characterise a phenomenological study (Brinkmann and Kvale, 2015, p. 32ff):

- Live world: the live world is the main subject of the interview, i.e. an unprejudiced narrative of the interviewee's lived everyday world shall be accessed.
- Meaning: the meaning of the key aspects of the interviewee's lived world shall be explored. Everything that is said and how it is said is interpreted regarding its meaning.
- Qualitative: the interviewer is interested in spoken language and words, not in numbers.
- Descriptive: the interviewee is fostered to describe his/her feelings, experiences and behaviour in the most accurate way with nuances which indicated diversity, difference and variety.
- Specificity: the specific circumstances and measures are of interest, not the interviewee's general opinion.
- Deliberate naiveté: the interviewer is supposed to be open and un-prepossessed regarding new and surprising phenomena and shouldn't have partisan opinions.
- Focus: the interview has got a certain focus, usually the topic of the research, and is designed with open questions.
- Ambiguity: the results of the interview may be ambiguous as there might be different options of interpretation as well as an interviewee with inconsistent statements.
- Change: during the interview the interviewee might change his/her point of view or position towards a certain topic as new aspects or relations may appear which were not obvious earlier.

- Sensitivity: the interviewers might have different understanding and tenderness towards the topic and therefore might produce different statements.
- Interpersonal situation: the interview is an interaction between two people and knowledge gained through the interview is a result of the interaction.
- Positive experience: for the interviewee the interview is often a positive experience as it is not common that another person pays full attention to one's descriptions and experiences.

However not only interviews, although they are the predominant method, can be utilised for a phenomenological study, but also focus groups (Bradbury-Jones et al., 2009; Palmer et al., 2010). The application of focus groups in phenomenological studies has increased over recent years, but there are sceptical voices about whether it is an appropriate method as phenomenology is concerned with the investigation of personal experience and the aim of focus groups has traditionally been the investigation of group interactions (Smith, 2004). Nevertheless Smith (2004, p. 50f) comes to the conclusion that if "the researcher is convinced that participants are able to discuss their own personal experiences in sufficient detail and intimacy, despite the presence of the group, then the data may be suitable". Therefore it needs to be ensured in the later steps that this prerequisite is satisfied as focus groups are the chosen method for this work.

The underlying theory on focus groups has been developed out of the ideas of the sociologist Robert Merton and the market researcher Alfred Goldman and is summarised by Stewart and Shamdasani (2015) in four major objectives:

- Focused research: the interview is focused on a special and precise situation and the researcher is interested in studying this situation and learning about it.
- Group interactions: the researcher is interested in understanding the group dynamics which have an impact on individuals' perceptions, information processing and decision making. The interactions are mainly

influenced by group compositions, interpersonal influences and research environment factors.

- In-depth data: researchers expect to obtain data which go beyond superficial explanations through a relatively small number of questions which is focused on a certain topic and discussed in detail.
- Humanistic interview: the interview includes empathy, openness, active listening and various types of interactions.

There are three key characteristics which define the nature of focus groups (Wilkinson, 1998): Firstly, focus groups allow access to participants' own language, ideas and worries, secondly, focus groups promote the production of more comprehensively articulated descriptions and thirdly, focus groups provide the chance to observe the procedure of collective sense-making. These characteristics are supported by the statement that "focus groups are useful when it comes to investigating *what* participants think, but they excel at uncovering *why* participants think as they do." (Morgan, 1988, p. 25).

Focus groups can be differentiated regarding the purpose they serve, i.e. if they are exploratory, experiential or clinical (Fern, 2001). The purposes of exploratory research are e.g. to create, to identify, to discover, to explain constructs and to generate thoughts, feelings and behaviour. Contrary to that experiential research is e.g. interested in shared life experiences and the purposes of clinical research are e.g. motivational and marketing studies. In the context of the research at hand the exploratory tasks seem to be most appropriate as one of the aims of the focus groups is to explain poorly understood survey results. The focus groups facilitate as a supplementary data collection method, as the primary data collection takes place with the questionnaire. The supplementary use is one of three basic uses of focus groups and allows the researcher, amongst other things, to follow up on unclear survey results and to refine them (Morgan, 1997). This approach has been applied in various studies (e.g. Morgan, 1989; Wilmot and Ratcliffe, 2002) and helps to clarify with the participants of the survey why they responded in the way they did and how they understood the survey, i.e. to illuminate the results (Barbour, 2007).

Furthermore focus groups can be differentiated regarding their application of theory or effect. The theory application in the context of exploratory tasks is concerned with the generation of e.g. theoretical constructs and the development of models or frameworks whereas the effect application is concerned with the explanation of survey results amongst other things (Fern, 2001). Therefore the work at hand uses effects applications and exploratory tasks to refine the model developed with the questionnaire.

As any other research method, focus groups have strengths and weakness which in this case result merely from its two defining properties: “the reliance on the researcher’s focus and the group’s interaction” (Morgan, 1997, p. 13). Strengths are e.g. the focus on the topic of interest, the relative efficiency of data collection or the confidence in group interaction, whereas weaknesses are e.g. the moderator’s influence on the group, the group’s influence on the individual’s opinion or the suitability of the topic. For the research at hand the strengths outbalance the weaknesses and therefore it is decided that focus groups are the appropriate qualitative method.

4.3.1.1 Sampling strategy

Contrary to the previous data collection with questionnaires the sampling strategy for focus groups is less rigid and much more dependent on the research problem (Silverman, 2013). The aim of the sampling is not so much to obtain a representative sample but more to show the diversity within the groups (Barbour, 2007) and to obtain an insight and understanding in the in-depth descriptions of people (Morgan and Scannell, 1998). Therefore the non-probability sampling strategy of purposive sampling is usually applied for focus groups, which allows the researcher to select cases which will best answer the research questions based on predefined criteria (Saunders et al., 2012).

With focus groups it is of particular importance to consider the composition of the group as it is the main unit of analysis (Barbour, 2007) and as the group productivity is affected (Fern, 2001). Especially the intrapersonal factors like demographic, physical and personality characteristics as well as interpersonal

influences like group cohesiveness, group compatibility and social power might play an important role (Stewart and Shamdasani, 2015). Therefore several key issues need to be considered in the composition of a focus group:

- Homogeneity: This refers to the homogeneity in the background of the participants not in the homogeneity of their attitudes (Morgan, 1988). It is mostly concerned with the compatibility of the participants as the compatibility usually supports the discussion of the topic of interest and the group dynamic instead of spending time with introducing the different points of view and building trust (Morgan and Scannell, 1998). This is an important point for the research at hand as it needs to be ascertained that there is no authority relationship between the participants which could potentially oppress free speech.
- Segmentation: This is known as the allocation of categories of participant to different focus groups (Morgan, 1997). It is basically the creation of different homogenous focus groups based on certain criteria, which ensure that the researcher's interests are considered (Morgan and Scannell, 1998). A segmentation is not undertaken for the work at hand, as the split between engineers/consultants and contractors doesn't seem to add any value to the research.
- Acquaintance: This is concerned with the participants being strangers or acquaintances (Morgan, 1997). Often there is no choice and often it doesn't make a difference, but it is important to ask the question: Is the group comfortable to discuss the topic of interest in a way that is useful? (ibid). It is assumed that it is not of high relevance for the work at hand, if the participants are strangers or not.

Overall it is the key to create a framework where a comfortable and productive conversation is possible, where the participants are comfortable to talk to each other and where the goals of the researcher to create a productive discussion are achieved (Morgan and Scannell, 1998). This is applicable for every single focus group as well as for the whole set of focus groups. Therefore the group composition for the work at hand is discussed next.

There are four different categories of project team members: clients, architects/engineers/consultants/project manager (in the following architects & co.), contractors and suppliers. For the focus groups, which have the aim to refine the model developed based on the findings of the questionnaire, all categories are viewed to be appropriate potential participants. Based on the preceding considerations there is no differentiation necessary for the focus groups, i.e. the focus groups can consist of all different categories at the same time.

Next to the composition of the group also the size and number of focus groups needs to be considered in connection with the sampling strategy. Regarding the size of the group there exists a general rule of thumb that it is usually between six and 10 participants (Morgan, 1997). But this number cannot simply be taken as a fixed rule as many factors influence the decision on the size of the focus group. The following questions need to be asked before deciding on the planned number of participants (Morgan and Scannell, 1998, p. 73):

- Have the participants a high level of involvement with the topic?
- Are participants emotionally caught up in the topic?
- Are the participants experts or do they know a lot about the topic?
- Is the topic controversial?
- Is the topic complex?
- Is the goal to hear detailed stories and personal accounts?
- Do recruitment factors limit other options?

If most of the above questions are answered with “yes” smaller groups are the preferable size as they allow the participants to have a higher involvement. If this is not the case, larger groups are the preferable size. For the work at hand most of the above questions need to be answered with “yes” and therefore this indicates that smaller groups should be utilised. It is decided that a number of four to seven participants seems to be appropriate for the work at hand.

In respect to the number of focus groups there is a rule of thumb that usually between three and five focus groups are administered, but that it depends very

much on the research itself how many are needed (Morgan, 1997). Usually the number of focus groups is determined by the point when theoretical saturation is reached, i.e. when additional focus groups don't deliver any or only very few new insights. (Morgan and Scannell, 1998). For the research at hand it can be stated that not a very diverse range of responses and not many different experiences or opinions are expected as the results of the primary data collection, i.e. the questionnaire, serve as a basis for the focus groups. Therefore fewer focus groups are acceptable (ibid) and it is decided that two focus groups will be conducted. Two focus groups usually give already a certain insight in the participants' opinions and serve as a good basis for the research at hand.

4.3.1.2 Defining the research problem

With the qualitative research, in this case the focus groups, a certain research problem is addressed. The research problem in this context is to further explore the relationships between organizational justice and the different elements of project performance as displayed in the conceptual framework (section 2.9). Most importantly poorly understood relationships from the previous data collection between these variables, i.e. the questionnaire, shall be explained. Additionally it shall be explored how the benefits of organizational justice influence project performance.

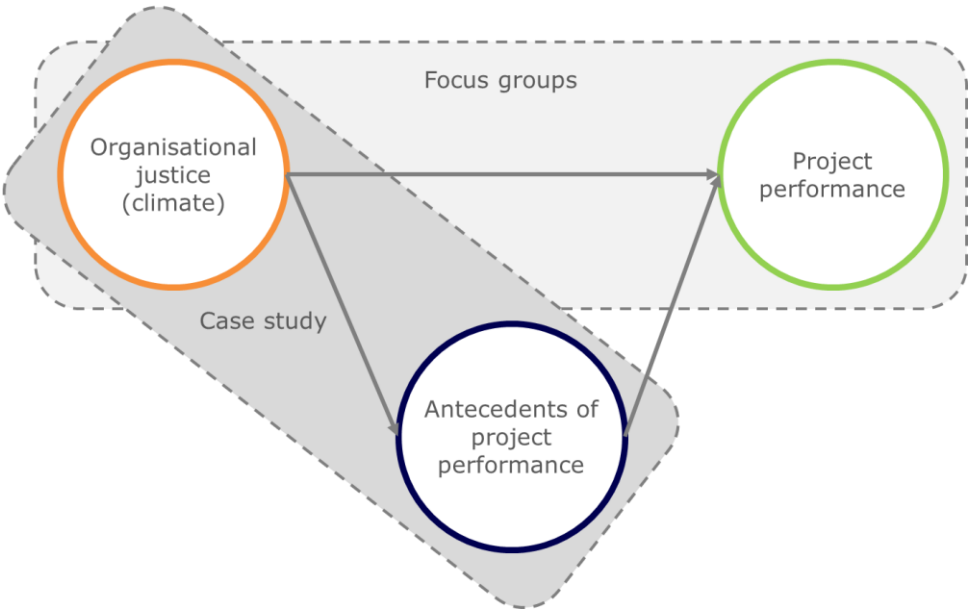

Figure 4.7 – Supplementary data collection methods

4.3.1.3 Structure of the focus group

After the definition of the research problem it is crucial to decide on the structure of the focus group, i.e. if either more structured groups, where the researcher's interests are prevailing or less structured groups, where the participants' interests preponderate are employed (Morgan and Scannell, 1998). The reason for that is, that the degree of structure has multiple impacts (ibid):

- It affects how the focus group guide and the questions are written.
- It influences how the moderator interacts with the participants.
- It determines the kind of data which can be generated during the discussion.
- It impinges on the way of data analysis.

Characteristics of more structured groups are that there is a clear aim with structured questions and a defined agenda available (Morgan, 1997; Morgan and Scannell, 1998). This leads to a standardized focus group guide and a comparatively high involvement of the moderator to ensure that the agenda is met and that the topic of interest is in the focus of the discussion. The weakness of this approach is that the more structured environment might restrict the open discussion and potential additional topics cannot be treated. By contrast characteristics of less structured groups are that there is a poor understanding of basic problems and existing knowledge is rarely available (Morgan, 1997; Morgan and Scannell, 1998). Therefore unstandardized focus group guides as well as minimal moderator involvement can be found in less structured focus groups to facilitate the discussion of topics which are in the participants' interest. The problem with this approach is that it is difficult to compare the results of different focus groups as different issues might be raised and discussed.

An alternative to the two extreme approaches is the so-called funnel approach, which combines the unstructured and the structured approach to focus groups by moving from broader to narrower topics (Morgan, 1997). It allows the participants at the beginning to state their points of view in detail and enables the

research to clarify concrete questions at the end. It typically consists of three stages (Morgan and Scannell, 1998, p. 53):

1. The top of the funnel: One or two broad, open-ended questions – This stage is less structured with a minimal moderator involvement.
2. The middle of the funnel: three or four central topics – This stage is dominated by some predetermined broad topics with a directive involvement of the moderator.
3. The bottom of the funnel: several specific questions – This stage is more structured, using narrowly defined issues with a high moderator involvement.

For the work at hand the funnel approach seems to be the most suitable one, as at the beginning the general experiences regarding organizational justice and organizational justice climate can be explored, then the link to project performance and its different aspects can be established and finally the detailed questions regarding the responses to the questionnaire can be asked.

4.3.1.4 Design of the focus group guide

Based on the decision regarding the structure of the focus groups the focus group guide can be developed. The focus group guide defines the agenda for the discussion and it should be developed in reference to the previously defined research questions (Stewart and Shamdasani, 2015). The purpose of the focus group guide is to provide guidance for the group discussion (ibid). There are generally two different strategies for a focus group guide (Krueger, 1998):

- Topic guide: is a list of topics and key words which help the moderator to remember the topics of interest.
- Questioning route: is a defined list of questions, which is written out in complete and conversational sentences.

The topic guide is usually used by more experienced moderators as it requires a skilful moderator in regards to spontaneously phrasing proper questions. Against

this background it is decided that for the research at hand the questioning route shall be facilitated. This also supports the quality analysis, as the same questions are asked in every focus group and therefore enhances consistency (Krueger, 1998).

During a focus group usually different categories of questions are asked to enable the participants to get acquainted with the topic and to ensure a smooth flow of the discussion (Krueger, 1998): At the beginning usually an opening question is asked to give the participants the opportunity to introduce themselves and to get to know each other. With the following introductory question the participants are slowly led to topic of interest in order to begin the discussion. On different occasions during a focus group the transition question is applied to move smoothly from one focus to another and to lead to the key questions. The key questions are the heart of the study and they are supposed to give the most insight into the area of interest by in-depth discussions. And at the end of the focus group an ending question is asked to identify the key emphasis and to close the discussion.

As in the design of the questionnaire the wording of the questions in the design of the focus group guide is also of particular importance. But in contrast to the questionnaire the questions in focus groups are usually open ended to facilitate a discussion amongst the participants (Morgan, 1988). The following factors should be considered while wording the questions:

- Respondents shouldn’t be placed in an embarrassing or defensive situation (Stewart and Shamdasani, 2015).
- “Why”-questions should be avoided, because the answers tend not to be reliable (Krueger, 1998).
- Questions should be kept simple, clear and short (Krueger, 1998).

Based on these considerations an initial focus group guide is developed.

4.3.1.5 Pilot testing of the focus group questions

The questions of the initial focus group guide are pilot tested to ensure that they facilitate answering the research questions. There are special problems in pilot testing focus groups questions and it is generally regarded as difficult, as the reasons for failure can be various and do not need to be grounded in the questions (Krueger, 1998). Therefore it is decided to follow a procedure similar to one recommended by Krueger (1998) where research team members and potential participants/non-researchers are asked to discuss the questions and to state their opinion. For this purpose three academics from LJMU and three construction industry practitioners are contacted and the questions are discussed with them.

The discussions reveal that the questions of the focus group guide are generally well structured and selected. There were some notes regarding the clarification of wording and the appropriateness of definitions. These notes are taken into account and the questions are reworded accordingly.

Furthermore it was observed that the allocated time for the focus group might be too long and it was recommended to shorten the scope. This recommendation is followed and some questions are taken out in order to have a time frame of 60 minutes. The final focus group guide can be found in Appendix A2.1.

4.3.2 Data analysis

Data analysis in qualitative research is concerned with much more than just analysing text and image data. The core is to make sense of the data, but it also involves the preparation of the data, the execution of different analyses, the representation and the interpretation of the data in a larger context (Creswell, 2009). There are different strategies to analyse qualitative data which mostly support similar procedures and differ only in the analytic phase.

In contrast to other qualitative research approaches there are very specific and structured methods to analyse data in a phenomenological research (Moustakas, 1994). Creswell (2013) modified and simplified one of these methods and

together with the different steps to analyse focus group data by Creswell (2009) a six step approach is developed for the work at hand. Each step will be presented in more detail in the following.

To support the researcher in the data analysis a qualitative computer programme is used. Qualitative computer programmes provide an organized storage file system, help the researcher to find material quickly, stimulate the researcher to accurately look at the data, empower the researcher to visualise relationships and finally facilitate in retrieving memos easily (Creswell, 2013). The disadvantages linked to use of computer programmes are not applicable for the work at hand. There are a lot of computer programmes available on the market and it is decided to use QSR NVivo 11 (in short NVivo) for the work at hand. This is justified in the fact that NVivo is one of the most popular qualitative computer programmes and freely available at LJMU.

Step 1 - Describe the researcher's personal experience

The first step in analysing the focus group data is to describe the personal experience of the researcher in detail. This step is undertaken in order to put aside the personal point of view and to focus entirely on the participants (Creswell, 2013; Moustakas, 1994):

The researcher has a significant amount of experience in construction project management. She is educated as an industrial engineer in construction and has a master's degree in international project management. She worked for three years as a construction manager in an architectural office in Switzerland on various multi-million CHFs projects. Afterwards she worked for five years as a project manager and client's representative with a big consultancy company in Germany and was responsible for a team that worked on different kinds of projects with a project volume of more than 100 million Euros.

Due to this experience the researcher believes that there is an urgent need to improve the collaboration within construction project teams in order to improve the performance of construction projects. The researcher furthermore believes

that the adoption of more just and fair treatment is one crucial component in this improvement.

As the experiences, beliefs and perceptions of the researcher are now clear the next step in data analysis can be viewed in more detail.

Step 2 – Preparation of the data

During the administration of the focus groups it was explained that all focus groups were audio recorded. The second step in analysis therefore involves the transcription of these audio recorded data into textual data. The transcription serves as a basis for the subsequent analysis, but also as a permanent written record (Stewart and Shamdasani, 2015). The degree of detail of the transcription depends on the purpose of the research as some research might require that incomplete sentences, half-finished thoughts or the like are reproduced one-to-one in the transcription whereas for other research some editing like filling missing words or gaps is perfectly acceptable (ibid).

For the research at hand detailed one-to-one transcriptions are produced, but a certain amount of editing to increase the readability will be applied. Next to the audio recorded data also the observer's notes are taken into account and added to the transcription to include non-verbal communication and therefore obtain a more complete picture (Stewart and Shamdasani, 2015).

Step 3 – Reading through the data

After the transcription of the audio data is completed and the observer's notes are added the transcripts are read through carefully in order to gain an understanding about the general sense and overall importance (Creswell, 2009). At this point of time a record about the general thoughts is kept.

Step 4 – Identify significant statements

After reading through the data and obtaining a general sense of the meaning a list of significant statements of how the participants experience the phenomenon is generated (Creswell, 2013). For this task the transcripts are imported into NVivo and the indexing/coding function is used to identify and extract the

significant sentences and phrases. Subsequently these significant statements are exported from NVivo into an Excel spread-sheet.

During this step an important consideration needs to be taken into account. First of all the unit of analysis needs to be clarified as there are individuals and the group in focus group research. According to Morgan (1988) none of them is a separable unit of analysis, it is much more about balancing and acknowledging the interaction between these two parties as the individual influences the group outcome, but that the group context also influences the individual's behaviour and thinking. Therefore there are three nested strategies to code focus group data which need to be taken in to account (Morgan, 1988, p. 60):

- all mentions of a given code
- whether each individual mentioned a given code or
- whether each group discussion contained a given code.

Step 5 – Creation of themes and meaning units

This step facilitates to identify and develop the main themes, e.g. five to seven main categories which are then presented as major findings and shaped into a general depiction (Creswell, 2013). The significant statements are grouped in themes with a three level hierarchy: high-level theme, middle-level theme and meaning unit (Figure 4.8).

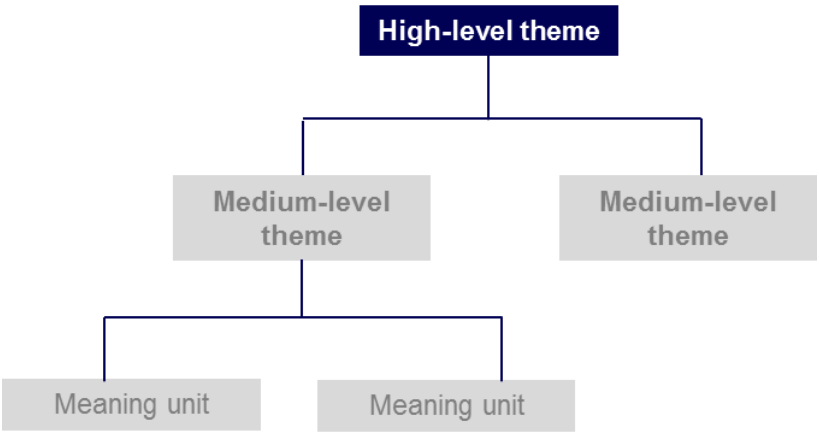

Figure 4.8 – Focus groups – Theme hierarchy

Step 6 – Writing up a composite description

In step 6 the essence of the phenomenological study is created by writing a composite description (Creswell, 2013). The description consists of two parts: the textual and the structural description. The textual description is concerned with "what" was experienced and contains word for word examples. The structural description is concerned with "how" the experienced happened and it is more about a reflection of the setting and context (ibid).

4.4 Case Study

4.4.1 Data collection

As previously mentioned there are different point of views what a case study really is. In the context of this chapter a case study shall be regarded as a formal research method which is defined as "an empirical enquiry that investigates a contemporary phenomenon (the "case") in depth and within its real-world context, especially when the boundaries between phenomenon and context may not be clearly evident" (Yin, 2014, p. 16). In addition, a case study is characterised by three features (ibid):

- More variables than data points: any case study has a large number of variables due to the in-depth inquiry, the study over time and the contextual conditions.
- Multiple sources of evidence: various sources of evidence are combined in a case study and the resulting data are converged in a triangulation.
- Development of theoretical propositions: the data collection and analysis are guided by the previously developed theoretical statements.

With a research method which is still not fully accepted as a formal method by all researchers it is inevitable that there are some concerns about its applicability. There is often the concern, that it is not rigorous enough as in the past no methodological texts were available which specified procedures to be followed, but nowadays there is a growing number which, if followed, ensure sufficient rigour (Yin, 2014). And also the worry that a case study may not be scientific

enough is not supported by literature as there is not one right way of doing scientific research, but many and the overall aim must be to provide answers to questions with good evidence and reasoning (Thomas, 2016). Furthermore a commonly asked question is how the findings from a case study can be generalized. As it is often just a single case study a generalisation to the population is not possible (Thomas, 2016), but it is possible to generalize a case study to theoretical propositions, i.e. expand and generalize theories (Yin, 2014). And finally the comparative advantage of case studies has been questioned in recent years, especially compared to experiments. But as experiments or other quantitative methods cannot answer "how" and "why" questions, case studies are now readily accepted as a complementary method to quantitative and statistical methods (ibid). This complementary use is exactly the context of this work: the primary data collection was quantitative with a questionnaire and is supported by the qualitative focus groups and a case study.

Therefore the purpose of the case study and the research question which is to be answered will be developed in the next section.

4.4.1.1 Defining the research problem

As previously mentioned qualitative research is led by a research problem, which shall be answered during the research. Again the conceptual framework which was developed in chapter 2 serves as a basis as well as the questionnaire findings. Hence, taking into account the conceptual framework and the questionnaire findings the problem which shall be addressed with this qualitative research is how the different dimensions of organizational justice (climate) influence antecedents of project performance.

This means that with the findings of the case study, which are based on an in-depth understanding of the case, explanations are being delivered and therefore an explanatory study is conducted which tests an existing theory, i.e. the strategic framework (Thomas, 2016). Several propositions are derived from the conceptual framework and the questionnaire findings:

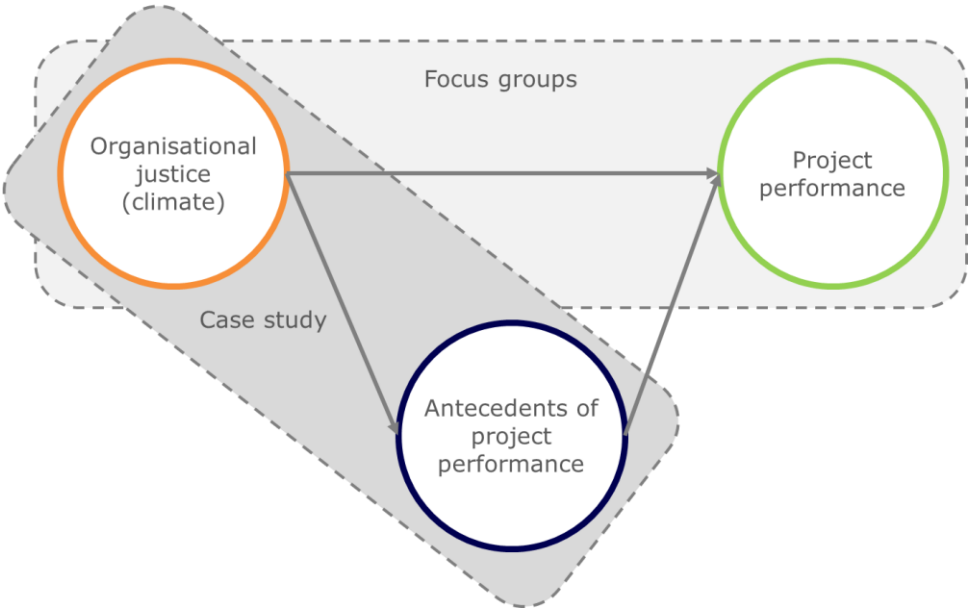

Figure 4.9 – Supplementary data collection methods

1) Distributive justice positively influences commitment, competence and managerial qualities and coordination.
2) Interactional justice positively influences commitment, competence and managerial qualities, conflict management and compliance to client's expectations.
3) Procedural justice positively influences conflict management and efficacy of procurement method and contract.
4) Distributive justice climate positively influences commitment, competence and managerial qualities and coordination.
5) Procedural justice climate positively influences coordination, decision making and efficacy of organizational structures.

The development and statement of propositions move the research into the right direction and support the identification of relevant evidence (Yin, 2014). But first of all the case itself needs to be identified.

4.4.1.2 Identifying the case

When conducting a case study the sampling strategy which was applied for the questionnaire and the focus groups in order to achieve generalisability and to

show the diversity of groups is not relevant (Thomas, 2016). For a case study no sample, which is supposed to be representative of a wider population, is necessary. It is rather a choice or selection which is made based on different considerations which are crucial to answer the research questions (ibid).

And the first consideration to start with is to identify the case for the research at hand. The word ‘case’ has many different meanings (Thomas, 2016) but in the context of a case study it is the unit of analysis (Yin, 2014). This can be an individual, a group, an institution or a community to name just a few single cases (Gillham, 2000). The identification of the case is usually undertaken in two steps: first the case is defined, i.e. selected, and second the case is bounded (Yin, 2014).

Defining the case

For the research at hand the unit of analysis shall be a construction project, and more specifically a construction project team. This team is a case of the social relationships in project settings, especially organizational justice (climate), and their influence on antecedents of project performance. The team is the subject to be investigated and the social relationships in project settings serve as the analytical frame or the theoretical scientific basis which accompany the subject (Thomas, 2016).

This selection is made based on the assumption that a single-case holistic design is applied (Yin, 2014). A single-case design is suitable and adequate because the selected project team is a common case, i.e. an everyday situation can be captured in order to answer questions on social processes concerning some theoretical interest. Furthermore a holistic design is chosen as only the global nature of the project team is examined with no further sub-units. This choice has some potential shortcomings as there is e.g. the risk that the study is conducted at an overly abstract level. This is not applicable for the research at hand as the smallest possible unit, apart from the individual, has been chosen. Another potential risk is that the focus of the study may shift without anyone realising it. Therefore it is necessary to pay special attention to the research questions and to put them in the centre of the research.

Bounding the case

As the case for the research at hand has been defined by now some other clarifications need to be undertaken. It has been stated before, that the subject of the case study is a construction project team, therefore it needs to be defined who the members of the construction project team are. Based on the definition developed in chapter 2 of this work the following members of the construction project team are included in the case study: client, architect, engineers, consultants, contractors, users, suppliers. Furthermore the time boundaries for the case study need to be clarified: the case study will be undertaken as a snapshot, i.e. only a certain period of time is examined (Thomas, 2016). The chosen period of time for the work at hand is two months. During this period of time data and evidence will be collected. The next section describes the preparation of the collection process.

4.4.1.3 Preparing the collection of evidence

Contrary to the previous methods a case study is usually not looking to collect data, i.e. information, but to collect evidence, i.e. data which supports the defined propositions (Thomas, 2016). This evidence is usually collected by utilising different sources. In order to establish construct validity and reliability of the evidence four principles for evidence collection are followed (Yin, 2014):

- Use multiple sources of evidence: The use of multiple sources of evidence is one strength of case studies because it enables the researcher to develop "*converging lines of inquiry*" (Yin, 2014, p. 120, emphasis in text) and therefore supports the triangulation of data/evidence.
- Create a case study database: This means that the case study data and evidence should be stored separately from the final report. In the past the collected evidence was often directly included in the report which caused a blending of the evidence and the author's interpretation.
- Maintain a chain of evidence: By maintaining a chain of evidence the reader shall be enabled to follow the evolution of every single piece of evidence from the pre-defined research question to the final conclusion, i.e. there

needs to be a link between the research questions, the case study protocol, the sources of evidence, the database and the final report.

- Exercise care when using data from electronic sources: As there is a wide range of sources of evidence in case study research some caution needs to be exercised for data from electronic sources regarding the wealth of information available, the cross-checking of sources and the information provided.

Another important part in establishing reliability of the research is to develop a case study protocol, which guides the research during the data and evidence collection process (Yin, 2014). The case study protocol has four major sections:

1. Overview of the case study
2. Data and evidence collection procedures
3. Data and evidence collection questions
4. Guide for the case study report

The case study protocol for the work at hand can be found in Appendix A3.1.

4.4.1.4 Sources of evidence

There is a vast amount of sources of evidence available to be used in case studies. The most commonly used kinds of evidence are (Gillham, 2000; Thomas, 2016; Yin, 2014):

- Documents, which offer a formal framework and are pertinent for every case study (e.g. letters, statements, meeting minutes etc.).
- Records, which view the past and can provide useful longitudinal evidence (e.g. accidents reported, time off work etc.).
- Interviews, which in case studies range from more informal conversations to structured interviews and are one of the most used sources of evidence (e.g. structured, unstructured, semi-structured, group interviews etc.).

- Observations, which can be very formal, quantitative or more casual, qualitative data collection activities (e.g. direct observation, participant observation, detached observation etc.).
- Physical artefacts, which are things which were made or produced (e.g. tools, instruments, artwork, etc.)

Additionally questionnaires, focus groups, image-based methods, measurements and test or official statistics may be utilised during data and evidence collection depending on the research questions.

For the work at hand four sources of evidence were selected: Documents, observations, and interviews. They are shown in Table 4.4 with their strengths and weaknesses and will be explicated in further detail below.

Source of evidence	Strengths	Weaknesses
Documents	• Stable – can be reviewed repeatedly • Unobtrusive – not created as a result of the case study • Specific – can contain the exact names, references, and details of an event • Broad – can cover a long span of time, many events, and many settings	• Retrievability – can be difficult to find • Biased selectivity, if collection is incomplete • Reporting bias – reflects (unknown) bias of any given document's author • Access – may be deliberately withheld
Observations	• Immediacy – covers actions in real time • Contextual – can cover the case's context	• Time-consuming • Selectivity – broad coverage difficult without a team of observers • Reflexitivity – actions may proceed differently because they are being observed • Cost – hours needed by human observers
Interviews	• Target – focuses directly on case study topics	• Bias due to poorly articulated questions • Response bias

Source of evidence	Strengths	Weaknesses
	• Insightful – provides explanations as well as personal views (e.g. perceptions, attitudes and meanings)	• Inaccuracies due to poor recall • Reflexitivity – interviewee gives what interviewer wants to hear

Table 4.4 – Case study – Sources of evidence
(adapted from Yin, 2014, p. 106)

Documents

The purpose of documents in case study research is to confirm and enlarge the evidence from other sources (Yin, 2014). Conclusions solely drawn from documents should only be treated as indicators for further examination of the topic and not used on their own (ibid). The reason for this is, that documents are usually produced for a certain purpose and audience and their content is therefore not the undiminished truth.

The quality and suitability of the evidence collected with documents, which are secondary data, is often a concern and needs to be addressed here (Saunders et al., 2012). First of all it needs to be ensured that the documents provide information which supports the answering of the research question (measurement validity). Furthermore the coverage needs to be suitable, i.e. if any evidence which is not needed is excluded, there must be enough evidence left for an analysis. The reliability and validity of the documents needs to be ensured by the reputation of the source, which is in this case the project team. The documents are produced for the project and reviewed by various project team members. A high reliability and validity can therefore be assumed. Also measurement bias based on the same reason.

Observations

A case study provides the unique opportunity to directly observe what happens in the real-world setting (Yin, 2014). In an unstructured observation the researcher immerses into this real world-setting and tries to understand what is happening there (Thomas, 2016). In general all kinds of activities can be observed, but for the work at hand it is decided that project meetings are

observed. During the different project meetings all project team members come together to discuss the status and the progress of the project. Therefore it is assumed that these meetings provide a good insight into how the project team members work together and how they are treated by the client.

The researcher acts as an observer-as-participant during the observations, i.e. the purpose of the observation is known to the meeting participants, but the researcher only observes and does not actively participate in the meetings. The observation will be conducted as a focused observation, i.e. the research focuses on certain events, interactions and behaviours. During the observations notes are taken and these notes serve as the evidence collected during the observations. The note taking has to take place on the same day as the fieldwork because otherwise important information is forgotten (Saunders et al., 2012).

Interviews

Interviews are one of the most significant sources of evidence in case studies (Yin, 2014). They are predominantly semi- or unstructured, whereas the unstructured setting is viewed as best, because it enables the researcher to really interpret the interviewees' comments (Thomas, 2016). The unstructured interview is a more casual and conversational way of conducting an interview and uses, if at all, just a few key open ended questions in order to give the interviewees the opportunity to talk freely (Gillham, 2000). For the work at hand it is decided that four key people of the project team will be interviewed. These are the contractor's contract manager, the contractor's site manager, the contractor's coordinator and the client's contract administrator.

In order to ensure a high quality of the evidence collected through interviews the typical quality issues for conducting interviews shall be addressed (Saunders et al., 2012). The first potential quality issue is reliability. The findings from interviews in case studies are not intended to be repeatable because they are collected in a certain environment which is subject to change depending on the project. Furthermore the circumstances investigated are usually complex and

dynamic. The second potential quality issue is bias. In order to overcome this issue the interviews are carefully prepared, an appropriate setting is chosen and the interviewer is attentive in her behaviour. The third potential quality issue in interviews is generalisability. With the single case study not only interviews are conducted but other evidence is collected as well. This strengthens the findings from case studies and allows generalisability. Furthermore the case study is grounded in an existing theory and therefore the findings have a broader theoretical significance. And the final potential quality issue is validity. The validity is enhanced by carefully wording the questions, using probes and pilot testing the questions.

4.4.2 Data analysis

Data analysis in case study research is “one of the least developed aspects of doing case studies” (Yin, 2014, p. 135). There is a vast number of ways available of doing the analysis for case studies which range from quantitative to qualitative methods, as pretty much every kind of method can be utilised (Thomas, 2016). Nevertheless there are some strategies and techniques which have been developed over the years and which provide support with some guidelines in order to enhance the reliability of the analysis.

First of all there needs to be a decision about the strategy which should guide the analysis (Yin, 2014). For the work at hand the chosen strategy is to rely on theoretical propositions. This means that the previously outlined propositions show the theoretical setting, support the organization of the analysis and highlight the significant framework and explanations to be identified and explained (ibid).

Second, an analytic technique has to be chosen. There are different techniques available, e.g. pattern matching, explanation building, time-series analysis, logic models or cross case synthesis (Yin, 2014). The technique which fits best to the case study at hand and the evidence which is expected to be collected is the pattern matching. For this purpose a pattern is developed prior to data collection. This pattern serves a prediction and the empirically based pattern, which is generated from the case study findings is compared to the predicted one (ibid).

For the explanatory study at hand the pattern is related to the non-equivalent dependent variable derived from the conceptual framework and the survey questionnaire. If the predicted values and patterns are congruent with the actual findings and no alternative patterns occurred during the analysis strong conclusions including the causality can be drawn. There are certain threats regarding the validity of this technique, especially with a single case research. There might be some contextual conditions which potentially leave room for counter-arguments to the conclusions. If such a contextual condition is identified during the analysis a subset of the dependent variable has to be developed and chain of evidence needs to be provided that the results would be different if this contextual condition was true (ibid).

In order to achieve a high quality of the analysis the following principles will be followed throughout the process (Yin, 2014):

- All evidence available must be considered and the strategies and techniques applied need to pay justice to the research question.
- All plausible rival interpretations need to be addressed and discussed, i.e. if there is the potential for counter-arguments they need to be invalidated or stated as need for further research.
- The most significant aspect of the case study should be the focus instead of addressing less important ones.
- The prior expert knowledge of the researcher should be utilised in order to show awareness of the latest understanding and discussions on the case study topic.

Taking into account the above mentioned strategies and techniques the final step in the analysis is the write-up of the findings. The linear-analytic approach to reporting is chosen and the findings will be presented in section 6.3.

4.5 Research framework

The different methods presented in this chapter serve the purpose to answer the research question stated in chapter 1 including the research objectives. Each method was selected carefully to obtain the best possible evidence and support for the hypotheses and propositions.

In order to address the objectives two and three, which are concerned with the identification and exploration of relationships, a questionnaire is conducted to collect quantitative data. This enables the researcher to find out if and which significant relationships between organizational justice and project performance exist. It furthermore allows to explore mediating variables and their impact. To address objective four and hence, to obtain a more in-depth understanding of the previously identified relationships two qualitative methods were chosen. These qualitative methods enable the researcher to ask questions regarding the how and why which in turn provide explanations for the relationships. Two different qualitative methods were selected because of the high number of relationships and the different foci. To explain the relationships between organizational justice and project performance focus groups are conducted. To explain the relationships between organizational justice and the antecedents of project performance a case study is conducted.

The structure of the methods and their individual contribution to each of the research objectives including their expected output is summarised in the following research framework (Figure 4.10).

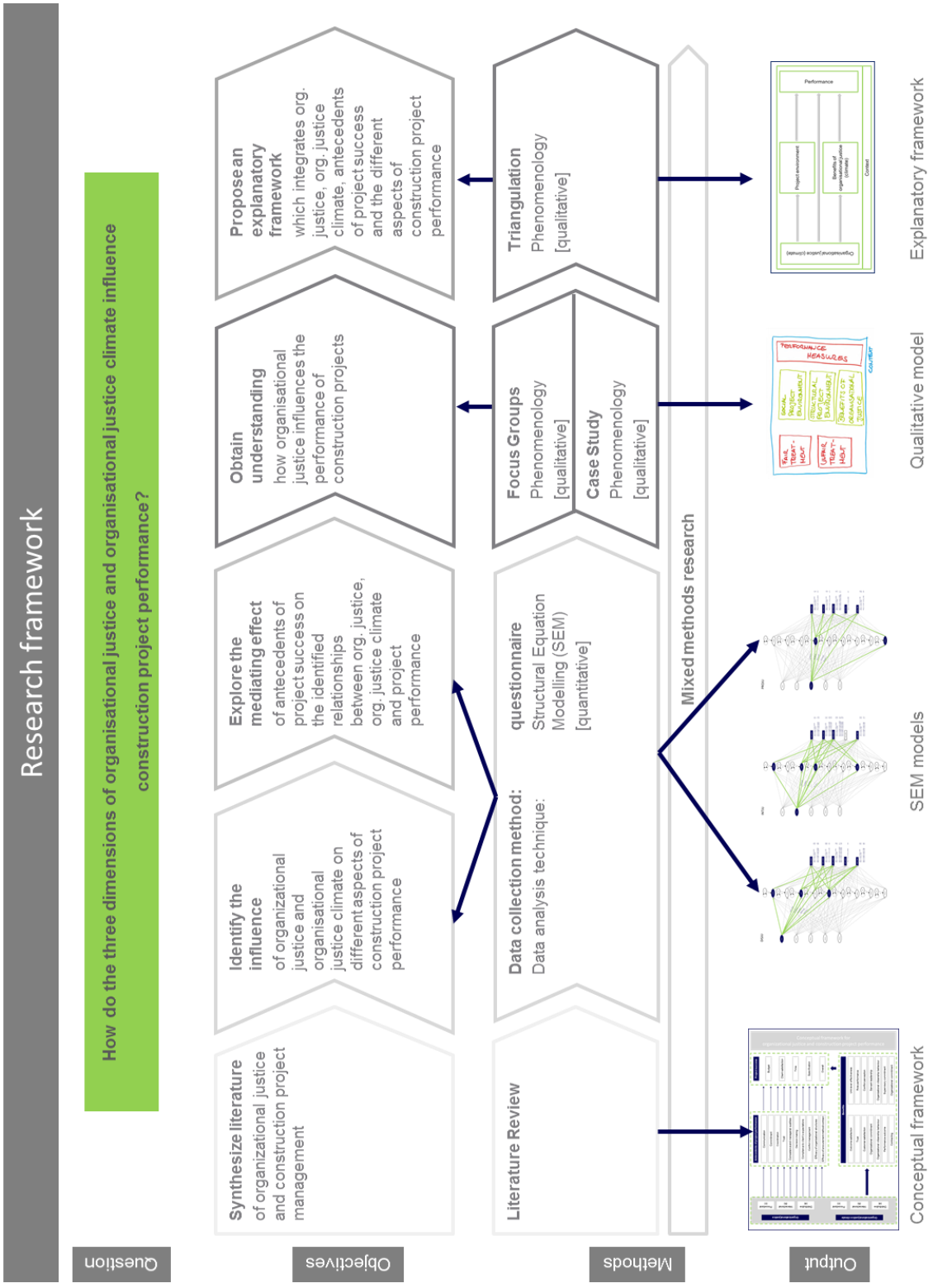

Figure 4.10 – Research framework

4.6 Summary

This chapter provided the background on how the data are collected and analysed for the three different methods chosen for the work. The selection of these methods was based on a careful consideration.

The first method chosen was the questionnaire. It was decided that a volunteer and purpose sampling strategy shall be applied. The questionnaire itself was developed by identifying hypotheses to be tested and designed by utilising established measures were available. To ensure validity of the questions a pilot test was conducted. The data analysis of the questionnaire was described in detail as well. First, it was explained which descriptive statistics need to be tested in order to prepare the data for SEM. Second, the different steps of SEM, which are model specification, model identification, model estimation, model testing and model modification, were explained.

The second method chosen was the focus group. For the focus group it was decided that two focus groups are sufficient based on the expected diversity of responses. Furthermore the research problem with the focus on the relationships between organizational justice and project performance was defined. It was explained that a funnel approach seems to be most appropriate for this research and the pilot test was conducted by asking academic and non-academics to discuss the questions prior to the focus groups. The planned data analysis was described step by step. Phenomenology, which is applied for this work, provides a structured and specific method to conduct the data analysis.

The third and final method chosen was the case study. The research problem for the case study are the relationships between organizational justice and the antecedents of project performance. Based on this research problem a construction project team was identified as a case of the social relationships in project settings. The different sources of evidence planned to be used for this work were defined as observations, documents and interviews. The data analysis method, which is again phenomenology, was described with the focus on the multiple sources of evidence.

5 Findings core data

5.1	Introduction	The purpose of the chapter is stated and the research objectives addressed in this chapter are highlighted.
5.2	Administration of the questionnaire	The administration of the questionnaire is described
5.3	Descriptive statistics	A univariate analysis is conducted and the data are screened for certain characteristics to prepare them for the analysis with structural equation modelling.
5.4	SEM model overview	An overview of the different measurement and structural models which are used in the next sections is provided.
5.5	Measurement model	The parameter estimates for the measurement model are identified, the measurement model is tested for model fit and modified several times in order to obtain a final measurement model.
5.6	Structural model	The structural model is tested for model fit and modified, the parameter estimates are calculated and equivalent and structural models are tested before a final structural model is defined.
5.7	Structural regression model	The structural regression model is set into context.
5.8	Hypotheses testing	The hypotheses are tested based on the data generated through the analysis.
5.9	Summary	A summary of the key points of the chapter is provided.

5 Findings of core data collection

5.1 Introduction

This chapter is dedicated to the analysis of the quantitative data collected through the questionnaire. The questionnaire is the core data collection method and identifies the theoretical drive of the overall research project. The description, understanding and explanation of these findings will be enhanced with the supplemental data collection methods whose findings will be presented in the next chapter.

It is the aim of the questionnaire to collect data which are required to answer the research question and objectives. In particular it is intended to answer the following research objectives with the data collected through the questionnaire:

- Objective 2: To identify the influence of organizational justice (climate) on different aspects of construction project performance in order to highlight the potentially positive impact on performance.
- Objective 3: To explore the mediating effect of antecedents of project performance on the identified relationships between organizational justice (climate) and construction project performance in order to investigate these relationships in more detail.

This chapter will provide detailed information over the findings of the core data collection and the process of analysing them. First it will be described how the questionnaire was administered, next the descriptive statistics of the data will be presented and afterwards the measurement and the structural model will be tested for model fit and modified and their parameter estimate will be analysed.

5.2 Administration of the questionnaire

Once the final questionnaire was developed and translated the data collection was administered by distributing the link of the online questionnaire which led the participants to the starting page displayed in Figure 5.1.

To collect the data two different non-probability sampling strategies were applied (section 4.2.1.1). Purposive and volunteer sampling were viewed as being the two most appropriate strategies and therefore two different approaches were used to distribute the link to the questionnaire.

1) E-Mail

   A personalized individual e-mail with the link to the questionnaire was sent out to all international business contacts of known identity of the researcher. A majority of these contacts is based in Germany due to the German background of the researcher. About 250 e-mails were sent out this way (Appendix A1.3). Furthermore accumulative e-mails were sent out to special mailing lists from a) the alumni network of the faculty of civil engineering at the University of Applied Sciences Constance, Germany, b) the alumni network of the masters course in international project management at the University of Applied Sciences Stuttgart, Germany and c) the alumni network of the University of Wuppertal, Germany.

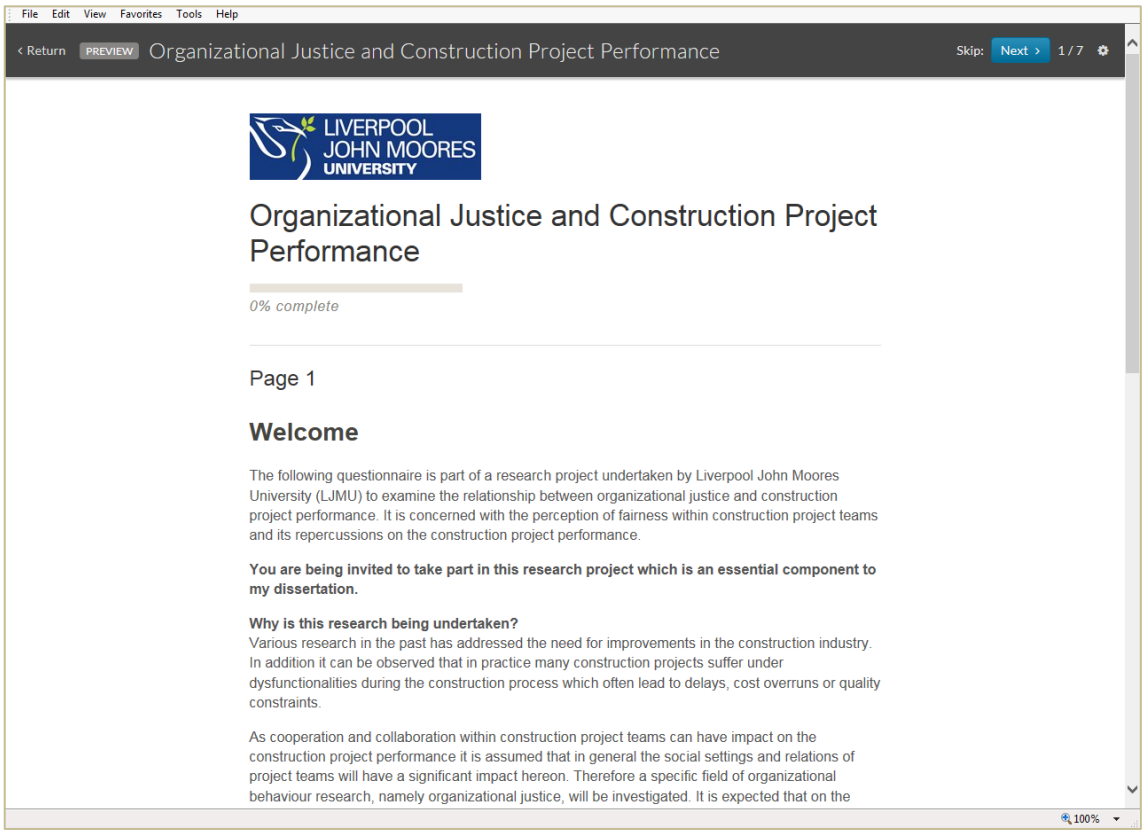

Figure 5.1 – Questionnaire – Start page

2) Web-pages

   A short abstract including the link to the questionnaire was published on the following web-pages and social networks (screenshots in Appendix A1.3):

   a. Deutscher Verband der Projektmanager in der Bau- und Immobilienwirtschaft e.V. (www.dvpev.de/aktuelles)
   b. Association for Project Management (www.apm.org.uk/research/student)
   c. Linked In-group Site Manager UK (https://www.linkedin.com/grp/post/3803028-6040080404403220483)
   d. Linked In-group Construction Management (https://www.linkedin.com/grp/post/102651-6040083332002246660)
   e. Xing-group Alumni Bauingenieurwesen HTWG Konstanz (civil engineering University of Applied Sciences Constance) (https://www.xing.com/communities/posts/alumni-gruppe-bauingenieurwesen-bi-der-htwg-konstanz-1009992470)
   f. Facebook-group IPM@HfT/LJMU (https://www.facebook.com/groups/172065469474240/)

A reminder was sent out to the personal contacts as well as to the mailing lists and was posted in the social network groups. The overall data collection phase was from 28.07.2015 to 25.09.2015. The questionnaire was closed after this date.

5.3 Descriptive statistics

The dataset is analysed and the results of the descriptive statistics are presented in this section. A total of 205 responses were collected during the phase of data collection. They served as the basis for the univariate analysis and the subsequent data screening.

5.3.1 Univariate analysis

At first the univariate analysis was conducted to get an overview of the nature of the data and to get acquainted with them. For this purpose the population which participated in the survey was examined in more detail and the corresponding questions were analysed.

Construction project team roles undertaken

The frequency distribution of the different roles in the construction project team points out that responses from each role are present in the survey. The distribution is shown in Table 5.1:

Role in project	Frequency	Percent
Client	14	6.8
Occupant	3	1.5
Client's representative	21	10.2
Project Manager	48	23.4
Architect or engineer	43	21.0
Consultant	22	10.7
Contractor	40	19.5
Subcontractor	7	3.4
Supplier	2	1.0
Other	5	2.4
Total	**205**	**100.0**

Table 5.1 – Descriptive statistics – Role in project

Type of project involved in

The frequency distribution of the different project types indicates that a wide variety of project types is covered from the survey. The distribution is shown in Table 5.2:

Project type	Frequency	Percent
Office	62	25.8
Education	22	9.2
Sports and leisure	38	15.8
Culture	7	2.9
Housing	21	8.8

Project type	Frequency	Percent
Health Care	11	4.6
Industry	47	19.6
Infrastructure	24	10
Other	8	3.3
Total	**240**	**100.0**

Table 5.2 – Descriptive statistics – Project types

For this question the participants had the opportunity to choose more than one answer as some projects might combine different types (e.g. office and education). Therefore the total number of responses is higher than the number of participants.

Size of project by its construction costs

The frequency distribution of the project size signals that more than 60% of the projects are smaller than £50 million and about 10% are larger than £200 million. A wide variety of project sizes is therefore present in the survey. The distribution is shown in Table 5.3:

Project size in million £	Frequency	Percent
0 - 25	90	43.9
26 - 50	43	21.0
51 - 75	17	8.3
76 - 100	16	7.8
101 - 150	11	5.4
151 - 200	4	2.0
> 200	24	11.7
Total	**205**	**100.0**

Table 5.3 – Descriptive statistics – Project size in million £

Country of project execution

The frequency distribution of the project origin shows that around 73% of the projects were executed in Germany and the remaining 27% were spread all over the world from Europe to Australia, the United States and Middle East. The distribution is shown in Table 5.4:

Country	Frequency	Percent
United Kingdom	8	3.9
Germany	150	73.2
Switzerland	16	7.8
Austria	2	1.0
France	2	1.0
Australia	3	1.5
United States	3	1.5
Other	21	10.2
Total	**205**	**100.0**

Table 5.4 – Descriptive statistics – Country

Role in organization

The frequency distribution of the position within the organization shows that more than 80% of the participants are project leader or have a higher position in the organization. This indicates that there is a high occupational qualification present in the sample. The distribution is shown in Table 5.5:

Role in organization	Frequency	Percent
Administrator	5	2.4
Assistant	32	15.6
Project Leader	90	43.9
Manager	24	11.7
Director	9	4.4
Managing Director	20	9.8
Partner/Owner	18	8.8
Other	7	3.4
Total	**205**	**100.0**

Table 5.5 – Descriptive statistics – Role in organization

Years of experience in the construction industry

The frequency distribution of the work experience signals that almost 85% of the participants have a work experience within the construction industry of at least six years and that 28% have even more than 20 years of experience. This indicates that a high level of experience is present in the sample. The distribution is shown in Table 5.6:

Work experience in years	Frequency	Percent
0 - 5	32	15.6
6 - 10	48	23.4
11 - 15	33	16.1
16 - 20	34	16.6
> 20	58	28.3
Total	**205**	**100.0**

Table 5.6 – Descriptive statistics – Work experience in years

Level of education

The frequency distribution of the level of education points out that a highly qualified sample took part in the survey as 76% hold a degree and 18% are beyond degree level. The distribution is shown in Table 5.7:

Level of education	Frequency	Percent
Below Degree level	9	4.4
Degree level	157	76.6
Beyond Degree level	37	18.0
Missing	2	1.0
Total	**205**	**100.0**

Table 5.7 – Descriptive statistics – Project size in million £

The overall analysis shows that a high level of occupational qualification is present in the sample which leads to the assumption that the responses are based on a broad experience in the construction industry and a high level of knowledge regarding the singularities of construction projects. Furthermore participants of all kinds of roles within a project team are present in the sample which indicates that the sample represents the population of the construction supply chain. Additionally the broad variety of project types and sizes suggests that a comprehensive account of the industry is reflected.

But almost 75% of the projects were executed in Germany. To make sure that there is no bias regarding the region where the project is executed various t-tests were conducted to compare the means of the two groups (group 1: project executed in Germany, group 2: project not executed in Germany). Regarding the

different aspects of performance it was found that (Appendix A1.2 for the coding table):

- The difference in SUCC_BUDG between Germany and the rest of the world is 0.17 (BCa 95%, CI [-0.23, 0.57]) and not significant t(192)=0.82, p=0.41.
- The difference in SUCC_CLIEN between Germany and the rest of the world is 0.13 (BCa 95%, CI [-0.11, 0.37]) and not significant t(192)=0.97, p=0.33.
- The difference in SUCC_OVERA between Germany and the rest of the world is 0.14 (BCa 95%, CI [-0.15, 0.43]) and not significant t(192)=0.87, p=0.39.
- The difference in SUCC_SPEC between Germany and the rest of the world is 0.18 (BCa 95%, CI [-0.09, 0.44]) and not significant t(192)=1.257, p=0.21.
- The difference in SUCC_TIME between Germany and the rest of the world is -0.08 (BCa 95%, CI [-0.50, 0.35]) and not significant t(192)=-0.39, p=0.70.

Regarding the antecedents of project performance which act as mediators for the work at hand it was found that:

- The difference in COMMI between Germany and the rest of the world is 0.03 (BCa 95%, CI [-0.15, 0.21]) and not significant t(192)=0.40, p=0.69.
- The difference in COMMU between Germany and the rest of the world is -0.03 (BCa 95%, CI [-0.27, 0.20]) and not significant t(192)=-0.25, p=0.80.
- The difference in COMP between Germany and the rest of the world is -0.01 (BCa 95%, CI [-0.36, 0.31]) and not significant t(192)=-0.07, p=0.95.
- The difference in CONF between Germany and the rest of the world is -0.01 (BCa 95%, CI [-0.34, 0.30]) ant not significant t(192)=-0.09, p=0.93.
- The difference in COOR between Germany and the rest of the world is 0.10 (BCa 95%, CI [-0.14, 0.32]) and not significant t(192)=0.89, p=0.38.

- The difference in DESC between Germany and the rest of the world is 0.17 (BCa 95%, CI [-0.09, 0.43]) and not significant t(192)=1.31, p=0.19.
- The difference in EXPE between Germany and the rest of the world is 0.13 (BCa 95%, CI [-0.04, 0.30]) and not significant t(192)=1.53, p=0.13.
- The difference in ORGST between Germany and the rest of the world is 0.17 (BCa 95%, CI [-0.10, 0.41]) and not significant t(192)=1.33, p=0.19.
- The difference in PROCO between Germany and the rest of the world is -0.01 (BCa 95%, CI [-0.20, 0.16]) and not significant t(192)=-0.13, p=0.90.

The results show that there is no significant difference between the means of the two groups. This indicates that there is no bias regarding the location of project execution present in the sample.

5.3.2 Data screening

In order to prepare and screen the data for the subsequent application of structural equation modelling (SEM) the following procedure was applied (as per guidance by Gaskin (2012) and Kline (2011)):

1) Case screening – missing data in rows (Gaskin, 2012)
   The 205 cases were screened for missing data. For 11 cases 10 or more data are missing, i.e. 10 or more questions of the survey were not answered which corresponds to a share of about 10% of the total 94 questions which were asked. It was decided that these 11 cases are deleted as they don't add any value to the results (list-wise deletion). Therefore the subsequent analyses were conducted with the remaining 194 cases.

2) Case screening – unengaged responses (Gaskin, 2012)
   The cases were screened for unengaged responses, i.e. cases where all the answers are the same and no variability in the answers is observable. For this purpose the standard deviation of all variables was calculated in SPSS. Only one case had a standard deviation of less than 0.5. This case was explored in more detail: the standard deviation for this case is

0.481, there is a high number of the same score in this case, but there is still a certain differentiation of the scores and it is assumed that the answers were not unengaged. Therefore it was decided that this case can remain in the dataset. No cases had to be deleted because of unengaged responses.

3) Case screening – outliers (Gaskin, 2012)

Outliers are scores which are atypical of the dataset or extreme compared to the rest of the scores (Kline, 2011; Schumacker and Lomax, 2010). As a Likert scale was used for most of the variables these ones don't need to be screened for outliers. These variables can only have a score between 1 and 5 and it cannot be said with certainty if a score of 1 or 5 is an outlier or a deliberate response. The remaining variables offer the opportunity to choose from certain values, therefore outliers cannot be produced. A detailed screening for outliers was therefore not conducted as it is not applicable.

4) Variable screening – missing data in columns (Gaskin, 2012)

Next the variables were screened for missing data. In point 1 above only the cases with 10 or more missing data were deleted. Therefore there were still cases with less than 10 missing data. For this purpose the missing data per variable were identified with SPSS. In total 50 variables had missing data, with the highest number of missing data for one variable being 6 and the total number being 94. It was assumed that the data are missing at random as no pattern was visible regarding the absent data (Kline, 2011). The missing data for each variable were substituted with the median of the variable for Likert scale variables and the mean for all other variables (Gaskin, 2012). The imputation of the medians and the means was conducted with SPSS. This is a simple but widely used method to replace missing data and is especially applicable if only a small number of data are missing per variable (Schumacker and Lomax, 2010). After the substitution of the missing data all 194 cases had a full set of data.

5) Variable screening – skewness and kurtosis (Gaskin, 2012)

Then the data were screened for univariate normality. This was done with the two statistics of skewness, which means that the data are asymmetrically distributed around the mean or median, and kurtosis, which means that the distribution has got a peak or is particularly flat (Kline, 2011). The statistics for skewness and kurtosis were calculated in SPSS. The analysis of the statistics shows that there are only two variables with a kurtosis larger than 2 or smaller than -2 and only three larger than 1.5 or smaller than -1.5. This means that for most of the data a univariate normality can be assumed as +/- 2 is usually an acceptable level and +/- 1 a very good level (Gaskin, 2013a). The same guideline applies for skewness, but as skewness is only relevant for continuous variables it is not pertinent for the work at hand because only ordinal variables are used (Gaskin, 2012). Generally it can be presumed that with a large sample of 194 cases normality shouldn't be an issue (Field, 2013) which was confirmed by the brief analysis of kurtosis and skewness.

6) Linearity and homoscedasticity (Gaskin, 2013b; Kline, 2011)

The screening of the data for linearity and homoscedasticity is most easily done graphically with scatterplots. Different scatterplots were printed for the dataset at hand and they all showed linear relations and uniform distributions (homoscedasticity) of the data (Field, 2013; Kline, 2011). It was not feasible to verify every common frequency distribution of the variables because of the high number of variables, but based on the samples taken it was assumed that linearity and homoscedasticity are not an issue for the data at hand.

7) Multivariate normality (Kline, 2011)

The two previous points together represent the multivariate normality (Kline, 2011). For most estimation methods in SEM it is assumed that the data are multivariate normal. Therefore the two previously conducted screenings for skewness and kurtosis as well as for linearity and

homoscedasticity lead to the assumption that the data for the work at hand were multivariate normally distributed.

8) Collinearity (Kline, 2011)

Moreover it is necessary to screen the data for collinearity, i.e. if two variables measure the same thing and not – as intended – two different aspects (Kline, 2011). For this purpose the variance inflation factor (VIF) for each variable was run in SPSS. The iterative process showed that there are problems with six variables, as their VIF is greater than 10 (Field, 2013): INTJCL_DIGN, INTJCL_POLIT, INTJCL_RESP, INTJU_DIGN, INTJU_POLIT and INTJU_RESP. Collinearity in data is difficult to deal with as in general not much can be done about it, but one option is to do a principal component analysis (PCA) to see if the variables can be combined to one or more components and how they correlate (Field, 2013). The individual variables are then replaced by a composite variable which is derived from the average score (Kline, 2011). The PCA for the six variables mentioned above identified one component which was called INTJUCL_COLLI. The subsequent test for collinearity with the VIF showed that there are no more variables with a VIF greater than 10, which is a good sign. Additionally the new average of the VIF is calculated which is 4.728. This number is greater than 1 which is an indication for potential bias in the model (Field, 2013). Furthermore some of the tolerances are below 0.2 which suggests potential problems as well. But all tolerances are greater than 0.1 which is good as no serious problems are to be expected (ibid). Therefore the dataset was not changed any further, whilst the potential bias is acknowledged during analysis.

9) Relative variance (Kline, 2011)

The analysis of ill-scaled covariance matrices can lead to problems in the iterative estimation methods in SEM (Kline, 2011). Therefore a screening of the variances for differences of more than 10 between the smallest and the greatest variance is necessary (ibid). For the data at hand the

difference is 1.635 which is far away from 10. Therefore it is assumed that the covariance matrix at hand is not ill-scaled.

10) Score reliability (Kline, 2011)

As already explained in section 4.2.2.2 the score reliability is concerned with the internal consistency of the measure and is mostly measured with Cronbach's α (Field, 2013). In general internally consistent measures should be used for SEM which hold a value of α>0.70 (adequate) or even α>0.80 (very good), but for latent variable methods slightly lower values are acceptable (Kline, 2011). The Cronbach αs for the data were calculated with SPSS. For this purpose the factors, which were defined in the measurement model in the previous chapter (section 4.2.2.2) were analysed for internal consistency. The Cronbach's α values are presented in Table 5.8:

Latent variable	Cronbach's α	Improvement with item deleted
COMMI	0.478	0.679
COMMU	0.864	
COMP	0.873	
CONF	0.778	
COOR	0.284	0.785
DESC	0.313	0.834
EXPE	0.603	0.701
ORGST	0.819	
PROCO	0.853	
TRUST	0.189	
DISJU	0.947	
INTJU	0.837	
PROJU	0.835	
DISJCL	0.956	
INTJCL	0.844	
PROJCL	0.869	
SUCC	0.794	

Table 5.8 – Descriptive statistics – Score reliability for latent variables
Key: blue = factors with resolvable issues regarding internal consistency; red = factors with non-resolvable issues regarding internal consistency

As shown in Table 5.8 there were problems regarding the internal consistency of the factors COMMI, COOR, DESC and TRUST. But the calculation in SPSS suggested improvements for the value of Cronbach's α:

- For COMMI, delete the indicator COMMI_EMO to obtain an α of 0.679 which is slightly below the acceptable level of 0.70. But as it is a latent construct, the slightly lower value is nevertheless acceptable. Therefore the indicator COMMI_EMO was deleted.
- For COOR, delete the indicator COOR_ADDIT to obtain an α of 0.785 which is an acceptable level. Therefore the indicator COOR_ADDIT was deleted.
- For DESC, delete the indicator DESC_WAY to obtain an α of 0.834 which is a very good value. Therefore the indicator DESC_WAY was deleted.
- For EXPE, delete the indicator EXPE_COMPL to obtain an α of 0.701 which is an acceptable value. Therefore the indicator EXPE_COMPL was deleted.
- For TRUST no improvement was suggested. This led to the conclusion that this measure does not show internal reliability and therefore does not measure what it is meant to. This was surprising as this is an established measure already used by Colquitt and Rodell (2011). As it is usually recommended for SEM to use only internally consistent measures this measure should be deleted and not further considered in the analysis.

The other factors show an acceptable to very good level of internal consistency which leads to the conclusion that all measures were reliable and that no further action was required.

11) Score validity (Kline, 2011)

    It was stated in section 4.2.1.3 that the validity is composed of different types: the construct validity is if the score measures what it is intended to measure, the internal validity is concerned with causal relationships between variables and the external validity addresses the generalizability of the score (De Vaus, 2002; Saunders et al., 2012). For the work at hand another type of validity was assessed: the face validity. With this type of validity other people are asked whether the question or the measure is a suitable one for the defined concept (Bryman, 2012; De Vaus, 2002). The supervisors of the work at hand gave their assessment regarding the validity of the score and they confirmed a valid score.

5.3.3 Results of the data screening

The test for score reliability and validity were the last steps in data preparation and screening. To summarize this task the data were screened for missing data and where appropriate a list-wise deletion or a substitution of missing data with the median or mean was conducted. Furthermore a screening for unengaged responses and outliers was executed and the test of multivariate normality led to the assumption that the data are normally distributed. The test for collinearity identified some issues which were as far as possible resolved. The relative variance of the data showed no reason for concern. The score reliability identified insufficient reliability for four scores which was resolved through the deletion of certain items. After all this preparatory work the data were suitably refined to start the analysis with SEM.

5.4 SEM model overview

As there are different models and different stages of model modification involved in the process of conducting the SEM an overview is given prior to the analysis to see how these models relate to each other (Figure 5.2).

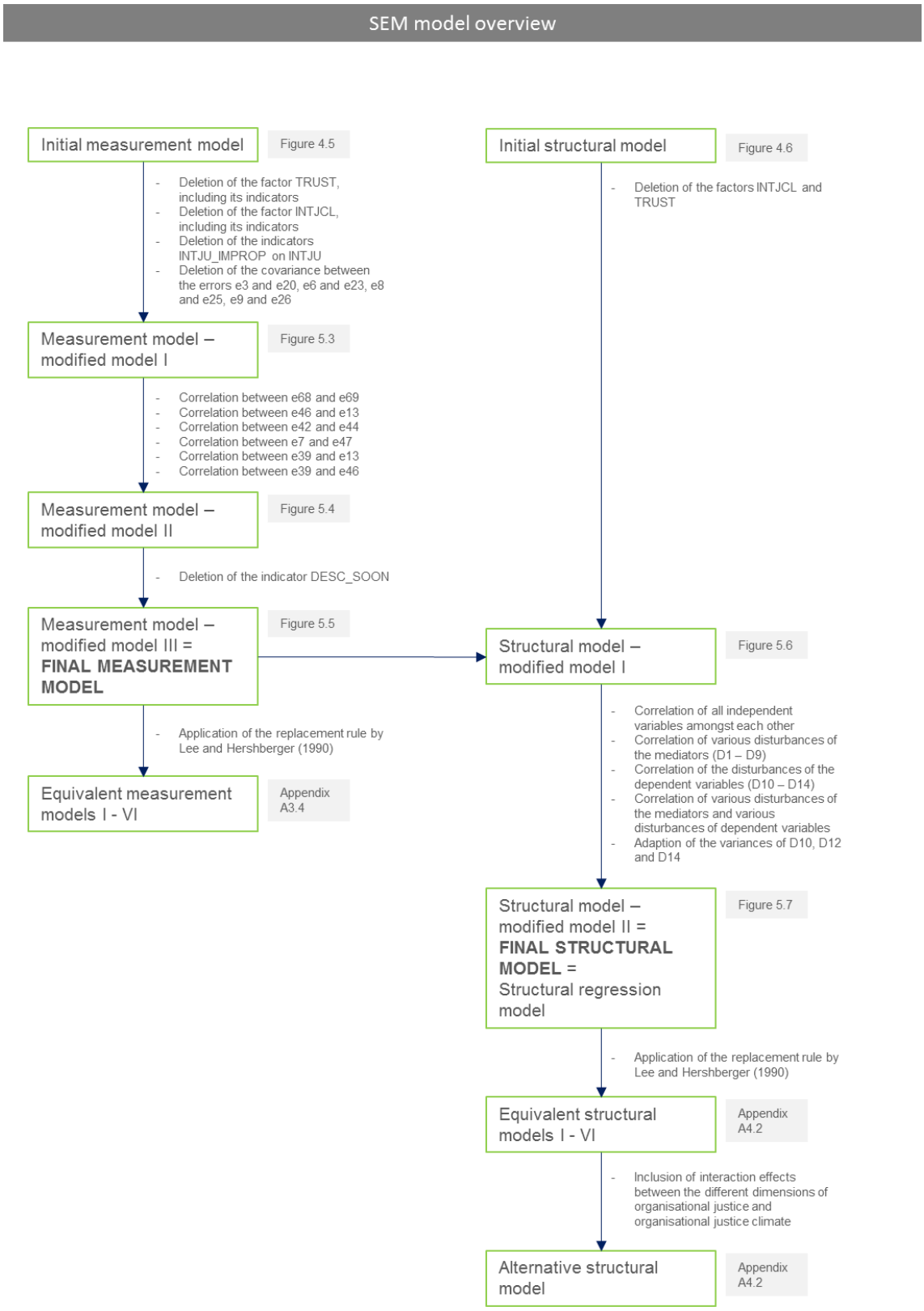

Figure 5.2 – SEM model overview

The point of origin are the two previously defined initial models, i.e. the initial measurement model and the initial structural model. Through the process of SEM they are tested and modified and equivalent and alternative models are tested. At the end a final measurement model and a final structural model is defined.

5.5 Measurement model

This section focuses on the analysis of the measurement model with a confirmatory factor analysis (CFA).

The initial measurement model, which was developed prior to data collection, was presented in section 4.2.2.2. Based on the findings of the data screening presented in the previous section the model was modified to incorporate the adjustments in the data. For the measurement model the following adjustments in the data are relevant:

- Development of the composite variable INTJUCL_COLL
- Deletion of the indicators COMMI_EMO, COOR_ADDIT, DESC_WAY and EXPE_COMPL

The factor TRUST, including its indicators, was not deleted at this step as further tests with the confirmatory factor analysis (CFA) were undertaken to verify the poor result regarding the internal consistency. The modified measurement model looks as follows (Figure 5.3).

For this model a confirmatory factor analysis (CFA) was conducted to analyse the relationships between the indicators and the factors. The results are presented and interpreted in the following sections.

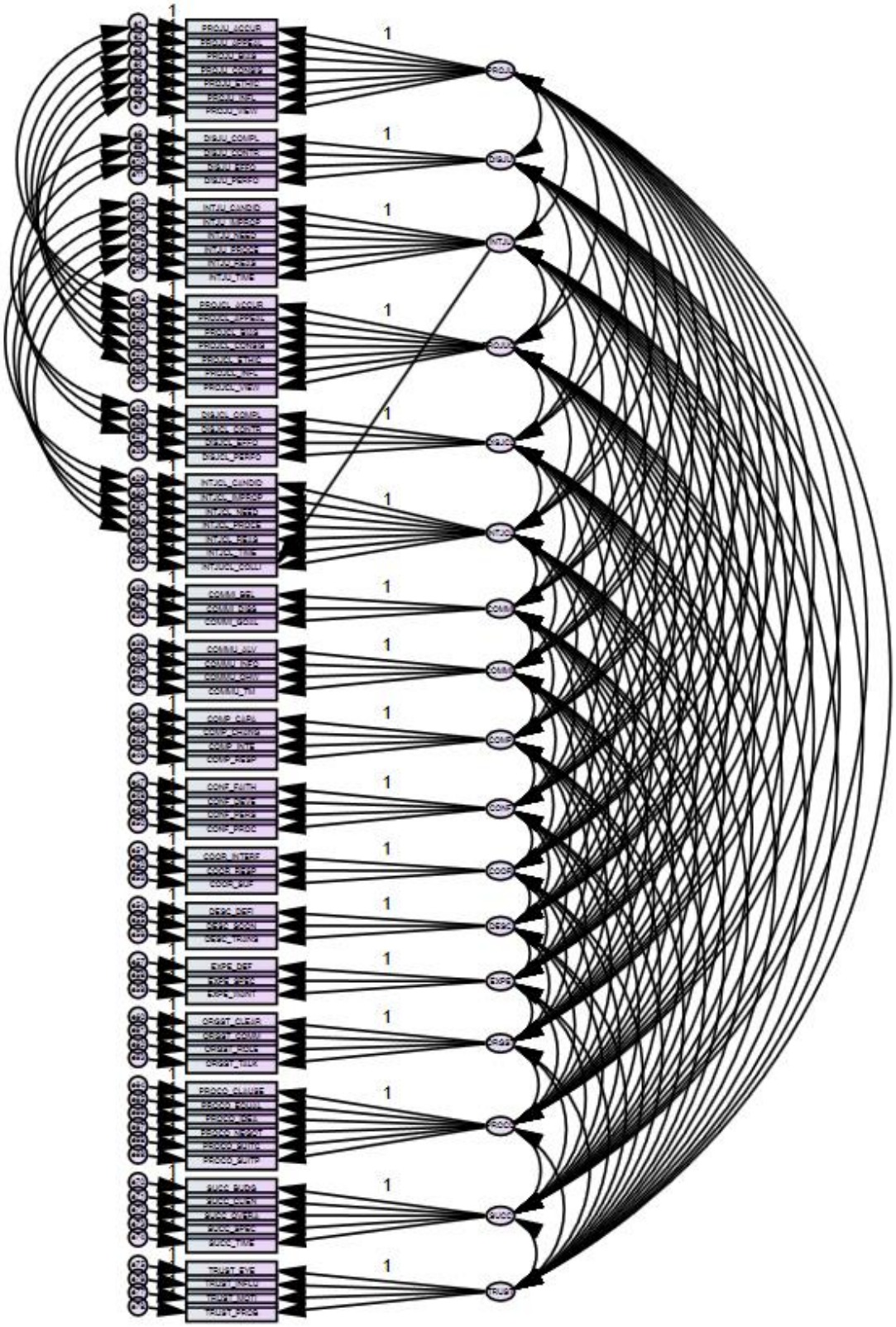

Figure 5.3 – Measurement model – Modified model I

5.5.1 Parameter estimates

The factor loadings between the indicators and factors are interpreted as standardized regression coefficients and it is generally recommended to use indicators which have comparatively high ones, i.e. >0.70 (Kline, 2011) but according to Stevens (2012) a value of >0.51 is already significant. Table 5.9 shows the factor loadings (unstandardized estimates) for this model:

Variables			Unstandardized estimate	SE	Standardized estimate	R^2_{smc}
COMMI_BEL	<---	COMMI	1.00		0.59	0.35
COMMI_DISS	<---	COMMI	1.22	0.20	0.63	0.39
COMMI_GOAL	<---	COMMI	1.26	0.19	0.72	0.52
COMMU_ALV	<---	COMMU	1.00		0.75	0.56
COMMU_INFO	<---	COMMU	0.98	0.09	0.76	0.58
COMMU_OHW	<---	COMMU	1.11	0.09	0.86	0.74
COMMU_TM	<---	COMMU	1.08	0.10	0.79	0.62
COMP_CAPA	<---	COMP	1.00		0.78	0.61
COMP_CHANG	<---	COMP	0.90	0.08	0.75	0.56
COMP_INTE	<---	COMP	0.97	0.07	0.86	0.73
COMP_RESP	<---	COMP	0.91	0.07	0.81	0.65
CONF_FAITH	<---	CONF	1.00		0.80	0.64
CONF_DEVE	<---	CONF	0.68	0.08	0.59	0.34
CONF_PERS	<---	CONF	0.68	0.08	0.59	0.35
CONF_PROC	<---	CONF	0.74	0.07	0.70	0.49
COOR_INTERF	<---	COOR	1.00		0.76	0.58
COOR_RESP	<---	COOR	1.03	0.11	0.72	0.51
COOR_SUF	<---	COOR	0.99	0.10	0.75	0.56
DESC_DEFI	<---	DESC	1.00		0.89	0.78
DESC_SOON	<---	DESC	0.89	0.09	0.65	0.42
DESC_TRANS	<---	DESC	1.10	0.06	0.91	0.83
EXPE_DEF	<---	EXPE	1.00		0.69	0.48
EXPE_SPEC	<---	EXPE	1.21	0.17	0.62	0.38
EXPE_WANT	<---	EXPE	1.04	0.13	0.70	0.49
ORGST_CLEAR	<---	ORGST	1.00		0.81	0.66
ORGST_COMM	<---	ORGST	0.85	0.09	0.67	0.45
ORGST_ROLE	<---	ORGST	0.85	0.08	0.71	0.50
ORGST_TALK	<---	ORGST	0.82	0.08	0.74	0.55
PROCO_CLAUSE	<---	PROCO	1.00		0.55	0.30
PROCO_EQUAL	<---	PROCO	1.34	0.18	0.77	0.59
PROCO_IDEA	<---	PROCO	1.38	0.19	0.74	0.55
PROCO_NEGOT	<---	PROCO	1.44	0.19	0.78	0.61

Variables			Unstandardized estimate	SE	Standardized estimate	R^2_{smc}
PROCO_SUITC	<---	PROCO	1.35	0.19	0.70	0.49
PROCO_SUITP	<---	PROCO	1.11	0.16	0.66	0.43
TRUST_EYE	<---	TRUST	1.00		0.23	0.05
TRUST_INFLU	<---	TRUST	2.39	0.78	0.50	0.25
TRUST_MOTI	<---	TRUST	-1.21	0.47	-0.28	0.08
TRUST_PROB	<---	TRUST	-0.62	0.37	-0.14	0.02
DISJU_COMPL	<---	DISJU	1.00		0.93	0.86
DISJU_CONTR	<---	DISJU	1.00	0.04	0.93	0.87
DISJU_EFFO	<---	DISJU	0.96	0.05	0.83	0.69
DISJU_PERFO	<---	DISJU	1.02	0.04	0.93	0.86
INTJU_CANDID	<---	INTJU	1.00		0.80	0.64
INTJU_IMPROP	<---	INTJU	0.20	0.13	0.10	0.01
INTJU_NEED	<---	INTJU	1.02	0.09	0.73	0.53
INTJU_PROCE	<---	INTJU	1.20	0.08	0.86	0.75
INTJU_REAS	<---	INTJU	1.15	0.08	0.87	0.76
INTJU_TIME	<---	INTJU	1.21	0.09	0.86	0.73
INTJUCL_COLLI	<---	INTJU	0.73	0.14	0.66	n/a
PROJU_ACCUR	<---	PROJU	1.00		0.81	0.65
PROJU_APPEAL	<---	PROJU	0.80	0.10	0.57	0.32
PROJU_BIAS	<---	PROJU	0.89	0.10	0.64	0.41
PROJU_CONSIS	<---	PROJU	0.82	0.08	0.67	0.45
PROJU_ETHIC	<---	PROJU	1.11	0.10	0.71	0.50
PROJU_INFL	<---	PROJU	0.71	0.09	0.57	0.32
PROJU_VIEW	<---	PROJU	0.76	0.09	0.60	0.36
DISJCL_COMPL	<---	DISJCL	1.00		0.93	0.87
DISJCL_CONTR	<---	DISJCL	1.00	0.04	0.92	0.84
DISJCL_EFFO	<---	DISJCL	0.97	0.04	0.91	0.82
DISJCL_PERFO	<---	DISJCL	0.99	0.04	0.92	0.84
INTJCL_CANDID	<---	INTJCL	8.30	7.66	0.85	0.72
INTJCL_IMPROP	<---	INTJCL	1.00		0.07	0.01
INTJCL_NEED	<---	INTJCL	7.06	6.52	0.70	0.50
INTJCL_PROCE	<---	INTJCL	8.82	8.14	0.90	0.80
INTJCL_REAS	<---	INTJCL	8.90	8.22	0.89	0.79
INTJCL_TIME	<---	INTJCL	8.97	8.28	0.87	0.75
INTJUCL_COLLI	<---	INTJCL	0.72	1.25	0.08	n/a
PROJCL_ACCUR	<---	PROJUCL	1.00		0.74	0.54
PROJCL_APPEAL	<---	PROJUCL	1.12	0.12	0.67	0.44
PROJCL_BIAS	<---	PROJUCL	1.11	0.12	0.68	0.47
PROJCL_CONSIS	<---	PROJUCL	1.01	0.11	0.70	0.49
PROJCL_ETHIC	<---	PROJUCL	1.18	0.12	0.69	0.48

Variables			Unstandar-dized estimate	SE	Standar-dized estimate	R^2_{smc}
PROJCL_INFL	<---	PROJUCL	1.04	0.11	0.69	0.48
PROJCL_VIEW	<---	PROJUCL	1.02	0.10	0.73	0.54
SUCC_BUDG	<---	SUCC	1.00		0.63	0.40
SUCC_CLIEN	<---	SUCC	0.75	0.09	0.73	0.54
SUCC_OVERA	<---	SUCC	1.09	0.11	0.89	0.80
SUCC_SPEC	<---	SUCC	0.57	0.09	0.52	0.27
SUCC_TIME	<---	SUCC	0.97	0.13	0.61	0.37

Table 5.9 – Measurement model – Parameter estimates

Key: blue = limited statistically meaningful values for R^2_{smc} (< 0.40); red = not statistically meaningful values for standardized estimates (< 0.51) and R^2_{smc} (< 0.30)

The results show that most of the factor loadings can be considered meaningful as the standardized loadings of most variables are greater than 0.51 (Stevens, 2012) and a very high number is even above the threshold of 0.70 (Kline, 2011). But especially the factor TRUST, which already showed big problems regarding its internal consistency, holds again partly very low factor loadings which are not statistically meaningful. Therefore it was decided to delete the factor TRUST, including its indicators, for the subsequent analysis. Furthermore the indicator INTJU_IMPROP on INTJU and the indicators INTJCL_IMPROP and INTJUCL_COLLI on INTJCL show very low factor loadings which don't fulfil the thresholds. The indicators of the two factors INTJU and INTJCL already showed some issues regarding their collinearity during the data screening in the previous section and therefore it is not surprising that there are certain problems regarding the significance of their factor loadings. Therefore it was decided that they would be deleted for the next stage of the analysis.

The standardized factor loadings can also be viewed as estimated correlations for the indicators which load on only one factor and if squared they explain the variance R^2_{smc} of the indicator. According to Kline (2011) R^2_{smc} should be preferably greater than 0.50 for each variable in a CFA model whereas Stevens (2012) argues that a value of 0.40 is sufficient and Field (2013) mentions that some researchers even decide on the value of 0.30. The table above shows that most variables fulfil the value of 0.50 or are very close to it. But there are some

variables which don't hold an R^2_{smc} > 0.30 and whose factors therefore don't explain more than 30% of the variance of the indicators. These variables are congruent with the ones of low significance shown in red in Table 5.9 and were not further considered in the analysis.

Only for the indicator INTJUCL_COLLI, which loads on two factors these conclusions cannot be drawn as they cannot be viewed as estimated correlations but as beta weights, which provide an indication for the expected differences in standard deviation units. As there is only one indicator for which this is applicable, no comparison can be drawn (Kline, 2011).

Furthermore the parameter estimates were examined regarding the following properties (Brown, 2015):

- Factor correlations: To represent clear and different constructs it is recommended that the factor correlations do not exceed a value of about 0.85. Five out of 135 correlations exceed this threshold. After closer examination of these correlations it was decided that no further action is undertaken as most of them are only slightly above the threshold.
- Error covariances: The significance of the error covariances allows a conclusion if some of the included error convariances, which were decided on based on theory (section 4.2.2.2), are unnecessarily included in the model. The covariances between e3 and e20, e6 and e23, e8 and e25 as well as between e9 and e26 are not significant at a level of p>0.05 and it was therefore decided that these covariances are deleted.
- Standard errors: The standard errors of the unstandardized factor loadings indicate how much sampling error is in the parameter estimates. If there are high standard errors compared to the other errors, this is a reason for concern. For the work at hand high standard errors were identified for the indicators related to the factor of INTJCL. Following the recommendations it was decided that this factor including its indicators should be deleted.
- Heywood cases: Heywood cases are cases which don't make statistical sense and which indicate problems or errors in model specification as well

as the sample or model-implied matrices. The data were screened for completely standardized factor correlations that exceed 1.0, negative factor variances and negative indicator error variances. There were no Heywood cases identified for the work at hand, which means that the parameter estimates are statistically viable.

From a substantive perspective the parameter estimates as well as their direction and magnitude make sense. Therefore no action was required in this context.

For information, the measurement error variances and covariances as well as the factor variances, covariances and correlations are shown in Appendix A4.1 to A4.4.

5.5.2 Model modification I

Based on the analysis of the factor loadings the necessary model modifications were undertaken. These were:

- Deletion of the factor TRUST, including its indicators.
- Deletion of the factor INTJCL, including its indicators.
- Deletion of the indicators INTJU_IMPROP on INTJU.
- Deletion of the covariances between errors e3 and e20, e6 and e23, e8 and e25 as well as between e9 and e26.

These deletions are compatible with the underlying theory which was explained in section 4.2.2.2 during the model development as they don't change the model significantly. But it means that certain hypotheses cannot be tested, as the factor TRUST is not a valid measure. Furthermore the dimension of interactional justice climate cannot be tested which means that the related hypotheses were erased. In the next step the model fit of the modified model (I) was tested.

5.5.3 Model fit I

As mentioned previously model fit is a complex question and the fit of the modified model (I) was evaluated in the following based on the most common fit indices (Table 5.10):

Fit statistic	Recommended value for good fit	Result	Interpretation
χ^2_M		3642.94	Significant → exact fit hypothesis rejected.
df_M		2034	
P	Not significant	0.00	
χ^2_M / df_M	1 – 3	1.75	Good value.
RMSEA (90% CI)	Less than 0.05 or 0.08	0.06 (0.06 – 0.07)	Close-fit hypothesis needs to be rejected and poor-fit hypothesis can be rejected → mixed results
$P_{\text{close-fit H0}}$	Significant	0.00	
GFI	Close to 0.90 or 0.95	0.59	Poor fit.
CFI	The greater the better	0.84	Adequate fit.
NFI	Close to 0.90 or 0.95	0.70	Poor fit.
TLI	Close to 0.90 or 0.95	0.83	Adequate fit.
RMR		0.07	
SRMR	Less than 0.05 or 0.08	0.07	Adequate to good fit.

Table 5.10 – Measurement model – Model fit I – Fit statistics

These first interpretations of the model fit indices show that there were problems with the model fit for the modified model (I). Therefore the modification indices which were suggested by AMOS were taken into consideration. These modification indices proposed improvements in model fit by freeing fixed or constraint parameters (Brown, 2015).

5.5.4 Model modification II

The following model modifications were suggested by AMOS and their justification with theory is given below (MacCallum and Austin, 2000):

- Correlation of e68 and e69 – The measurement error e68 belongs to the indicator PROCO_SUITC and e69 belongs to the indicator PROCO_SUITP, i.e. one is concerned with the suitability of the procurement method for the client and the other one with the suitability for the project. It is plausible that

these two indicators have “something in common” (Kline, 2011, p. 115) which is not explained by the model. Therefore the correlation was adopted.

- Correlation of e46 and e13 – The measurement error e46 belongs to the indicator COMP_RESP and e13 belongs to the indicator INTJUCL_COLLI, i.e. one is concerned with the client’s respectful treatment of the team members and the other with the new calculated variable which consists, amongst others, of the two former variables INTJU_RESP and INTJCL_RESP which are also concerned with the respectful treatment of the individuals and/or team members. Therefore it is also plausible that an error correlation was adopted for the two indicators.
- Correlation of e42 and e44 – The measurement error e42 belongs to the indicator COMMU_TM and e44 belongs to the indicator COMP_CANGE, i.e. one is concerned with the communication in a timely manner and the other with the quick adaption to a changing environment. Thus, both indicators relate to the topic of time which leads to the assumption that they might have “something in common” (Kline, 2011, p. 115) which justified the adoption of the error correlation.
- Correlation of e7 and e47 – The measurement error e7 belongs to the indicator PROJU_VIEW and e47 belongs to the indicator CONF_FAITH, i.e. one is concerned with individual’s ability to express thoughts and feelings during the project and the other one with the feeling of a faithful conversation basis with the client. These two indicators are therefore affected by the feelings for the client and the adoption of an error correlation seemed plausible.
- Correlation of e39 and e13 – The measurement error e39 belongs to the indicator COMMU_ALV and e13 belongs to the indicator INJUCL_COLLI, i.e. one is concerned with the adequate language and volume in communication and the other with the new calculated variable which is concerned with the polite, dignified and respectful treatment of individuals and teams. Hence, it was plausible to assume that the two indicators have “something in common” (Kline, 2011, p. 115) which is not explained by the model and to adopt the error correlation.

- Correlation of e39 and e46 – The measurement error e39 belongs to the indicator COMMU_ALV and e46 belongs to the indicator COMP_RESP, i.e. one is concerned with the adequate language and volume in communication and the other with the client's respectful treatment of the team members. These two are therefore affected by the respectful relationship between the client and the individual and an error correlation was justifiable.

Furthermore various adaptions in the regression weights, i.e. the factor loadings, were suggested by AMOS. But these suggestions were not plausible, based on the model's underlying theory, as one indicator cannot predict another indicator. Therefore these modification suggestions were ignored.

The resulting model is the modified model (II) and it looks as follows (Figure 5.4).

5.5.5 Model fit II

The modified model (II) was also tested for model fit based on the previously reported indices (Table 5.11):

Fit statistic	Recommended value for good fit	Result	Interpretation
χ^2_M		3259.38	Significant → exact fit hypothesis rejected.
df_M		2028	
P	Not significant	0.00	
χ^2_M / df_M	1 – 3	1.61	Good value.
RMSEA (90% CI)	Less than 0.05 or 0.08	0.06 (0.05 – 0.06)	Close-fit hypothesis doesn't need to be rejected and poor-fit hypothesis can be rejected → good results
$P_{\text{close-fit H0}}$	Significant	0.00	
GFI	Close to 0.90 or 0.95	0.68	Poor fit.
CFI	The greater the better	0.87	Good fit.
NFI	Close to 0.90 or 0.95	0.72	Poor fit.
TLI	Close to 0.90 or 0.95	0.86	Good fit.
RMR		0.07	
SRMR	Less than 0.05 or 0.08	0.07	Adequate to good fit.

Table 5.11 – Measurement model – Model fit II – Fit statistics

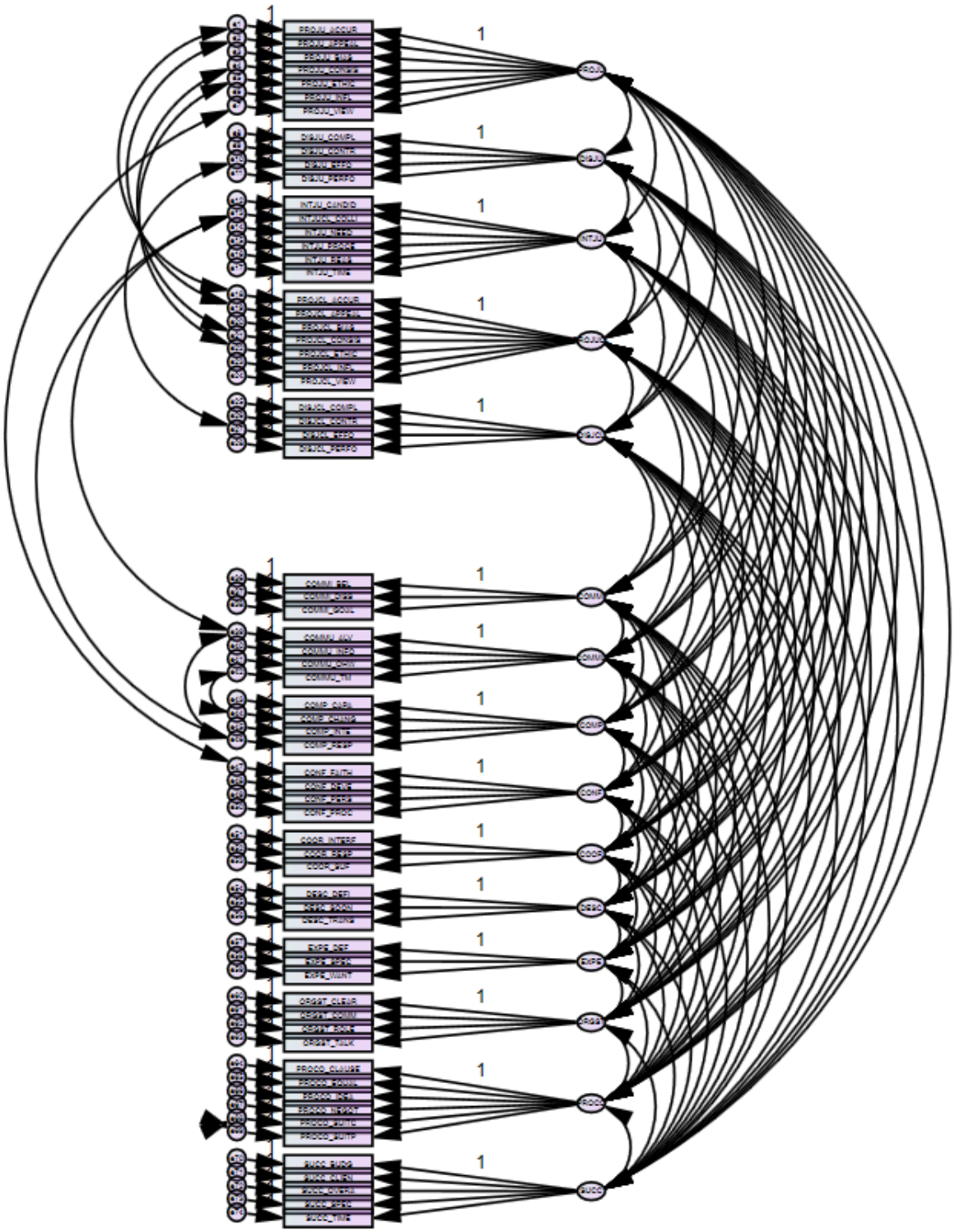

Figure 5.4 – Measurement model – Modified model II

The above described interpretation of the fit indices needs to be viewed critically because, as mentioned before, the cut-off values of the indices are not commonly agreed upon (Brown, 2015). Therefore the guidelines of Hu and Bentler (1999) and the rule of thumb by Browne and Cudeck (1993) regarding a combined evaluation of the fit indices were applied additionally (Table 5.12):

Fit statistic	Recommended value for good fit	Value for the work at hand	Interpretation
Hu and Bentler (1999) guidelines			
SRMR	≤0.08	0.06	✓
RMSEA (90% CI)	Close to or <0.06	0.06 (0.05 – 0.06)	✓
CFI	Close to or >0.95	0.87	(✓)
TLI	Close to or >0.95	0.86	(✓)
Browne and Cudeck (1993) rule of thumb			
RMSEA adequate fit	<0.08	0.06	✓
RMSEA good fit	<0.05	0.06	x
RMSEA upper value 90% CI	<0.08	0.06	✓

Table 5.12 – Measurement model – Model fit II – Fit statistic guidelines

These additional, more comprehensive, evaluations led to the assumption that based on the model fit indices an adequate to good fit can be supposed for the modified model (II). This provides preliminary support that the model was specified properly.

5.5.6 Model modification III

Before it was decided to use the model for the further analysis one more step in model modification was undertaken. For this purpose the standardized residual covariance matrix was inspected and it was screened for outliers or values greater than 2.58 (Brown, 2015). The inspection showed that there was a problem with the indicator DESC_SOON as it had a high number of residual covariances with a value greater than 2.58. This means that the relationship between DESC_SOON and the other indicators is underestimated by the model (ibid). This is furthermore underpinned by the fact that there were still modification indices suggested by AMOS in connection with this indicator. It was decided that the indicator DESC_SOON should be deleted because of the problems it caused

in relation with other indicators. The resulting model is the modified model (III) and it looks as follows (Figure 5.5).

5.5.7 Model fit III

The modified model (III) was once more tested for model fit based on the previously reported indices (Table 5.13):

Fit statistic	Recommended value for good fit	Result	Interpretation
χ^2_M		3142.94	Significant → exact fit hypothesis rejected.
df_M		1963	
p	Not significant	0.00	
χ^2_M / df_M	1 – 3	1.60	Good value.
RMSEA (90% CI)	Less than 0.05 or 0.08	0.06 (0.05 – 0.06)	Close-fit hypothesis doesn't need to be rejected and poor-fit hypothesis can be rejected → good results
$P_{\text{close-fit H0}}$	Significant	0.01	
GFI	Close to 0.90 or 0.95	0.69	Poor fit.
CFI	The greater the better	0.88	Good fit.
NFI	Close to 0.90 or 0.95	0.73	Poor fit.
TLI	Close to 0.90 or 0.95	0.86	Good fit.
RMR		0.07	
SRMR	Less than 0.05 or 0.08	0.06	Good fit.

Table 5.13 – Measurement model – Model fit III – Fit statistics

Some of the reported model fit indices improved slightly for the modified model (III) compared to the modified model (II). Therefore the deletion of the indicator DESC_SOON was perceived to be a good decision.

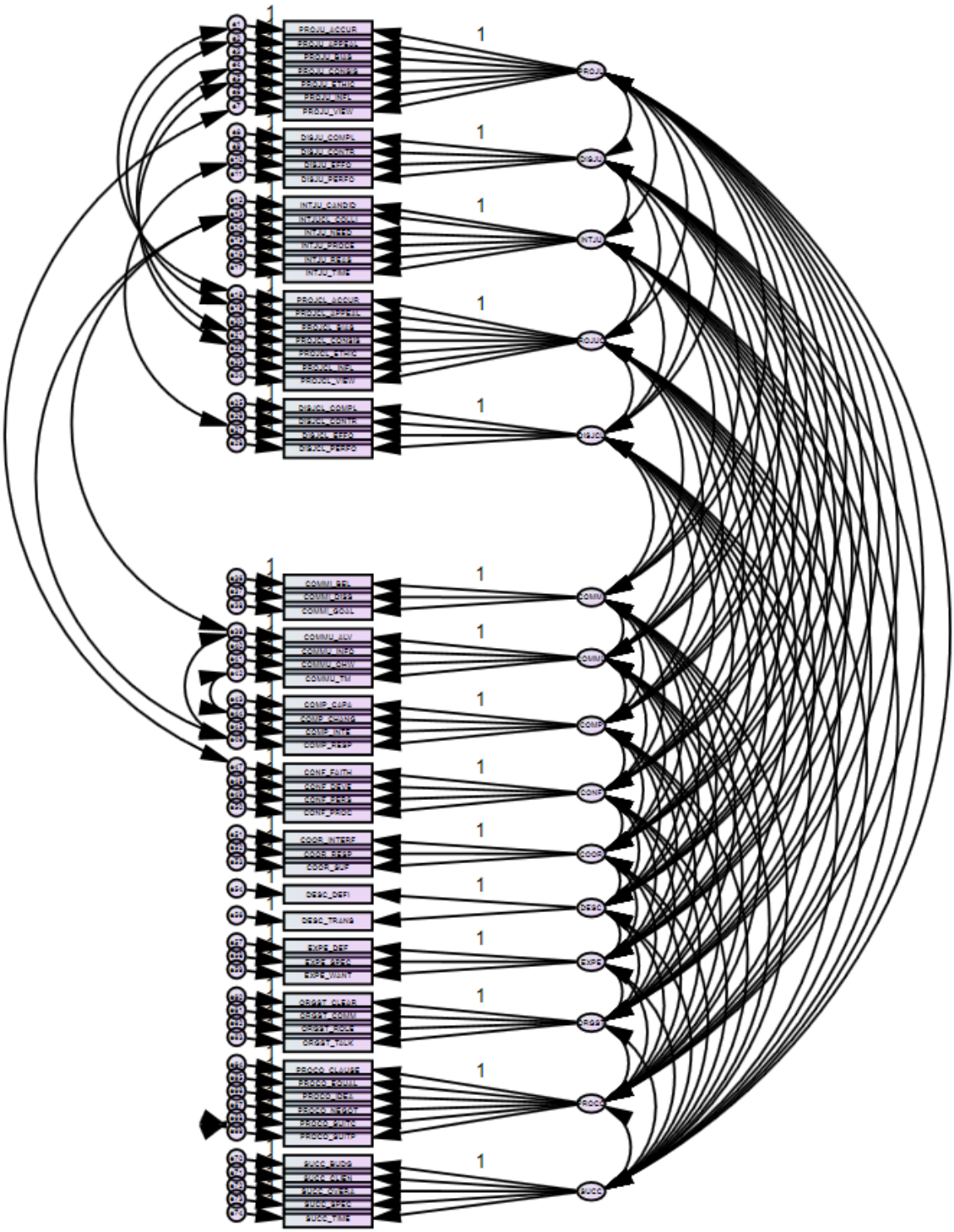

Figure 5.5 – Measurement model – Modified model III

The guidelines of Hu and Bentler (1999), as well as the rule of thumb by Browne and Cudeck (1993), were applied to the modified model (III) (Table 5.14):

Fit statistic	Recommended value for good fit	Value for the work at hand	Interpretation
Hu and Bentler (1999) guidelines			
SRMR	≤0.08	0.06	✓
RMSEA (90% CI)	Close to or <0.06	0.05 (0.05 – 0.06)	✓
CFI	Close to or >0.95	0.88	✓
TLI	Close to or >0.95	0.86	(✓)
Browne and Cudeck (1993) rule of thumb			
RMSEA adequate fit	<0.08	0.06	✓
RMSEA good fit	<0.05	0.06	x
RMSEA upper value 90% CI	<0.08	0.06	✓

Table 5.14 – Measurement model – Model fit III – Fit statistic guidelines

The interpretation of the fit indices and the more comprehensive evaluations show that the model fit had improved and that the modified model (III) shows good model fit. As all assumptions in the model are also based on theory it was decided that the modified model (III) should be used for further analysis and that it is the final measurement model.

5.5.8 Equivalent models

As recommended by Schumacker and Lomax (2010), as well as by Kline (2011), some nearly equivalent models were developed with the replacement rule by Lee and Hershberger (1990) and tested. They are presented in Appendix A4.4 with the corresponding fit indices and characterised as follows:

- *Equivalent model (I):* All covariances are replaced with direct effects and the second order factors ORGJU, ORGJCL and ANTECE are implemented.
- *Equivalent model (II):* All covariances are replaced with direct effects and the second order factors second1 to second7 are implemented, i.e. every two first order factors are combined to one second order factor.
- *Equivalent model (III):* The DESC factor is substituted with a measurement error correlation of its indicators which now load on COOR.

- *Equivalent model (IV):* The DESC factor is substituted with a measurement error correlation of its indicators which now load on EXPE.
- *Equivalent model (V):* The covariances of PROJCL and DISJCL are replaced with direct effects and the second order factor ORGJCL is implemented.
- *Equivalent model (VI):* This is a combination of the equivalent model (III) and (IV).

All models show fit indices which are not as good as the ones of the final measurement model, but it is worth noting that some of them are nearly as good. This is especially applicable for the equivalent model (III) which holds the same fit indices apart from a little worse χ^2_M/df_M compared to the final measurement model. According to the previously mentioned comprehensive evaluations by Hu and Bentler (1999) and Browne and Cudeck (1992) this represents a model fit as good as the final measurement model. The equivalent model (IV) exhibits also a model fit very close to the one of the final measurement model as it differs only in the χ^2_M/df_M and the GFI. The indices are displayed in detail in Table 5.15:

Fit statistic	Model						
	final model	equiv I	equiv II	equiv III	equiv IV	equiv V	equiv VI
χ^2_M	**3142.94**	3572.06	3470.59	3172.97	3178.36	3222.35	3252.05
df_M	**1963**	2048	2033	1976	1976	1975	1987
p	**0**	0	0	0	0	0	0
χ^2_M/df_M	**1.60**	1.74	1.71	1.61	1.61	1.63	1.64
RMSEA (90% CI)	**0.06 (0.05 – 0.06)**	0.06 (0.06 – 0.07)	0.06 (0.06 – 0.06)	**0.06 (0.05 – 0.06)**	**0.06 (0.05 – 0.06)**	**0.06 (0.05 – 0.06)**	**0.06 (0.05 – 0.06)**
P close-fit H0	**0.01**	0.00	0.00	0.00	0.00	0.00	0.00
GFI	**0.69**	0.64	0.67	**0.69**	0.67	0.68	0.68
RMR	**0.07**	0.09	0.09	**0.07**	**0.07**	**0.07**	**0.07**
SRMR	**0.06**	0.08	0.08	**0.06**	**0.06**	0.07	0.07
CFI	**0.88**	0.84	0.85	0.87	0.87	0.87	0.87
NFI	**0.73**	0.69	0.70	**0.73**	**0.73**	0.72	0.72
TLI	**0.86**	0.83	0.84	**0.86**	**0.86**	**0.86**	**0.86**

Table 5.15 – Measurement model – Equivalent models – Fit statistics

Based on these evaluations it was decided that the equivalent models (III) and (IV) are examined more closely in relation to their underlying theory and the

plausibility of their relationships. For the equivalent model (III) the indicators of DESC load on COOR as DESC is deleted. The factor COOR is concerned with the coordination amongst the team members and has little in common with the decision making of DESC. Therefore it was decided that based on theoretical considerations this equivalent model is not plausible. The same is true for the equivalent model (IV) as the indicators of DESC load on EXPE which is concerned with the compliance to client's expectations.

It was concluded that some equivalent models examined do not fit as well as the final measurement model or that they are not plausible, based on theoretical considerations. Therefore the final measurement model as shown in Figure 5.5 is the basis for the further analysis.

5.6 Structural model

The next step in SEM was to test the structural model. The initial structural model was developed in section 4.2.2.2 and, based on the modifications in the measurement model, a modification of the structural model was necessary. For the structural model the following adjustments in the measurement model were relevant:

- Deletion of the factors INTJCL and TRUST

Therefore the modified structural model (I) looks as follows (Figure 5.6). For this model a path analysis was conducted which is extended to latent variables. The observed variables pictured above are in effect latent variables which were computed out of their indicators with AMOS. An exception are the variables of success which are observed or single indicator variables. Distinct from the measurement model for the structural model, the model fit is tested first and the parameter estimates are tested second. The reason for that is that, based on the parameter estimates, no modifications are expected and that model modification can in turn change the parameter estimates. Therefore the model fit of the initial model was tested first.

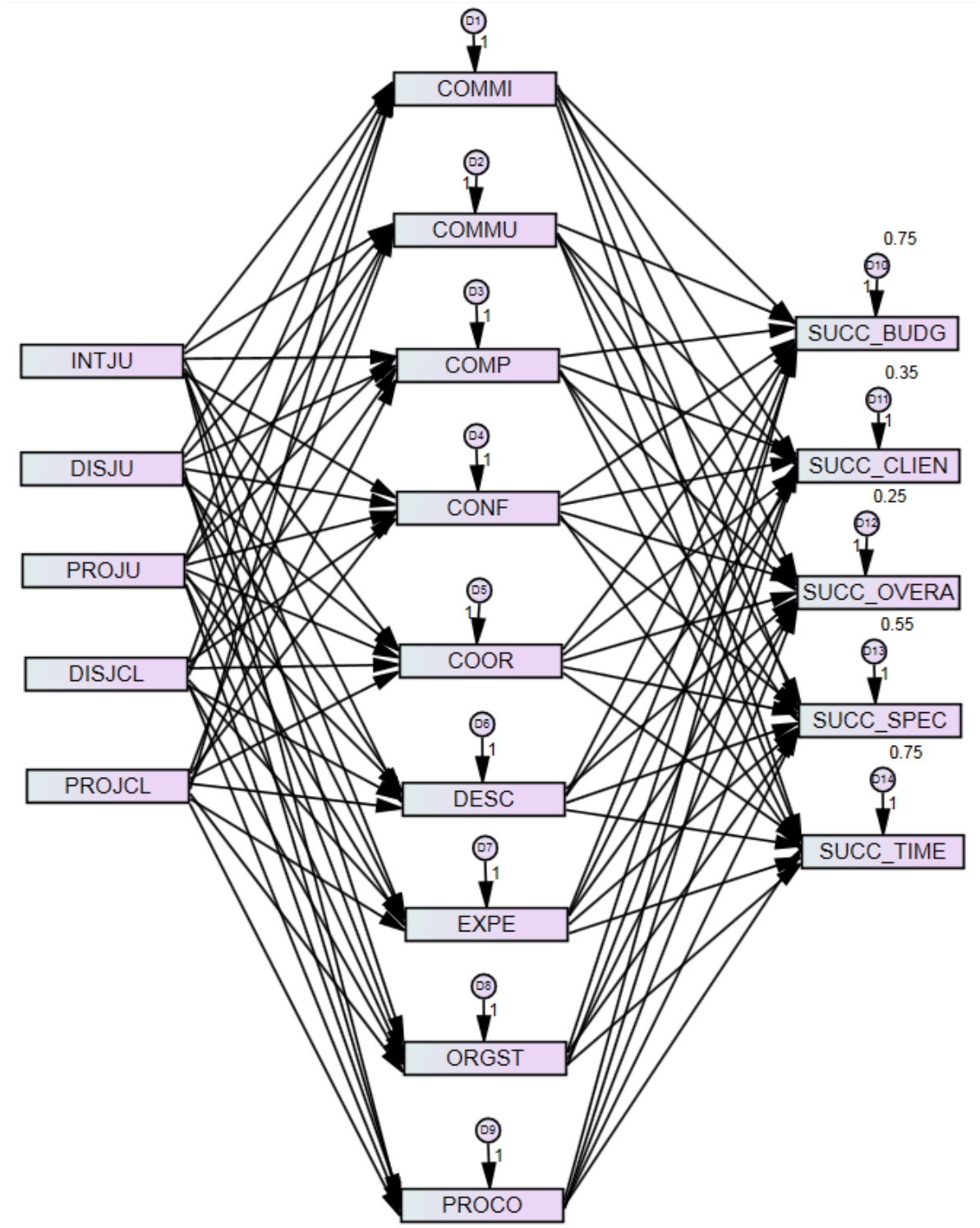

Figure 5.6 – Structural model – Modified model I

5.6.1 Model fit I

The test of the structural model's model fit was conducted analogous to the measurement model's model fit, therefore the same difficulties or challenges regarding the interpretation of the fit indices apply (Kline, 2011; Schumacker and Lomax, 2010). The model fit indices for the initial structural model are as follows (Table 5.16):

Fit statistic	Recommended value for good fit	Result	Interpretation
χ^2_M		2433.36	Significant → exact fit hypothesis rejected.
df_M		86	
p	Not significant	0.00	
χ^2_M / df_M	1 – 3	28.30	Bad value.
RMSEA (90% CI)	Less than 0.05 or 0.08	0.38 (0.36 – 0.39)	Close-fit hypothesis needs to be rejected and poor-fit hypothesis cannot be rejected → bad results
$P_{\text{close-fit H0}}$	Significant	0.00	
GFI	Close to 0.90 or 0.95	0.46	Poor fit.
CFI	The greater the better	0.52	Poor fit.
NFI	Close to 0.90 or 0.95	0.52	Poor fit.
TLI	Close to 0.90 or 0.95	0.04	Poor fit.
RMR		0.55	
SRMR	Less than 0.05 or 0.08	0.43	Poor fit.

Table 5.16 – Structural model – Model fit I – Fit statistics

All fit indices represent a bad model fit. Therefore model modifications were necessary. For this purpose the modification indices suggested by AMOS were considered.

5.6.2 Model modification I

The following model modifications were suggested by AMOS and their justification with theory is given below (MacCallum and Austin, 2000):

- Correlation of all independent variables amongst each other (INTJU, DISJU, PROJU, DISJCL, PROJCL) – It is plausible that the different dimensions of organizational justice and organizational justice climate are

correlated as they are all concerned with justice. Therefore the correlations were adopted.

- Correlation of various disturbances of the mediators (D1, D2, D3, D4, D5, D6, D7, D8, D9) – All mediators are antecedents of project performance. It is therefore plausible that they have "something in common" (Kline, 2011, p. 115) which is not explained by the model. Therefore the correlations were adopted.
- Correlation of the disturbances of the dependent variables (D10, D11, D12, D13, D14) – All dependent variables are concerned with project success. Therefore the correlations were adopted, because it is also reasonable that these variables have some commonalities.
- Correlations of various disturbances of the mediators and various disturbances of dependent variables (e.g. D3, D11, D12) – Correlations of disturbances of mediators and dependent variables are not recommended as they falsify the model (Gaskin, 2013d). Therefore the correlations were not adopted.
- Adaptation of the variances of D10, D12 and D14 – These variances had to be estimated a priori as the variables have only one indicator. The adaption of the variances is part of the sensitivity analysis and was therefore adopted.

Furthermore various adaptations in the regression weights, i.e. the path coefficients, were suggested by AMOS. But these suggestions are not plausible based on the model's underlying theory as one antecedent should not directly affect another one. Additionally these indices are not very high, therefore the impact of changes in model fit is probably only minor. Hence, these modification suggestions were ignored.

In addition to the modification recommendations by AMOS the direct paths between the independent and the dependent variables were added to the model. These direct effects are needed later on to test for mediation.

The resulting model is the modified model (II) and it looks as follows (Figure 5.7):

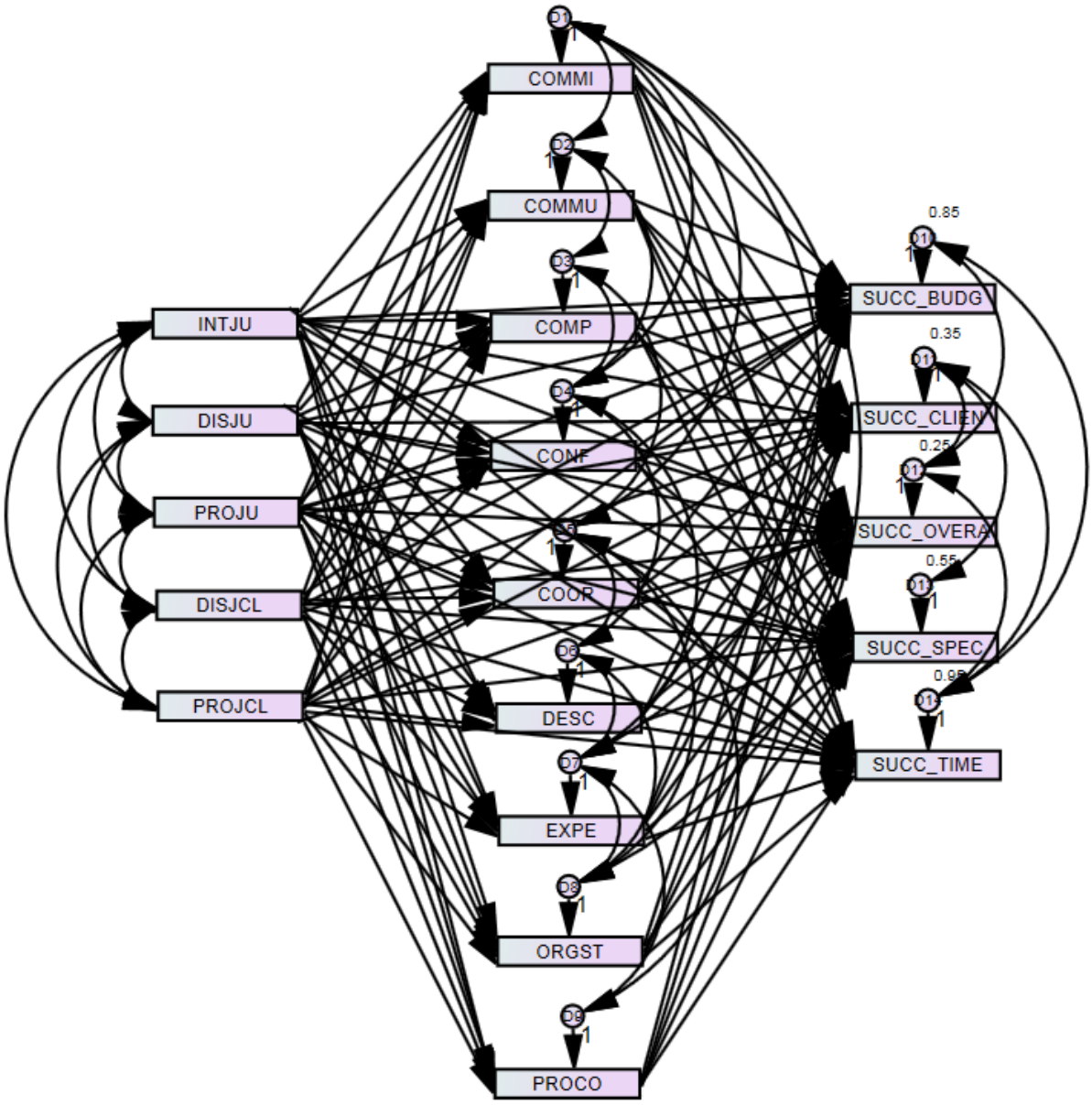

Figure 5.7 – Structural model – Modified model II

5.6.3 Model fit II

The modified model (II) was also tested for model fit based on the previously reported indices (Table 5.17):

Fit statistic	Recommended value for good fit	Result	Interpretation
χ^2_M		161.98	Significant → exact fit hypothesis rejected.
df_M		27	
p	Not significant	0.00	
χ^2_M / df_M	1 – 3	6.00	Moderate value.
RMSEA (90% CI)	Less than 0.05 or 0.08	0.16 (0.14 – 0.19)	Close-fit hypothesis needs to be rejected and poor-fit hypothesis cannot be rejected → bad results
$P_{\text{close-fit H0}}$	Significant	0.00	
GFI	Close to 0.90 or 0.95	0.92	Good fit.
CFI	The greater the better	0.97	Good fit.
NFI	Close to 0.90 or 0.95	0.97	Good fit.
TLI	Close to 0.90 or 0.95	0.82	Adequate fit.
RMR		0.03	
SRMR	Less than 0.05 or 0.08	0.04	Good fit.

Table 5.17 – Structural model – Model fit II – Fit statistics

All model fit indices improved dramatically. They were then evaluated with the guidelines of Hu and Bentler (1999) and the rule of thumb by Browne and Cudeck (1993) (Table 5.18):

Fit statistic	Recommended value for good fit	Value for the work at hand	Interpretation
Hu and Bentler (1999) guidelines			
SRMR	≤0.08	0.04	✓
RMSEA (90% CI)	Close to or <0.06	0.16 (0.14 – 0.19)	x
CFI	Close to or >0.95	0.97	✓
TLI	Close to or >0.95	0.82	(✓)
Browne and Cudeck (1993) rule of thumb			
RMSEA adequate fit	<0.08	0.16	x
RMSEA good fit	<0.05	0.16	x
RMSEA upper value 90% CI	<0.08	0.19	x

Table 5.18 – Structural model – Model fit II – Fit statistic guidelines

These additional, more comprehensive evaluations led to the assumption that based on the model fit indices a mixed picture arises. Some of the fit indices show very good results whereas some show poor fit. The two combined evaluations delivered the same mixed results as the Hu and Bentler (1999) guidelines indicate a good fit whereas the Browne and Cudeck (1992) rule of thumb does not.

As discussed previously the evaluation of model fit cannot be purely relied on the fit indices but must also consider the suitability to the underlying theory (Kline, 2011; MacCallum and Austin, 2000). Some of the fit indices indicate good to very good model fit and the model is based on a theory which was developed out of an extensive literature review of previous research. There were no more modification indices calculated by AMOS which are plausible and which could be adopted.

It was decided that the fit of the modified model (II) is adequate and that the model is used for further analysis. This decision was also made with the background knowledge that it is more difficult to achieve very good model fit with complex models. The modified model (II) is therefore the final structural model as shown in Figure 5.7.

5.6.4 Parameter estimates

5.6.4.1 Direct effects

As mentioned previously the parameter estimates were tested in the second step. Based on the final structural model the unstandardized and standardized estimates were analysed. They are interpreted as regression coefficients (unstandardized estimates) and represent the direct effects of one variable to another (Table 5.19).

Variables			Unstan-dardized estimate	SE	Sign.	Standar-dized estimate	Correlation coefficient
SUCC_BUDG	<---	DISJU	-0.60	0.20	**	-0.49	0.44
SUCC_CLIEN	<---	DISJU	-0.53	0.13	***	-0.66	0.49
SUCC_OVERA	<---	DISJU	-0.55	0.11	***	-0.58	0.67

Variables			Unstan-dardized estimate	SE	Sign.	Standar-dized estimate	Correlation coefficient
SUCC_SPEC	<---	DISJU	-0.13	0.16	ns	-0.16	0.35
SUCC_TIME	<---	DISJU	-0.67	0.21	**	-0.53	0.41
COMMI	<---	DISJU	0.15	0.04	***	0.30	0.53
COMMU	<---	DISJU	0.15	0.03	***	0.21	0.56
COMP	<---	DISJU	0.23	0.05	***	0.24	0.51
CONF	<---	DISJU	-0.09	0.05	*	-0.10	0.44
COOR	<---	DISJU	0.23	0.05	***	0.34	0.49
DESC	<---	DISJU	0.04	0.07	ns	0.05	0.67
EXPE	<---	DISJU	0.07	0.04	ns	0.13	0.35
ORGST	<---	DISJU	0.03	0.06	ns	0.04	0.41
PROCO	**<---**	**DISJU**	**-0.01**	**0.04**	**ns**	**-0.02**	**0.53**
SUCC_BUDG	<---	INTJU	-0.77	0.26	**	-0.47	0.56
SUCC_CLIEN	<---	INTJU	-0.57	0.16	***	-0.53	0.51
SUCC_OVERA	<---	INTJU	-0.69	0.14	***	-0.55	0.47
SUCC_SPEC	<---	INTJU	-0.06	0.21	ns	-0.05	0.57
SUCC_TIME	<---	INTJU	-1.05	0.27	***	-0.63	0.35
COMMI	<---	INTJU	0.25	0.05	***	0.37	0.45
COMMU	<---	INTJU	0.67	0.04	***	0.74	0.46
COMP	<---	INTJU	1.09	0.05	***	0.87	0.55
CONF	**<---**	**INTJU**	**0.69**	**0.05**	*******	**0.57**	**0.36**
COOR	<---	INTJU	-0.03	0.06	ns	-0.03	0.35
DESC	<---	INTJU	0.05	0.08	ns	0.05	0.35
EXPE	<---	INTJU	0.30	0.05	***	0.44	0.36
ORGST	**<---**	**INTJU**	**0.08**	**0.07**	**ns**	**0.08**	**0.30**
PROCO	<---	INTJU	0.22	0.04	***	0.30	0.67
SUCC_BUDG	<---	PROJU	2.23	0.61	***	1.05	0.90
SUCC_CLIEN	<---	PROJU	1.30	0.39	***	1.20	0.92
SUCC_OVERA	<---	PROJU	2.52	0.33	***	1.74	0.86
SUCC_SPEC	<---	PROJU	0.36	0.49	ns	0.28	0.54
SUCC_TIME	**<---**	**PROJU**	**1.84**	**0.64**	******	**0.96**	**0.48**
COMMI	<---	PROJU	0.32	0.11	**	0.41	0.70
COMMU	<---	PROJU	-0.03	0.09	ns	-0.03	0.59
COMP	<---	PROJU	-0.14	0.12	ns	-0.09	0.74
CONF	<---	PROJU	0.60	0.12	***	0.44	0.38
COOR	<---	PROJU	-0.30	0.14	*	-0.29	0.47
DESC	<---	PROJU	-0.15	0.19	ns	-0.13	0.56
EXPE	<---	PROJU	0.05	0.11	ns	0.07	0.37
ORGST	<---	PROJU	0.26	0.16	ns	0.23	0.31
PROCO	**<---**	**PROJU**	**0.41**	**0.10**	*******	**0.48**	**0.73**
SUCC_BUDG	<---	DISJCL	0.64	0.18	***	0.47	0.76

Variables			Unstan-dardized estimate	SE	Sign.	Standar-dized estimate	Correlation coefficient
SUCC_CLIEN	<---	DISJCL	0.63	0.12	***	0.70	0.70
SUCC_OVERA	<---	DISJCL	0.76	0.10	***	0.72	0.81
SUCC_SPEC	<---	DISJCL	0.17	0.15	ns	0.18	0.72
SUCC_TIME	<---	DISJCL	0.75	0.19	***	0.53	0.59
COMMI	<---	DISJCL	-0.17	0.05	***	-0.31	0.68
COMMU	<---	DISJCL	-0.07	0.04	ns	-0.09	0.74
COMP	<---	DISJCL	-0.18	0.05	***	-0.17	0.82
CONF	<---	DISJCL	0.04	0.06	ns	0.04	0.38
COOR	<---	DISJCL	-0.23	0.06	***	-0.31	0.51
DESC	<---	DISJCL	-0.17	0.08	*	-0.20	0.59
EXPE	<---	DISJCL	-0.09	0.05	ns	-0.15	0.30
ORGST	<---	DISJCL	-0.14	0.07	*	-0.17	0.34
PROCO	<---	DISJCL	0.05	0.04	ns	0.08	0.43
SUCC_BUDG	<---	PROJCL	-2.28	0.62	***	-1.01	0.59
SUCC_CLIEN	<---	PROJCL	-1.07	0.40	**	-0.72	0.53
SUCC_OVERA	<---	PROJCL	-2.48	0.34	***	-1.41	0.56
SUCC_SPEC	<---	PROJCL	-0.30	0.50	ns	-0.19	0.50
SUCC_TIME	<---	PROJCL	-2.37	0.66	***	-1.02	0.36
COMMI	<---	PROJCL	0.05	0.14	ns	0.05	0.46
COMMU	<---	PROJCL	0.24	0.12	ns	0.19	0.45
COMP	<---	PROJCL	0.25	0.15	ns	0.14	0.60
CONF	<---	PROJCL	0.03	0.16	ns	0.02	0.41
COOR	<---	PROJCL	1.35	0.17	***	1.08	0.52
DESC	<---	PROJCL	1.20	0.24	***	0.87	0.58
EXPE	<---	PROJCL	0.34	0.14	*	0.36	0.40
ORGST	<---	PROJCL	0.81	0.20	***	0.59	0.34
PROCO	<---	PROJCL	0.10	0.12	ns	0.10	0.70
SUCC_BUDG	<---	COMMI	-0.67	0.33	*	-0.28	0.77
SUCC_CLIEN	<---	COMMI	0.03	0.21	ns	0.02	0.72
SUCC_OVERA	<---	COMMI	-0.51	0.18	**	-0.27	0.81
SUCC_SPEC	<---	COMMI	0.42	0.26	ns	0.25	0.78
SUCC_TIME	<---	COMMI	0.12	0.35	ns	0.05	0.63
SUCC_BUDG	<---	COMMU	-0.40	0.36	ns	-0.22	0.70
SUCC_CLIEN	<---	COMMU	0.39	0.23	ns	0.33	0.76
SUCC_OVERA	<---	COMMU	0.00	0.20	ns	0.00	0.81
SUCC_SPEC	<---	COMMU	0.07	0.29	ns	0.05	0.34
SUCC_TIME	<---	COMMU	0.23	0.38	ns	0.12	0.46
SUCC_BUDG	**<---**	**COMP**	**2.12**	**0.35**	*******	**1.64**	**0.53**
SUCC_CLIEN	<---	COMP	0.71	0.23	**	0.83	0.44
SUCC_OVERA	<---	COMP	1.34	0.19	***	1.34	0.37

Variables			Unstan-dardized estimate	SE	Sign.	Standar-dized estimate	Correlation coefficient
SUCC_SPEC	<---	COMP	0.41	0.28	ns	0.46	0.47
SUCC_TIME	<---	COMP	1.88	0.37	***	1.41	0.46
SUCC_BUDG	<---	CONF	-1.11	0.30	***	-0.82	0.53
SUCC_CLIEN	<---	CONF	-0.86	0.19	***	-0.96	0.40
SUCC_OVERA	<---	CONF	-0.94	0.16	***	-0.89	0.42
SUCC_SPEC	<---	CONF	-0.58	0.24	*	-0.62	0.49
SUCC_TIME	<---	CONF	-1.30	0.32	***	-0.93	0.41
SUCC_BUDG	<---	COOR	2.87	0.53	***	1.59	0.50
SUCC_CLIEN	<---	COOR	1.62	0.34	***	1.36	0.38
SUCC_OVERA	<---	COOR	3.05	0.29	***	2.17	0.41
SUCC_SPEC	<---	COOR	0.60	0.43	ns	0.48	0.42
SUCC_TIME	<---	COOR	2.65	0.56	***	1.42	0.42
SUCC_BUDG	<---	DESC	0.34	0.19	ns	0.21	0.51
SUCC_CLIEN	<---	DESC	0.31	0.12	*	0.29	0.38
SUCC_OVERA	<---	DESC	0.44	0.10	***	0.34	0.35
SUCC_SPEC	<---	DESC	0.21	0.15	ns	0.18	0.45
SUCC_TIME	<---	DESC	0.54	0.20	**	0.32	0.51
SUCC_BUDG	<---	EXPE	0.95	0.36	**	0.40	0.65
SUCC_CLIEN	<---	EXPE	0.78	0.23	***	0.50	0.42
SUCC_OVERA	<---	EXPE	1.20	0.20	***	0.65	0.42
SUCC_SPEC	<---	EXPE	0.51	0.29	ns	0.31	0.35
SUCC_TIME	<---	EXPE	0.69	0.38	ns	0.28	0.40
SUCC_BUDG	<---	ORGST	-2.28	0.51	***	-1.40	0.49
SUCC_CLIEN	<---	ORGST	-1.45	0.33	***	-1.34	0.35
SUCC_OVERA	<---	ORGST	-2.55	0.28	***	-2.00	0.33
SUCC_SPEC	<---	ORGST	-0.48	0.41	ns	-0.43	0.41
SUCC_TIME	<---	ORGST	-2.12	0.54	***	-1.25	0.44
SUCC_BUDG	<---	PROCO	-0.36	0.29	ns	-0.16	0.52
SUCC_CLIEN	<---	PROCO	-0.21	0.18	ns	-0.14	0.42
SUCC_OVERA	<---	PROCO	-0.61	0.16	***	-0.35	0.36
SUCC_SPEC	<---	PROCO	-0.19	0.23	ns	-0.12	0.39
SUCC_TIME	<---	PROCO	-0.25	0.30	ns	-0.11	0.42

*** = p<0.001, ** = p<0.01, * = p<0.05, ns = not significant

Table 5.19 – Structural model – Parameter estimates

Key: **bold** = explained in the following as examples

The unstandardized path coefficient represents the change of the endogenous variable predicted by a 1-point increase of the exogenous variable (Kline, 2011). Furthermore it allows a prognosis regarding the statistical significance in

combination with the standard error which permits inferences regarding the rejection of the null hypothesis that the corresponding parameter is 0 (ibid). For the variables at hand this means e.g.

- A 1-point increase in INTJU predicts a 0.69-point increase in CONF. This relationship is statistically significant.
- A 1-point increase in INTJU predicts a 0.08-point increase in ORGST. This relationship is not statistically significant.
- A 1-point increase in PROJU predicts a 0.41-point increase in PROCO. This relationship is statistically significant.
- A 1-point increase in COMP predicts a 2.12-point increase in SUCC_BUDG. This relationship is statistically significant.

On closer examination it is visible that about 40% of the relationships are not statistically significant. This non-significance is also an important finding as it shows that some antecedents of project performance might not be influenced by one or more dimensions of organizational justice (climate) or that the different aspects of project performance are not influenced by their antecedents. These relationships will be discussed in more detail in the next chapter.

The standardized path coefficients enable the direct comparison of the influence of two or more different exogenous variables on an endogenous variable as well as the detection of suppression effects (Kline, 2011). Suppression effects in SEMs are usually not planned and involve problems with the interpretation, but their presence in latent variable models is not uncommon (Maassen and Bakker, 2001). There are various definitions for suppression and they are still controversial (Shieh, 2006), but there is kind of an agreement that a suppression effect is existing when the correlation coefficient is smaller than the standardized path coefficient or has a different sign (Friedman and Wall, 2005; Kline, 2011; Maassen and Bakker, 2001; Shieh, 2006). Applying this rule to the parameter estimates for this work shows that more than half of the relationships are influenced by this phenomenon. For example:

- DISJU → PROCO with a standardized estimate of -0.02 and a correlation coefficient of 0.53
- PROJU → SUCC_TIME with a standardized estimate of 0.96 and a correlation coefficient of 0.48

This means that their interpretation is “particularly problematic: [as] one finds something contrary to expectation” (Maassen and Bakker, 2001, p. 267) which therefore needs special attention. There are different ways to deal with the suppression phenomenon (Maassen and Bakker, 2001):

- If the suppressor variable and the endogenous variable are highly correlated, one of the variables can be crossed out due to parsimony.
- If the suppressor variable and the endogenous variable differ considerably a variable cannot be deleted but it must be stated that the hypotheses are partly erroneous. If suitable a modified model can be developed.
- If a path coefficient between the suppressor variable and the endogenous variable is the opposite sign to that expected it should not be deduced that a direct effect opposing the hypothesized relationship is present. It is then necessary to interpret all the involved relationships together meaningfully.

The relationships with suppression effects of this work are not highly correlated as their correlation coefficients are all smaller than 0.80 and most are even smaller than 0.50. This means that no variables could be deleted to cope with the suppression phenomenon. It was also not expedient to modify the model as too many variables and relationships were affected. Therefore the only way to give consideration to the suppression phenomenon was to interpret the resulting composites rationally. These resulting composites were derived by taking into consideration also the indirect and total effects which were analysed in addition to the direct effects in the following.

The analysis of the indirect effects was undertaken in a three step approach as explained in the previous chapter. In the first step following Baron and Kenny (1986) the direct effects with and without all the mediators are presented in Table

5.20. For this purpose the standardized direct effects based on regression analysis were used:

Variables			Direct effect without mediator	Sign.	Direct effect with mediator	Sign.	Correlation coefficient
SUCC_BUDG	<---	DISJU	0.46	***	-0.49	**	0.44
SUCC_CLIEN	<---	DISJU	0.22	*	-0.66	***	0.49
SUCC_OVERA	<---	DISJU	0.58	***	-0.58	***	0.67
SUCC_SPEC	**<---**	**DISJU**	**0.31**	******	**-0.16**	**ns**	**0.35**
SUCC_TIME	<---	DISJU	0.49	***	-0.53	**	0.41
SUCC_BUDG	<---	INTJU	0.22	*	-0.47	**	0.36
SUCC_CLIEN	<---	INTJU	-0.08	ns	-0.53	***	0.35
SUCC_OVERA	**<---**	**INTJU**	**-0.03**	**ns**	**-0.55**	*******	**0.35**
SUCC_SPEC	<---	INTJU	0.19	*	-0.05	ns	0.36
SUCC_TIME	<---	INTJU	0.16	ns	-0.63	***	0.30
SUCC_CLIEN	<---	PROJU	-0.24	ns	1.05	***	0.38
SUCC_BUDG	<---	PROJU	-0.31	ns	1.20	***	0.47
SUCC_OVERA	<---	PROJU	-0.24	ns	1.74	***	0.56
SUCC_SPEC	<---	PROJU	-0.38	*	0.28	ns	0.37
SUCC_TIME	<---	PROJU	-0.16	ns	0.96	**	0.31
SUCC_BUDG	<---	DISJCL	-0.12	ns	0.47	***	0.38
SUCC_CLIEN	<---	DISJCL	0.16	ns	0.70	***	0.51
SUCC_OVERA	<---	DISJCL	0.01	ns	0.72	***	0.59
SUCC_SPEC	<---	DISJCL	-0.18	ns	0.18	ns	0.30
SUCC_TIME	<---	DISJCL	-0.12	ns	0.53	***	0.34
SUCC_BUDG	**<---**	**PROJCL**	**0.40**	*****	**-1.01**	*******	**0.41**
SUCC_CLIEN	<---	PROJCL	0.59	**	-0.72	**	0.52
SUCC_OVERA	<---	PROJCL	0.46	***	-1.41	***	0.58
SUCC_SPEC	<---	PROJCL	0.43	*	-0.19	ns	0.40
SUCC_TIME	<---	PROJCL	0.40	*	-1.02	***	0.34

*** = p<0.001, ** = p<0.01, * = p<0.05, ns = not significant

Table 5.20 – Structural model – Standardized direct effects

Key: **bold** = explained in the following as examples

This table indicates that there is a high number of mediation effects present in the model because of changes in the direction and significance in the direct effects, e.g.:

- DISJU → SUCC_SPEC: The direct effect is significant without the mediators, but not significant with the mediators.
- INTJU → SUCC_OVERA: There is no significant direct effect without the mediators, but there is one with the mediators.
- PROJCL → SUCC_BUDG: This direction of the significant effect changes from a positive to a negative sign and the direct effect is significant and gets much stronger with the mediators.

The results of the direct effects between the independent and the dependent variables show once more suppression effects as the correlation coefficients often have a different sign or are smaller than the direct effects (with mediators).

5.6.4.2 Indirect effects

In the second step following Preacher and Hayes (2008) the bootstrapping (2000 bootstrapping samples, 90% bias-corrected confidence interval) for the indirect effects of the relationships was conducted and reported in Table 5.21. The indirect effects are the net-mediated effects as they take into account all the mediators together at the same time:

Variables			Indirect effect (boot-strapping)	Sign.	Corre-lation coeffi-cient	Total effect (boot-strapping)	Sign.	Indication for mediation
SUCC_BUDG	<---	DISJU	0.89	***	0.44	0.41	**	Mediation
SUCC_CLIEN	<---	DISJU	0.86	***	0.49	0.20	ns	Mediation
SUCC_OVERA	<---	DISJU	1.09	***	0.67	0.51	ns	Mediation
SUCC_SPEC	<---	DISJU	0.45	**	0.35	0.30	*	Mediation
SUCC_TIME	<---	DISJU	0.96	***	0.41	0.42	***	Mediation
SUCC_BUDG	<---	INTJU	0.67	***	0.36	0.19	ns	Mediation
SUCC_CLIEN	<---	INTJU	0.47	**	0.35	-0.07	ns	Mediation
SUCC_OVERA	<---	INTJU	0.52	**	**0.35**	-0.03	ns	Mediation
SUCC_SPEC	**<---**	**INTJU**	**0.24**	**ns**	**0.36**	**0.19**	**ns**	**No mediation**
SUCC_TIME	<---	INTJU	0.76	***	0.30	0.14	ns	Mediation
SUCC_BUDG	<---	PROJU	-1.27	***	0.47	-0.22	ns	Mediation
SUCC_CLIEN	<---	PROJU	-1.48	***	0.38	-0.28	ns	Mediation
SUCC_OVERA	<---	PROJU	-1.88	***	0.56	-0.14	ns	Mediation
SUCC_SPEC	<---	PROJU	-0.51	*	0.37	-0.23	ns	Mediation

Variables			Indirect effect (boot-strapping)	Sign.	Corre-lation coeffi-cient	Total effect (boot-strapping)	Sign.	Indication for mediation
SUCC_TIME	<---	PROJU	-1.29	***	0.31	-0.33	ns	Mediation
SUCC_BUDG	<---	DISJCL	-0.58	***	0.38	-0.11	ns	Mediation
SUCC_CLIEN	<---	DISJCL	-0.55	***	0.51	0.15	ns	Mediation
SUCC_OVERA	<---	DISJCL	-0.71	***	0.59	0.01	ns	Mediation
SUCC_SPEC	**<---**	**DISJCL**	**-0.35**	**ns**	**0.30**	**-0.17**	**ns**	**No mediation**
SUCC_TIME	<---	DISJCL	-0.64	***	0.34	-0.11	ns	Mediation
SUCC_BUDG	<---	PROJCL	1.37	***	0.41	0.35	ns	Mediation
SUCC_CLIEN	<---	PROJCL	1.26	***	0.52	0.54	**	Mediation
SUCC_OVERA	<---	PROJCL	1.81	***	0.58	0.40	**	Mediation
SUCC_SPEC	<---	PROJCL	0.60	*	0.40	0.41	**	Mediation
SUCC_TIME	<---	PROJCL	1.37	***	0.34	0.35	ns	Mediation

*** = p<0.001, ** = p<0.01, * = p<0.05, ns = not significant;

Table 5.21 – Structural model – Indirect and total effects – Bootstrapping

Key: **bold** = explained in the following as examples

This table confirms that a high number of mediation effects are present in the model. Apart from the two relationships INTJU → SUCC_SPEC and PROJU → SUCC_SPEC all mediation effects are significant at least the p<0.05 level. But as mentioned before these mediation effects were calculated considering all the mediators at the same time and it cannot be deduced which mediators significantly influence the relationships. For this purpose the Sobel test was carried out. The detailed table with all Sobel test statistics, their significance and the corresponding type of mediation taking into consideration the direct effect from Table 5.20 can be found in Appendix A5.1.

There are in total 225 indirect effects of which 42 are significant either with complementary or competitive mediation and 45 have a no-effect non-mediation. The remaining relationships have a direct-only non-mediation as only the direct effects between the dimensions of organizational justice and organizational justice climate and the different aspects of performance are significant, but not their relationships with the mediators. The Table 5.22 shows the 42 significant indirect relationships with the Sobel test statistic.

Variables					Sobel test statistic	Sign.	Type of mediation
SUCC_OVERA	<---	COMMI	<---	DISJU	-2.11	*	Complementary mediation
SUCC_BUDG	<---	COMP	<---	DISJU	2.95	**	Competitive mediation
SUCC_OVERA	<---	COMP	<---	DISJU	3.12	**	Competitive mediation
SUCC_TIME	<---	COMP	<---	DISJU	2.85	**	Competitive mediation
SUCC_BUDG	<---	COOR	<---	DISJU	3.05	**	Competitive mediation
SUCC_CLIEN	<---	COOR	<---	DISJU	2.62	**	Competitive mediation
SUCC_OVERA	<---	COOR	<---	DISJU	3.48	***	Competitive mediation
SUCC_TIME	<---	COOR	<---	DISJU	2.81	**	Competitive mediation
SUCC_OVERA	<---	COMMI	<---	INTJU	-2.27	*	Complementary mediation
SUCC_BUDG	<---	COMP	<---	INTJU	4.42	***	Competitive mediation
SUCC_CLIEN	<---	COMP	<---	INTJU	2.20	*	Competitive mediation
SUCC_OVERA	<---	COMP	<---	INTJU	5.07	***	Competitive mediation
SUCC_TIME	<---	COMP	<---	INTJU	4.12	***	Competitive mediation
SUCC_BUDG	<---	CONF	<---	INTJU	-2.70	**	Complementary mediation
SUCC_CLIEN	<---	CONF	<---	INTJU	-3.43	*	Complementary mediation
SUCC_OVERA	<---	CONF	<---	INTJU	-4.29	***	Complementary mediation
SUCC_TIME	<---	CONF	<---	INTJU	-3.11	**	Complementary mediation
SUCC_CLIEN	<---	EXPE	<---	INTJU	2.40	**	Competitive mediation
SUCC_OVERA	<---	EXPE	<---	INTJU	3.31	***	Competitive mediation
SUCC_BUDG	<---	CONF	<---	PROJU	-2.32	*	Competitive mediation
SUCC_CLIEN	<---	CONF	<---	PROJU	-2.73	**	Competitive mediation
SUCC_OVERA	<---	CONF	<---	PROJU	-3.11	**	Competitive mediation
SUCC_TIME	<---	CONF	<---	PROJU	-2.56	*	Competitive mediation
SUCC_OVERA	<---	PROCO	<---	PROJU	-2.22	*	Competitive mediation
SUCC_OVERA	<---	COMMI	<---	DISJCL	2.04	*	Complementary mediation
SUCC_BUDG	<---	COMP	<---	DISJCL	-2.25	*	Competitive mediation
SUCC_OVERA	<---	COMP	<---	DISJCL	-2.32	*	Competitive mediation
SUCC_TIME	<---	COMP	<---	DISJCL	-2.20	*	Competitive mediation
SUCC_BUDG	<---	COOR	<---	DISJCL	-2.75	**	Competitive mediation
SUCC_CLIEN	<---	COOR	<---	DISJCL	-2.43	*	Competitive mediation
SUCC_OVERA	<---	COOR	<---	DISJCL	-3.05	**	Competitive mediation
SUCC_TIME	<---	COOR	<---	DISJCL	-2.57	**	Competitive mediation
SUCC_BUDG	<---	COOR	<---	PROJCL	3.94	***	Competitive mediation
SUCC_CLIEN	<---	COOR	<---	PROJCL	3.14	**	Competitive mediation
SUCC_OVERA	<---	COOR	<---	PROJCL	5.07	***	Competitive mediation
SUCC_TIME	<---	COOR	<---	PROJCL	3.48	***	Competitive mediation
SUCC_OVERA	<---	DESC	<---	PROJCL	2.55	*	Competitive mediation
SUCC_TIME	<---	DESC	<---	PROJCL	2.07	*	Competitive mediation

Variables					Sobel test statistic	Sign.	Type of mediation
SUCC_BUDG	<---	ORGST	<---	PROJCL	-2.40	*	Complementary mediation
SUCC_CLIEN	<---	ORGST	<---	PROJCL	-2.26	*	Complementary mediation
SUCC_OVERA	<---	ORGST	<---	PROJCL	-2.79	**	Complementary mediation
SUCC_TIME	<---	ORGST	<---	PROJCL	-2.40	*	Complementary mediation

*** = p<0.001, ** = p<0.01, * = p<0.05, ns = not significant

Table 5.22 – Structural model – Indirect effects – Significant Sobel test statistics

Because of the complexity of the model and the resulting high number of direct and indirect effects an analysis of the composite results was conducted next. For this purpose each direct effect was analysed in connection with its corresponding indirect estimates. To take into account the suppression phenomenon adequately in the analysis the recommendation by Zhao et al. (2010) was followed. They report that it is not uncommon for the different signs in the relationships to be ignored and that only the significance of the indirect effects is interpreted. This recommendation was followed throughout the work. Nevertheless they emphasise that all necessary information should be reported so that the reader can evaluate the results himself/herself.

5.6.4.3 Disturbance variances

To conclude the analysis of the parameter estimates the disturbance variances were analysed (Kline, 2011). The disturbance variances provide information about the (un)explained variability of the endogenous variables, i.e. it allows the calculation of the R^2_{smc} which indicates the proportion of explained variance for each endogenous variable by the model. As explained in section 4.2.2.2 the disturbances D10 to D14 need to be fixed to a certain value by the researcher to ensure identification of the model as they are single indicator variables (Table 5.23).

Disturbance	Variable	Variance estimate	SD	R^2_{smc}
D1	PROCO	0.09	0.57	0.74
D2	ORGST	0.25	0.79	0.60
D3	EXPE	0.13	0.54	0.58

Disturbance	Variable	Variance estimate	SD	R^2_{smc}
D4	DESC	0.40	0.82	0.42
D5	COOR	0.17	0.70	0.65
D6	CONF	0.15	0.93	0.83
D7	COMP	0.13	0.97	0.86
D8	COMMU	0.07	0.70	0.85
D9	COMMI	0.10	0.51	0.62
D10	SUCC_BUDG	0.75	1.27	0.53
D11	SUCC_CLIEN	0.35	0.82	0.48
D12	SUCC_OVERA	0.25	0.98	0.74
D13	SUCC_SPEC	0.55	0.88	0.29
D14	SUCC_TIME	0.75	1.28	0.54

Table 5.23 – Structural model – Disturbance variances

The table above shows that for SUCC_BUDG 53% of the variance is explained by its direct causes from the model. For SUCC_CLIEN it is 48%, for SUCC_OVERA it is 74%, for SUCC_SPEC it is 29% and for SUCC_TIME it is 54%.

5.6.5 Relationship summaries

In order to provide a systematic overview of the different relationships between the five remaining dimensions of organizational justice (climate) and project performance each dimension and its impact will be reported separately and in detail in the following sections.

5.6.5.1 Distributive justice

The direct and indirect effects of distributive justice on the antecedents and the different aspects of project performance are illustrated in Figure 5.8, where the significant relationships are highlighted in green. The impact on each aspect of project performance will be highlighted in the following.

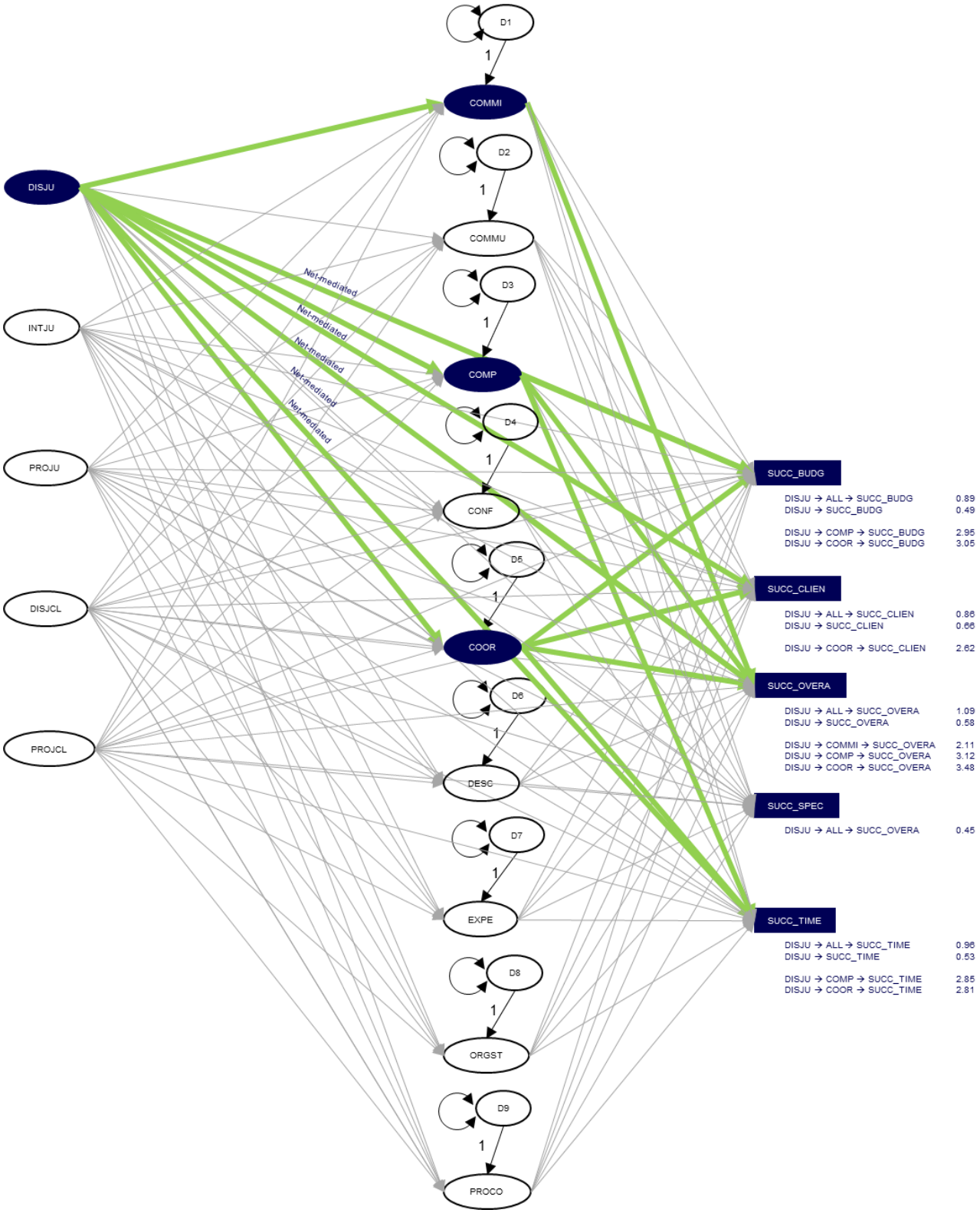

Figure 5.8 – Structural model – Impact of distributive justice

Distributive justice (DISJU) → Performance regarding compliance to budget (SUCC_BUDG)

There is a significant standardized direct effect (with mediators) of -0.49, a significant standardized direct effect (without mediators) of 0.46 and a significant indirect net-mediated effect of 0.89 generated with bootstrapping between these two variables. The relationship between DISJU and SUCC_BUDG is net-mediated with all antecedents of project performance present at the same time and that a 1-point increase in DISJU leads to a 0.89-point increase in SUCC_BUDG. Furthermore there are individual contributions of COMP and COOR which influence the relationship significantly whilst controlling for all other mediators.

The direct effect increases in value when all mediators are present. This indicates in combination with the net-mediated indirect effect and the specific indirect effects that the model with mediators explains the relationship between DISJU and SUCC_BUDG better than the model without.

Distributive justice (DISJU) → Performance regarding compliance to time (SUCC_TIME)

There is a significant standardized direct effect (with mediators) of -0.53, a significant standardized direct effect (without mediators) of 0.49 and a significant indirect net-mediated effect of 0.96 generated with bootstrapping between these two variables. The relationship between DISJU and SUCC_TIME is net-mediated with all antecedents of project performance present at the same time and that a 1-point increase in DISJU leads to a 0.96-point increase in SUCC_TIME. Furthermore there are individual contributions of COMP and COOR which influence the relationship significantly whilst controlling for all other mediators.

The direct effect increases in value when all mediators are present. This indicates in combination with the net-mediated indirect effect and the specific indirect effects that the model with mediators explains the relationship between DISJU and SUCC_TIME better than the model without.

Distributive justice (DISJU) → Performance regarding compliance to specification/quality (SUCC_SPEC)

There is no significant standardized direct effect (with mediators), a significant standardized direct effect (without mediators) of 0.31 and a significant indirect net-mediated effect of 0.45 generated with bootstrapping between these two variables. The relationship between DISJU and SUCC_SPEC is net-mediated with all antecedents of project performance present at the same time. A 1-point increase in DISJU leads to a 0.45-point increase in SUCC_SPEC. But it is remarkable that there is no specific indirect effect significant in this relationship.

Furthermore the direct effect is significant when no mediators are present and becomes insignificant with their presence. In combination with the non-significant specific indirect effects this indicates that the model without the mediators represents the relationship between DISJU and SUCC_SPEC better than the model with the mediators despite the presence of the significant net-mediated indirect effect.

Distributive justice (DISJU) → Performance regarding client's satisfaction (SUCC_CLIEN)

There is a significant standardized direct effect (with mediators) of -0.66, a significant standardized direct effect (without mediators) of 0.22 and a significant indirect net-mediated effect of 0.86 generated with bootstrapping between these two variables. The relationship between DISJU and SUCC_CLIEN is net-mediated with all antecedents of project performance present at the same time and that a 1-point increase in DISJU leads to a 0.86-point increase in SUCC_CLIEN. Furthermore there is an individual contribution of COOR which influences the relationship significantly whilst controlling for all other mediators.

The direct effect increases in value when all mediators are present. This indicates in combination with the net-mediated and the specific indirect effect that the model with mediators explains the relationship between DISJU and SUCC_CLIEN better than the model without.

Distributive justice (DISJU) → Overall project performance (SUCC_OVERA)
There is a significant standardized direct effect (with mediators) of -0.58, a significant standardized direct effect (without mediators) of 0.58 and a significant indirect net-mediated effect of 1.09 generated with bootstrapping between these two variables. The relationship between DISJU and SUCC_OVERA is net-mediated with all antecedents of project performance present at the same time and that a 1-point increase in DISJU leads to a 1.09-point increase in SUCC_OVERA. Furthermore there are individual contributions of COMMI, COMP and COOR which influence the relationship significantly whilst controlling for all other mediators.

The direct effect stays constant in value when all mediators are present. But as there is a significant net-mediated indirect effect and several significant individual indirect effects it is assumed that the model with mediators explains the relationship between DISJU and SUCC_OVERA better than the model without.

5.6.5.2 Interactional justice

The direct and indirect effects of interactional justice on the antecedents and the different aspects of project performance are illustrated in Figure 5.9, whereas the significant relationships are highlighted in green. The impact on each aspect of project performance will be highlighted in the following.

Interactional justice (INTJU) → Performance regarding compliance to budget (SUCC_BUDG)
There is a significant standardized direct effect (with mediators) of -0.47, a significant standardized direct effect (without mediators) of 0.22 and a significant indirect net-mediated effect of 0.67 generated with bootstrapping between these two variables. The relationship between INTJU and SUCC_BUDG is net-mediated with all antecedents of project performance present at the same time and that a 1-point increase in INTJU leads to a 0.67-point increase in SUCC_BUDG. Furthermore there are individual contributions of COMP and CONF which influence the relationship significantly whilst controlling for all other mediators.

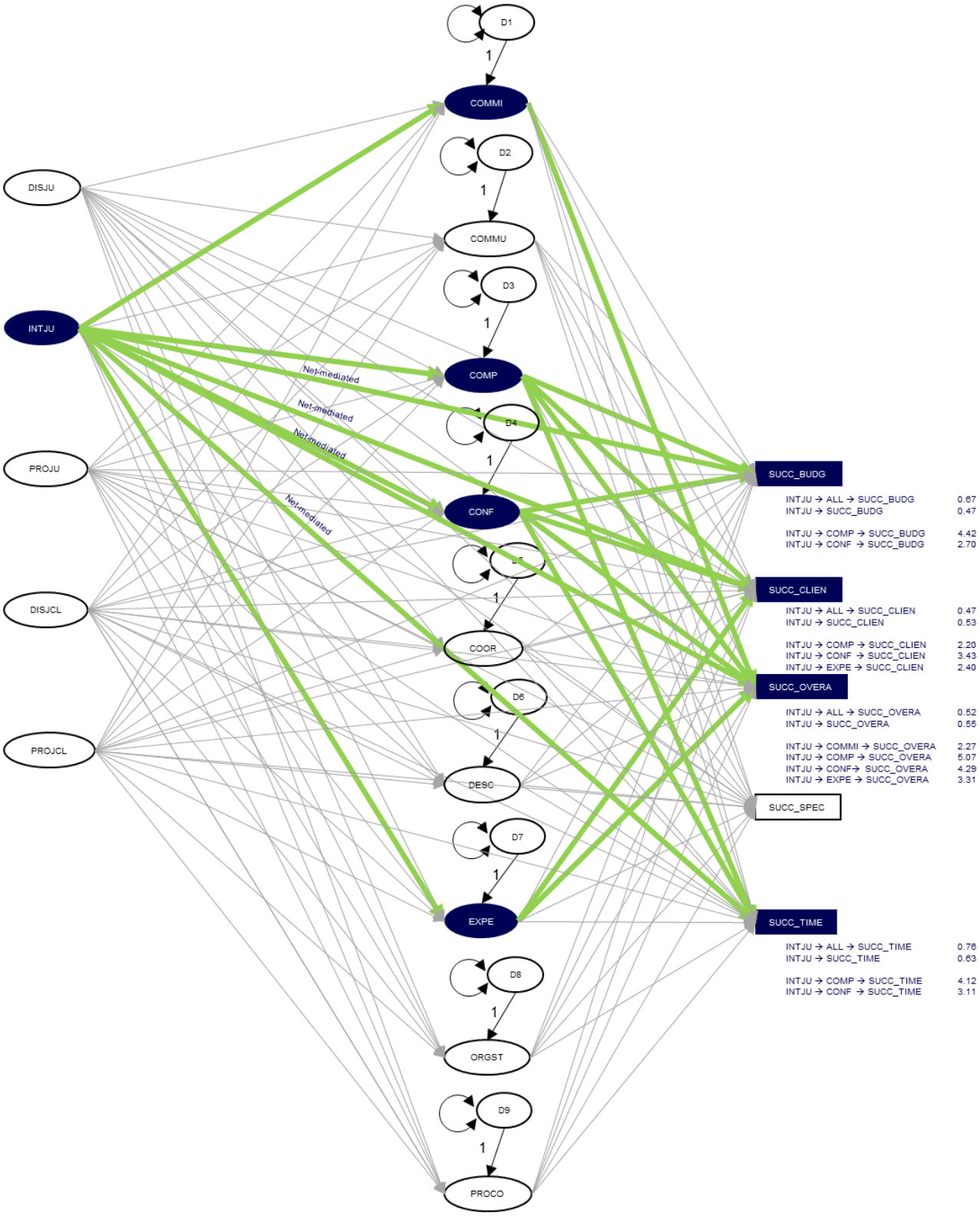

Figure 5.9 – Structural model – Impact of interactional justice

The direct effect increases in value when all mediators are present. This indicates in combination with the net-mediated indirect effect and the specific indirect effects that the model with mediators explains the relationship between INTJU and SUCC_BUDG better than the model without. In total a complementary mediation is present.

Interactional justice (INTJU) → Performance regarding compliance to time (SUCC_TIME)

There is a significant standardized direct effect (with mediators) of -0.63, no significant standardized direct effect (without mediators) and a significant indirect net-mediated effect of 0.76 generated with bootstrapping between these two variables. The relationship between INTJU and SUCC_TIME is net-mediated with all antecedents of project performance present at the same time and that a 1-point increase in INTJU leads to a 0.76-point increase in SUCC_TIME. Furthermore there are individual contributions of COMP and CONF which influence the relationship significantly whilst controlling for all other mediators.

The direct effect becomes significant when all mediators are present. This indicates in combination with the net-mediated indirect effect and the specific indirect effects that the model with mediators explains the relationship between INTJU and SUCC_TIME better than the model without.

Interactional justice (INTJU) → Performance regarding compliance to specification/quality (SUCC_SPEC)

There is no significant standardized direct effect (with mediators), a significant standardized direct effect (without mediators) of 0.19 and no significant indirect net-mediated effect generated with bootstrapping between these two variables. The relationship between INTJU and SUCC_SPEC is not net-mediated with all antecedents of project performance present at the same time and there are no individual contributions which influence the relationship whilst controlling for all other mediators.

The direct effect is significant when no mediators are present and becomes insignificant with their presence. In combination with the non-significant net-

mediated indirect effect and the non-existent significant specific indirect effects this indicates that the model without the mediators represents the relationship between INTJU and SUCC_SPEC better than the model with.

Interactional justice (INTJU) → Performance regarding client's satisfaction (SUCC_CLIEN)

There is a significant standardized direct effect (with mediators) of -0.53, no significant standardized direct effect (without mediators) and a significant indirect net-mediated effect of 0.47 generated with bootstrapping between these two variables. The relationship between INTJU and SUCC_CLIEN is net-mediated with all antecedents of project performance present at the same time and a 1-point increase in INTJU leads to a 0.47-point increase in SUCC_CLIEN. Furthermore there are individual contributions of COMP, CONF and EXPE which influence the relationship significantly whilst controlling for all other mediators.

The direct effect becomes significant when all mediators are present. This indicates in combination with the net-mediated indirect effect and the specific indirect effects that the model with mediators explains the relationship between INTJU and SUCC_CLIEN better than the model without.

Interactional justice (INTJU) → Overall project performance (SUCC_OVERA)

There is a significant standardized direct effect (with mediators) of -0.55, no significant standardized direct effect (without mediators) and a significant indirect net-mediated effect of 0.52 generated with bootstrapping between these two variables. The relationship between INTJU and SUCC_OVERA is net-mediated with all antecedents of project performance present at the same time and that a 1-point increase in INTJU leads to a 0.52-point increase in SUCC_OVERA. Furthermore there are individual contributions of COMMI, COMP, CONF and EXPE which influence the relationship significantly whilst controlling for all other mediators.

The direct effect becomes significant when all mediators are present. This indicates in combination with the net-mediated indirect effect and the specific

indirect effects that the model with mediators explains the relationship between INTJU and SUCC_OVERA better than the model without.

5.6.5.3 Procedural justice

The direct and indirect effects of procedural justice on the antecedents and the different aspects of project performance are illustrated in Figure 5.10, where the significant relationships are highlighted in green. The impact on each aspect of project performance will be highlighted in the following.

Procedural justice (PROJU) → Performance regarding compliance to budget (SUCC_BUDG)

There is a significant standardized direct effect (with mediators) of 1.20, no significant standardized direct effect (without mediators) and a significant indirect net-mediated effect of -1.27 generated with bootstrapping between these two variables. The relationship between PROJU and SUCC_BUDG is net-mediated with all antecedents of project performance present at the same time and that a 1-point increase in PROJU leads to a 1.27-point increase in SUCC_BUDG. Furthermore there is an individual contribution of CONF which influences the relationship significantly whilst controlling for all other mediators.

The direct effect becomes significant when all mediators are present. This indicates in combination with the net-mediated and the specific indirect effect that the model with mediators explains the relationship between PROJO and SUCC_BUDG better than the model without.

Procedural justice (PROJU) → Performance regarding compliance to time (SUCC_TIME)

There is a significant standardized direct effect (with mediators) of 0.96, no significant standardized direct effect (without mediators) and a significant indirect net-mediated effect of -1.29 generated with bootstrapping between these two variables. The relationship between PROJU and SUCC_TIME is net-mediated with all antecedents of project performance present at the same time and that a 1-point increase in PROJU leads to a 1.29-point increase in SUCC_TIME.

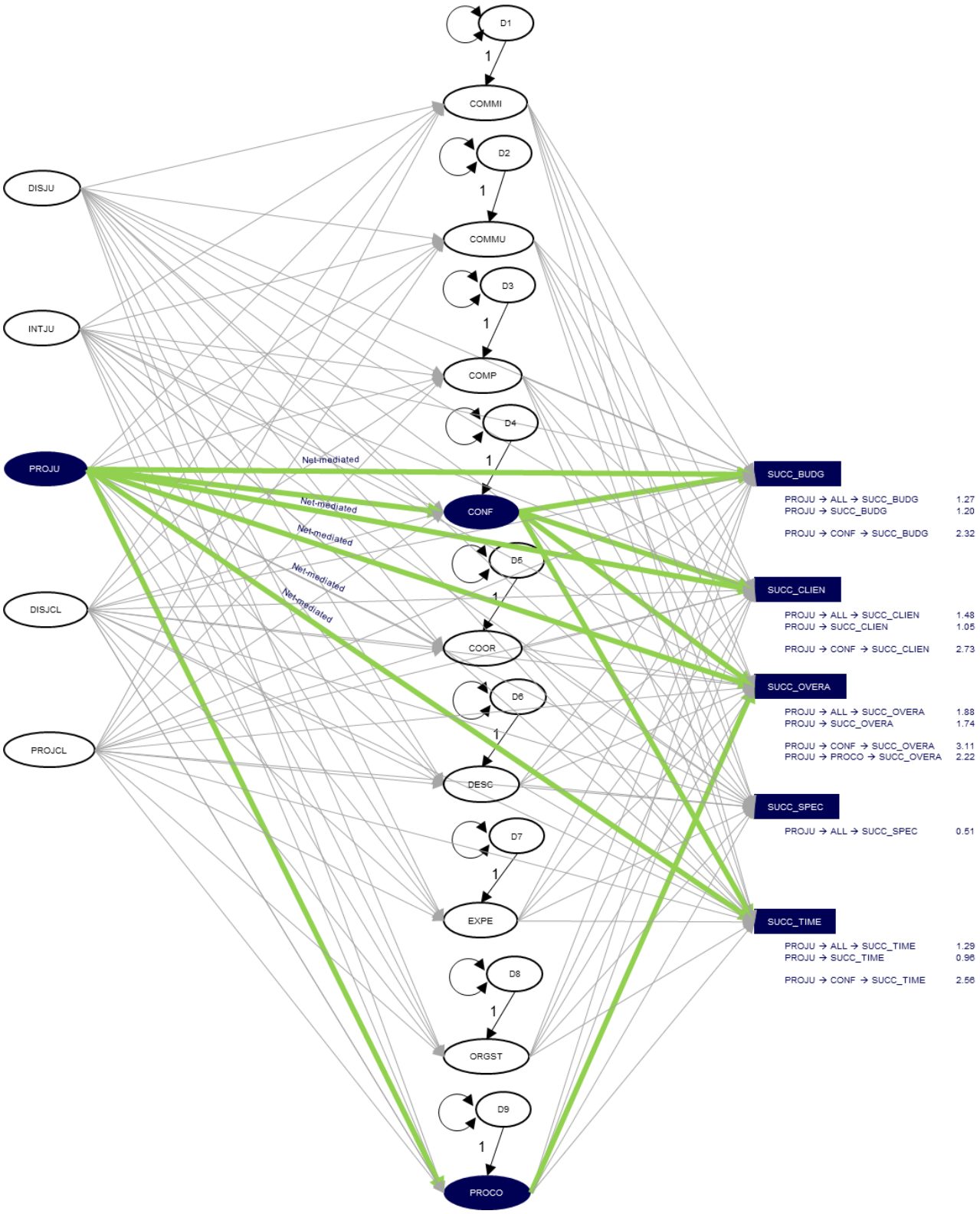

Figure 5.10 – Structural model – Impact of procedural justice

Furthermore there is an individual contribution of CONF which influences the relationship significantly whilst controlling for all other mediators.

The direct effect becomes significant when all mediators are present. This indicates in combination with the net-mediated and the specific indirect effect that the model with mediators explains the relationship between PROJU and SUCC_TIME better than the model without.

Procedural justice (PROJU) → Performance regarding compliance to specification/quality (SUCC_SPEC)

There is no significant standardized direct effect (with mediators), a significant standardized direct effect (without mediators) of -0.38 and a significant indirect net-mediated effect of -0.51 generated with bootstrapping between these two variables. The relationship between PROJU and SUCC_SPEC is net-mediated with all antecedents of project performance present at the same time and that a 1-point increase in PROJU leads to a 0.51-point increase in SUCC_SPEC. But it is worth noting that there are no individual contributions which influence the relationship significantly whilst controlling for all other mediators.

The direct effect is significant when no mediators are present and becomes insignificant with their presence. In combination with the non-significant specific indirect effects this indicates that the model without the mediators represents the relationship between PROJU and SUCC_SPEC better than the model with the mediators despite the presence of the significant net-mediated indirect effect.

Procedural justice (PROJU) → Performance regarding client's satisfaction (SUCC_CLIEN)

There is a significant standardized direct effect (with mediators) of 1.05, no significant standardized direct effect (without mediators) and a significant indirect net-mediated effect of -1.48 generated with bootstrapping between these two variables. The relationship between PROJU and SUCC_CLIEN is net-mediated with all antecedents of project performance present at the same time and a 1-point increase in PROJU leads to a 0.76-point increase in SUCC_CLIEN.

Furthermore there is an individual contribution of CONF which influences the relationship significantly whilst controlling for all other mediators.

The direct effect becomes significant in value when all mediators are present. This indicates in combination with the net-mediated and the specific indirect effect that the model with mediators explains the relationship between PROJU and SUCC_CLIEN better than the model without.

Procedural justice (PROJU) → Overall project performance (SUCC_OVERA)
There is a significant standardized direct effect (with mediators) of 1.74, no significant standardized direct effect (without mediators) and a significant indirect net-mediated effect of -1.88 generated with bootstrapping between these two variables. The relationship between PROJU and SUCC_OVERA is net-mediated with all antecedents of project performance present at the same time and that a 1-point increase in PROJU leads to a 1.88-point increase in SUCC_OVERA. Furthermore there are individual contributions of CONF and PROCO which influence the relationship significantly whilst controlling for all other mediators.
The direct effect becomes significant when all mediators are present. This indicates in combination with the net-mediated indirect effect and the specific indirect effects that the model with mediators explains the relationship between PROJO and SUCC_OVERA better than the model without.

5.6.5.4 Distributive justice climate

The direct and indirect effects of distributive justice climate on the antecedents and the different aspects of project performance are illustrated in Figure 5.11, whereas the significant relationships are highlighted in green. The impact on each aspect of project performance will be highlighted in the following.

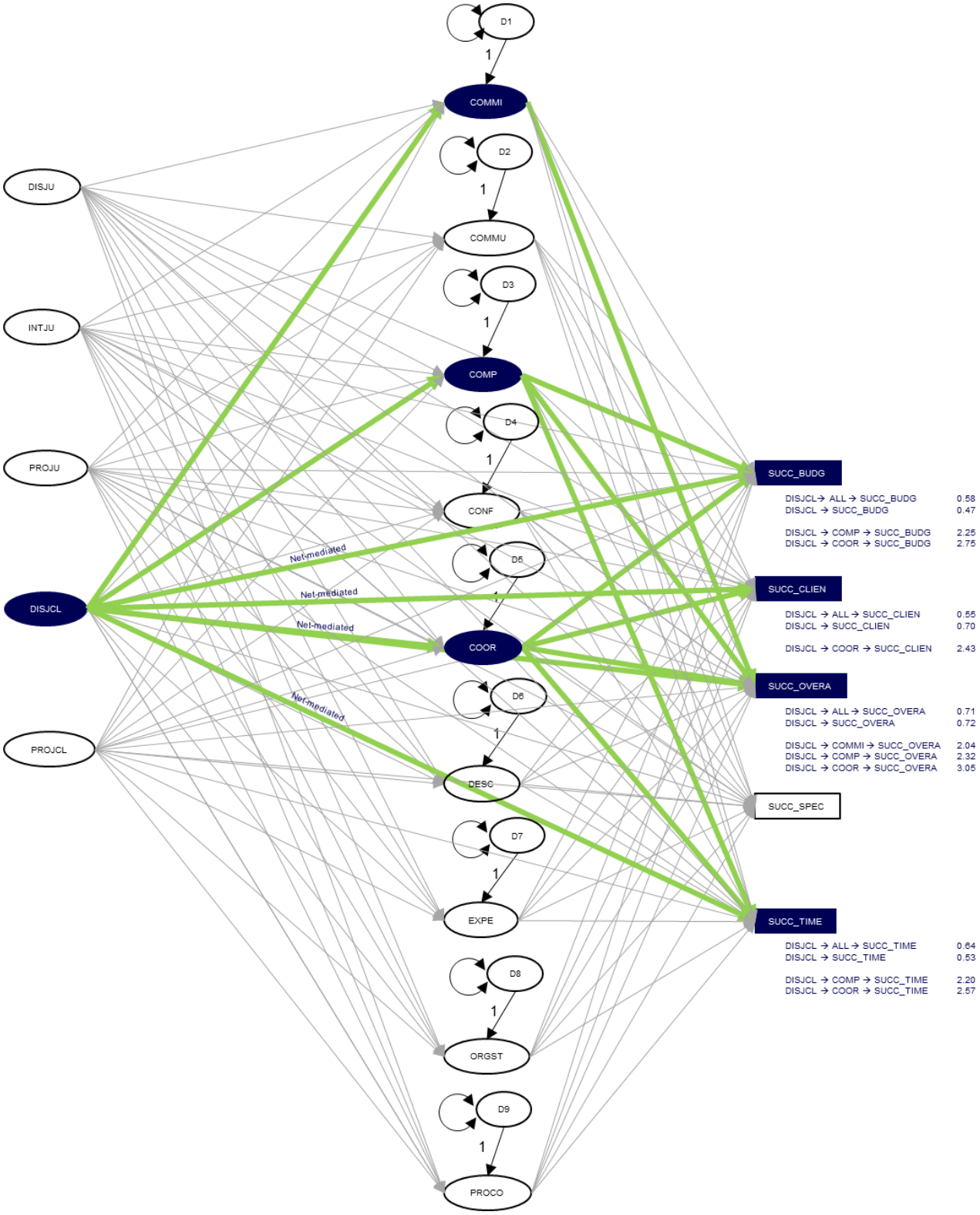

Figure 5.11 – Structural model – Impact of distributive justice climate

Distributive justice climate (DISJCL) → Performance regarding compliance to budget (SUCC_BUDG)

There is a significant standardized direct effect (with mediators) of 0.47, no significant standardized direct effect (without mediators) and a significant indirect net-mediated effect of -0.58 generated with bootstrapping between these two variables. The relationship between DISJCL and SUCC_BUDG is net-mediated with all antecedents of project performance present at the same time and that a 1-point increase in DISJCL leads to a 0.58-point increase in SUCC_BUDG. Furthermore there are individual contributions of COMP and COOR which influence the relationship significantly whilst controlling for all other mediators.

The direct effect becomes significant when all mediators are present. This indicates in combination with the net-mediated indirect effect and the specific indirect effects that the model with mediators explains the relationship between DISJCL and SUCC_BUDG better than the model without.

Distributive justice climate (DISJCL) → Performance regarding compliance to time (SUCC_TIME)

There is a significant standardized direct effect (with mediators) of 0.52, no significant standardized direct effect (without mediators) of -0.11 and a significant indirect net-mediated effect of -0.64 generated with bootstrapping between these two variables. The relationship between DISJCL and SUCC_TIME is net-mediated with all antecedents of project performance present at the same time and that a 1-point increase in DISJCL leads to a 0.64-point increase in SUCC_TIME. Furthermore there are individual contributions of COMP and COOR which influence the relationship significantly whilst controlling for all other mediators.

The direct effect becomes significant when all mediators are present. This indicates in combination with the net-mediated indirect effect and the specific indirect effects that the model with mediators explains the relationship between DISJCL and SUCC_TIME better than the model without.

Distributive justice climate (DISJCL) → Performance regarding compliance to specification/quality (SUCC_SPEC)

There is no significant standardized direct effect (with mediators), no significant standardized direct effect (without mediators) and no significant indirect net-mediated effect generated with bootstrapping between these two variables. The relationship between DISJCL and SUCC_SPEC is not net-mediated with all antecedents of project performance present at the same time and there are no individual contributions which influence the relationship significantly whilst controlling for all other mediators.

The direct effect is not significant neither with mediators present nor without their presence.

Distributive justice climate (DISJCL) → Performance regarding client's satisfaction (SUCC_CLIEN)

There is a significant standardized direct effect (with mediators) of 0.70, no significant standardized direct effect (without mediators) and a significant indirect net-mediated effect of -0.55 generated with bootstrapping between these two variables. The relationship between DISJCL and SUCC_CLIEN is net-mediated with all antecedents of project performance present at the same time and a 1-point increase in DISJCL leads to a 0.55-point increase in SUCC_CLIEN. Furthermore there is an individual contribution of COOR which influences the relationship significantly whilst controlling for all other mediators.

The direct effect becomes significant when all mediators are present. This indicates in combination with the net-mediated and the specific indirect effect that the model with mediators explains the relationship between DISJCL and SUCC_CLIEN better than the model without.

Distributive justice climate (DISJCL) → Overall project performance (SUCC_OVERA)

There is a significant standardized direct effect (with mediators) of 0.72, no significant standardized direct effect (without mediators) and a significant indirect net-mediated effect of -0.71 generated with bootstrapping between these two

variables. The relationship between DISJCL and SUCC_OVERA is net-mediated with all antecedents of project performance present at the same time and a 1-point increase in DISJCL leads to a 0.71-point increase in SUCC_OVERA. Furthermore there are individual contributions of COMMI, COMP and COOR which influence the relationship significantly whilst controlling for all other mediators.

The direct effect becomes significant when all mediators are present. This indicates in combination with the net-mediated indirect effect and the specific indirect effects that the model with mediators explains the relationship between DISJCL and SUCC_OVERA better than the model without.

5.6.5.5 Procedural justice climate

The direct and indirect effects of procedural justice climate on the antecedents and the different aspects of project performance are illustrated in Figure 5.12, where the significant relationships are highlighted in green. The impact on each aspect of project performance will be highlighted in the following.

Procedural justice climate (DISJCL) → Performance regarding compliance to budget (SUCC_BUDG)

There is a significant standardized direct effect (with mediators) of -1.01, a significant standardized direct effect (without mediators) of 0.40 and a significant indirect net-mediated effect of 1.37 generated with bootstrapping between these two variables. The relationship between PROJCL and SUCC_BUDG is net-mediated with all antecedents of project performance present at the same time and a 1-point increase in PROJCL leads to a 1.37-point increase in SUCC_BUDG. Furthermore there are individual contributions of COOR and ORGST which influence the relationship significantly whilst controlling for all other mediators.

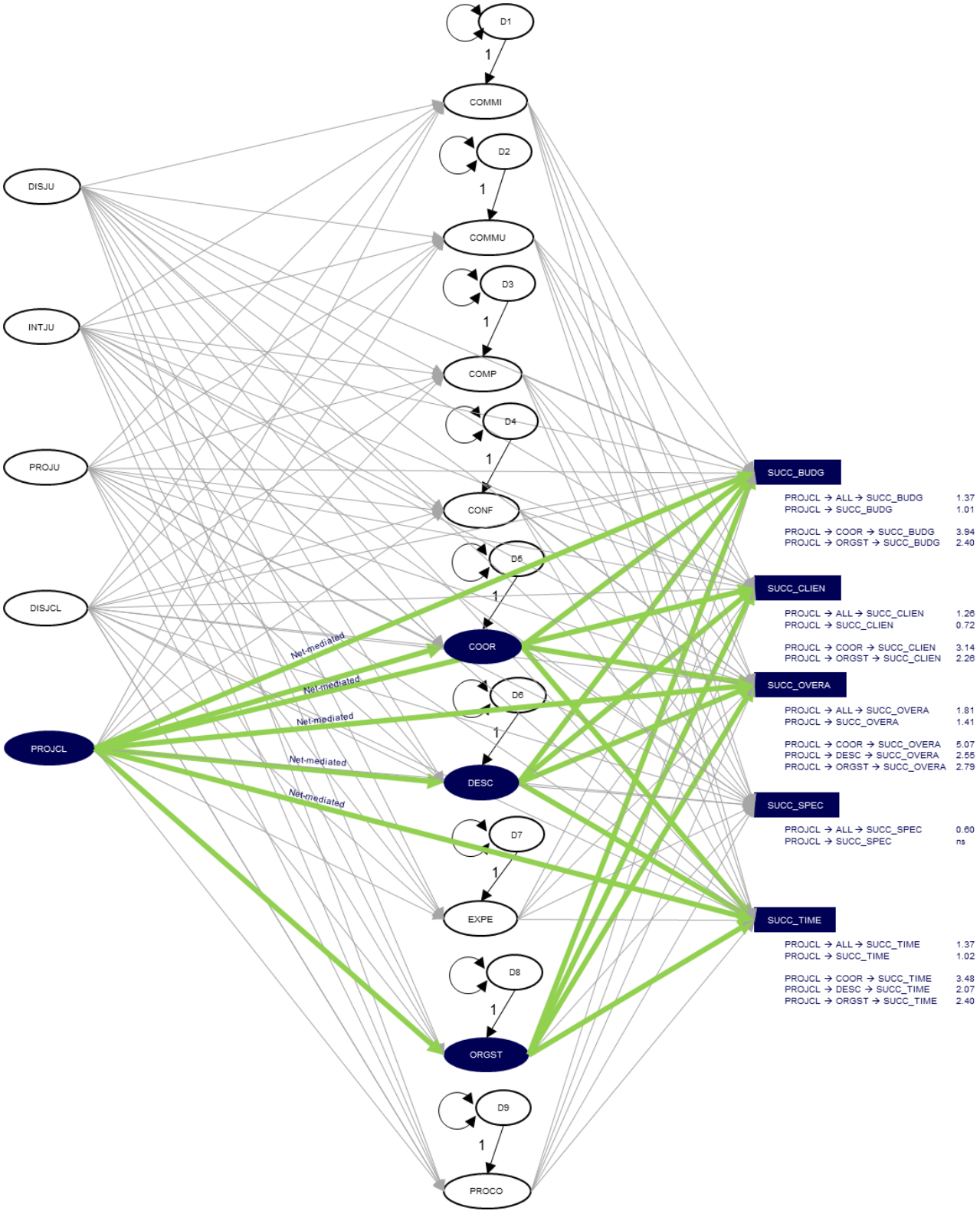

Figure 5.12 – Structural model – Impact of procedural justice climate

The direct effect increases in value when all mediators are present. This indicates in combination with the net-mediated indirect effect and the specific indirect effects that the model with mediators explains the relationship between PROJCL and SUCC_BUDG better than the model without.

Procedural justice climate (DISJCL) → Performance regarding compliance to time (SUCC_TIME)

There is a significant standardized direct effect (with mediators) of -1.02, a significant standardized direct effect (without mediators) of 0.40 and a significant indirect net-mediated effect of 1.37 generated with bootstrapping between these two variables. The relationship between PROJCL and SUCC_TIME is net-mediated with all antecedents of project performance present at the same time and a 1-point increase in PROJCL leads to a 1.37-point increase in SUCC_TIME. Furthermore there are individual contributions of COOR, DESC and ORGST which influence the relationship significantly whilst controlling for all other mediators.

The direct effect increases in value when all mediators are present. This indicates in combination with the net-mediated indirect effect and the specific indirect effects that the model with mediators explains the relationship between PROJCL and SUCC_TIME better than the model without.

Procedural justice climate (DISJCL) → Performance regarding compliance to specification/quality (SUCC_SPEC)

There is no significant standardized direct effect (with mediators), a significant standardized direct effect (without mediators) of 0.43 and a significant indirect net-mediated effect of 0.60 generated with bootstrapping between these two variables. The relationship between PROJCL and SUCC_SPEC is net-mediated with all antecedents of project performance present at the same time and a 1-point increase in PROJCL leads to a 0.60-point increase in SUCC_SPEC. But there are no individual contributions which influence the relationship significantly.

The direct effect is significant when no mediators are present and becomes insignificant with their presence. In combination with the non-significant specific

indirect effects this indicates that the model without the mediators represents the relationship between PROJCL and SUCC_SPEC better than the model with the mediators despite the presence of the significant net-mediated indirect effect.

Procedural justice climate (DISJCL) → Performance regarding client's satisfaction (SUCC_CLIEN)

There is a significant standardized direct effect (with mediators) of -0.72, a significant standardized direct effect (without mediators) of 0.59 and a significant indirect net-mediated effect of 1.26 generated with bootstrapping between these two variables. The relationship between PROJCL and SUCC_CLIEN is net-mediated with all antecedents of project performance present at the same time and a 1-point increase in PROJCL leads to a 1.26-point increase in SUCC_CLIEN. Furthermore there are individual contributions of COOR and ORGST which influence the relationship significantly whilst controlling for all other mediators.

The direct effect increases in value when all mediators are present. This indicates in combination with the net-mediated indirect effect and the specific indirect effects that the model with mediators explains the relationship between PROJCL and SUCC_CLIEN better than the model without.

Procedural justice climate (DISJCL) → Overall project performance (SUCC_OVERA)

There is a significant standardized direct effect (with mediators) of -1.41, a significant standardized direct effect (without mediators) of 0.46 and a significant indirect net-mediated effect of 1.81 generated with bootstrapping between these two variables. The relationship between PROJCL and SUCC_OVERA is net-mediated with all antecedents of project performance present at the same time and that a 1-point increase in PROJCL leads to a 1.81-point increase in SUCC_OVERA. Furthermore there are individual contributions of COOR, DESC and ORGST which influence the relationship significantly whilst controlling for all other mediators.

The direct effect increases in value when all mediators are present. This indicates in combination with the net-mediated indirect effect and the specific indirect effects that the model with mediators explains the relationship between PROJCL and SUCC_OVERA better than the model without.

5.6.6 Preliminary considerations

The analysis of the parameter estimates shows that there are certain dimensions of organizational justice and organizational justice climate as well as certain mediators which have an influence on different aspects of project success. These influences can often be explained with the underlying theory and conducted literature review. The connection between the literature and the research findings is made in detail in the next chapter, which is the discussion.

But there are some preliminary considerations which should take place in connection with the findings presented in this section. The analysis so far shows that all mediators apart from COMMU are responsible for significant specific indirect effects. The non-significance of COMMU could be explained by the fact, that a lot of the communication aspect is already covered by the independent variables of organizational justice and organizational justice climate, especially INTJU. Furthermore it is worth noting that there is no significant specific indirect effect between the different dimensions of organizational justice (climate) and SUCC_SPEC and hardly any significant direct or net-mediated indirect effect.

In addition different tests with alternative models revealed that the suppression phenomenon, which is present in the whole model, is supposably rooted to a great portion in the independent variable of DISJCL and the mediator ORGST. During the tests different variables were deleted and the impact on the model was analysed. There was no change in the model regarding the presence of the suppression phenomenon except when the two variables DISJCL and ORGST were deleted. In this case all indirect effects became positive and confirm therefore the hypotheses. A closer examination of why this suppression effect is present and why it is probably rooted in DISJCL and ORGST is conducted in the next chapter.

5.6.7 Equivalent models

Moreover just as for the measurement model equivalent models which could fit the data as well as the final structural model are taken into account. As explained previously it is crucial to acknowledge their existence and to take them into account when making any interpretations, otherwise the validity of the study is threatened (Kline, 2011). Therefore a couple of comparable models were developed and examined (ibid) and the replacement rule developed by Lee and Hershberger (1990) was applied. Some nearly equivalent models are presented in Appendix A5.2 with the corresponding fit indices. They are characterised as follows:

- *Equivalent model (I):* The covariances between COMMI, COMMU, COMP and CONF are replaced with direct effects.
- *Equivalent model (II):* The direct effects between the dimensions of organizational justice and organizational justice climate and PROCO are replaced with covariances between the dimensions of organizational justice and organizational justice climate and D9, which is the disturbance of PROCO.
- *Equivalent model (III):* The direct effects between the dimensions of organizational justice and organizational justice climate and COMMI are replaced with covariances between the dimensions of organizational justice and organizational justice climate and D1, which is the disturbance of COMMI.
- *Equivalent model (IV):* This is a combination of the equivalent model (II) and (III).
- *Equivalent model (V):* The direct effects between ORGST and the different aspects of success are replaced with covariances between their disturbances.
- *Equivalent model (VI):* The direct effects between COOR and the different aspects of success are changed regarding their direction.

The equivalent models (II) and (III) have the same fit indices as the final model. It was assumed that the replacement of the direct effects between the dimensions

of organizational justice and organizational justice climate and each mediator on its own will lead to the same result. But the equivalent model (IV) which combines the two other models shows worse fit indices than the final structural model. This also applies to the three other models although the replacement rules by Lee and Hershberger (1990) were applied (Table 5.24).

Fit statistic	Model						
	final model	equiv I	equiv II	equiv III	equiv IV	equiv V	equiv VI
χ^2_M	**161.98**	185.52	**161.97**	**161.97**	290.35	182.01	203.52
df_M	**27**	27	**27**	**27**	27	27	27
p	**0.00**	0.00	**0.00**	**0.00**	0.00	0.00	0.00
χ^2_M / df_M	**6.00**	6.87	**6.00**	**6.00**	10.75	6.74	7.54
RMSEA (90% CI)	**0.16 (0.14 – 0.19)**	0.17 (0.15 – 0.20)	**0.16 (0.14 – 0.19)**	**0.16 (0.14 – 0.19)**	0.23 (0.20 – 0.25)	0.17 (0.15 – 0.20)	0.18 (0.16 – 0.21)
$P_{close\text{-}fit\ H0}$	**0.00**	0.00	**0.00**	**0.00**	0.00	0.00	0.00
GFI	**0.92**	0.91	**0.92**	**0.92**	0.88	0.91	0.90
RMR	**0.03**	0.03	**0.03**	**0.03**	0.13	0.03	0.04
SRMR	**0.04**	0.03	**0.04**	**0.04**	0.15	0.04	0.03
CFI	**0.97**	0.97	**0.97**	**0.97**	0.95	0.97	0.96
NFI	**0.97**	0.96	**0.97**	**0.97**	0.94	0.96	0.96
TLI	**0.82**	0.79	**0.82**	**0.82**	0.66	0.80	0.77

Table 5.24 –Structural model – Equivalent Model – Fit statistics

The equivalent models (II) and (III) needed to be examined in more detail as they show a model fit which is as good as the fit of the final structural model: COMMI as well as PROCO act in the final structural model as mediators between organizational justice (climate) and the different aspects of project performance. But COMMI and PROCO can also be viewed as antecedents of project performance, as shown by previous research. Therefore it is in parts comprehensible that the deletion of the direct path and the implementation of a covariance shows the same model fit, as it is amongst antecedents of project performance.

But these models do not reflect the underlying theory which assumes that organizational justice (climate) positively influences the different aspects of project performance mediated through the antecedents of project performance. The final structural model is therefore still viewed as the best model for this work,

despite the existence of other models which are just as good regarding their model fit.

5.6.8 Alternative model

As a final step in the analysis of the structural model an alternative model was tested. The alternative model includes interaction effects which represent "the combined effect of two variables on another" (Field, 2013, p. 395) and are also known as moderation. As there is already mediation present in the model the interaction effects lead to a moderated mediation (James and Brett, 1984). The tested model is also a first-stage moderation model because the first path of the indirect effect of the independent variables on the dependent variables through the mediators depends on the other independent variables and mediators (Kline, 2011).

The interaction variables for the work at hand are DISJU_x_DISJCL and PROJU_x_PROJCL as explained in section 4.2.2.2. The alternative model looks as follows (Figure 5.13). The model fit of the alternative model is comparable with the final structural model and shows no considerable improvement or deterioration (Table 5.25):

Fit statistic	Recommended value for good fit	Result	Interpretation
χ^2_M		159.55	Significant → exact fit hypothesis rejected.
df_M		27	
p	Not significant	0.00	
χ^2_M / df_M	1 – 3	5.91	Moderate value.
RMSEA (90% CI)	Less than 0.05 or 0.08	0.16 (0.14 – 0.18)	Close-fit hypothesis needs to be rejected and poor-fit hypothesis cannot be rejected → bad results
$P_{\text{close-fit H0}}$	Significant	0.00	
GFI	Close to 0.90 or 0.95	0.93	Good fit.
CFI	The greater the better	0.97	Good fit.
NFI	Close to 0.90 or 0.95	0.97	Good fit.
TLI	Close to 0.90 or 0.95	0.80	Adequate fit.
RMR		0.02	
SRMR	Less than 0.05 or 0.08	0.03	Good fit.

Table 5.25 –Structural model – Alternative model – Fit statistics

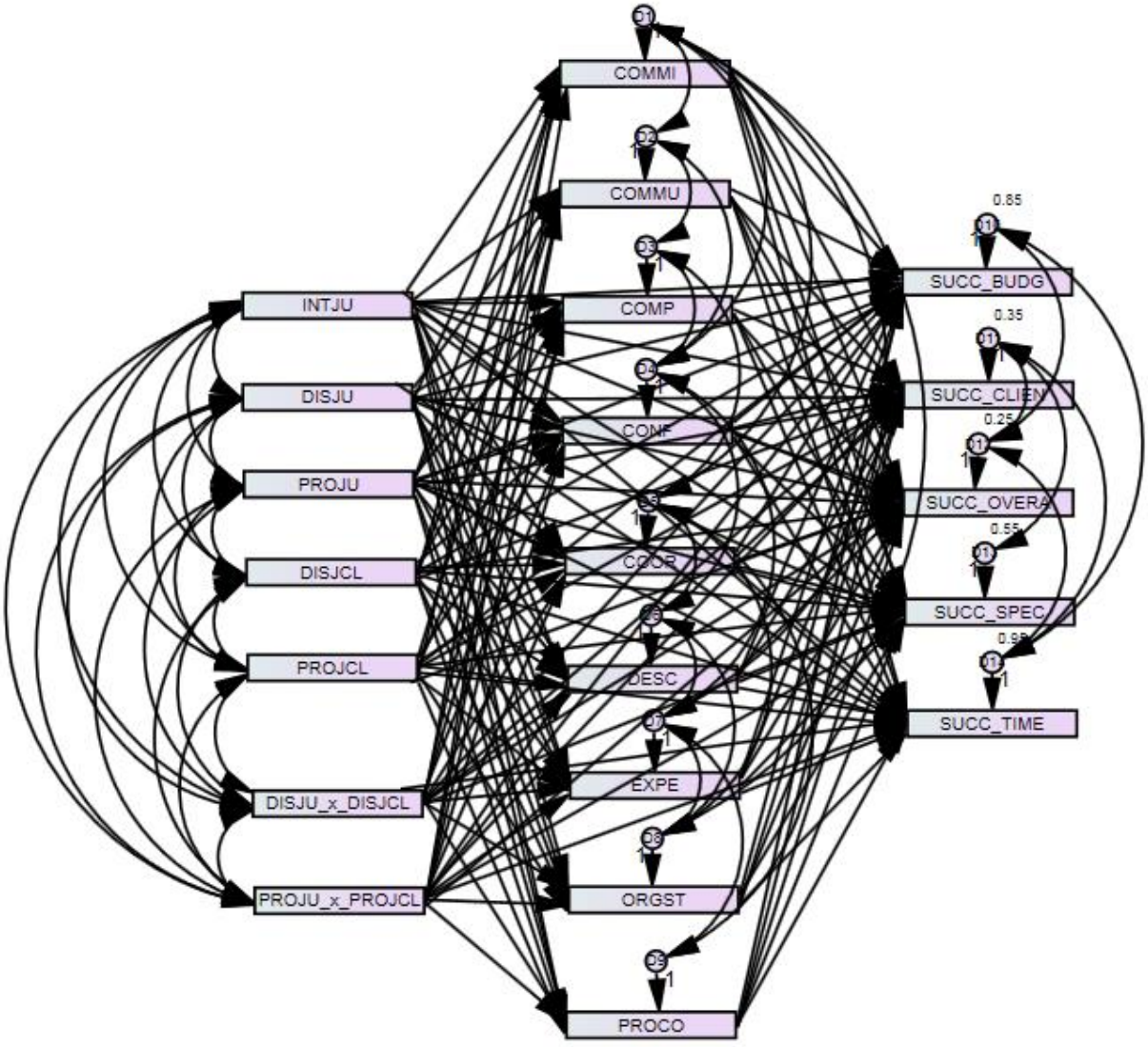

Figure 5.13 – Structural model – Alternative model

The unstandardized and standardized parameter estimates for the interaction effects were analysed next (Table 5.26):

Variables			Unstan-dardized estimate	SE	Sign.	Standar-dized estimate
COMMI	<---	DISJU_x_DISJCL	-0.05	0.02	*	-0.14
COMMU	<---	DISJU_x_DISJCL	0.01	0.02	ns	0.02
COMP	<---	DISJU_x_DISJCL	-0.01	0.02	ns	-0.01
CONF	<---	DISJU_x_DISJCL	-0.03	0.03	ns	-0.04
COOR	<---	DISJU_x_DISJCL	-0.03	0.03	ns	-0.07
DESC	<---	DISJU_x_DISJCL	-0.05	0.04	ns	-0.10
EXPE	<---	DISJU_x_DISJCL	-0.03	0.02	ns	-0.07
ORGST	<---	DISJU_x_DISJCL	-0.04	0.03	ns	-0.08
PROCO	<---	DISJU_x_DISJCL	-0.02	0.02	ns	-0.05
COMMI	<---	PROJU_x_PROJCL	0.02	0.02	ns	0.06
COMMU	<---	PROJU_x_PROJCL	0.03	0.02	ns	0.06
COMP	<---	PROJU_x_PROJCL	0.06	0.02	**	0.10
CONF	<---	PROJU_x_PROJCL	0.04	0.02	ns	0.06
COOR	<---	PROJU_x_PROJCL	0.02	0.02	ns	0.05
DESC	<---	PROJU_x_PROJCL	0.03	0.03	ns	0.07
EXPE	<---	PROJU_x_PROJCL	0.02	0.02	ns	0.05
ORGST	<---	PROJU_x_PROJCL	0.03	0.03	ns	0.06
PROCO	<---	PROJU_x_PROJCL	0.03	0.02	ns	0.09

Table 5.26 –Structural model – Alternative model – Parameter estimates

There are only two significant relationships with the interaction effects. These are DISJU_x_DISJCL → COMMI and PROJU_x_PROJCL → COMP. This indicates that the interaction effects do not have a great influence.

The unstandardized direct, indirect and total effects with all mediators present are shown in Table 5.27. To generate the estimates bootstrapping (2000 bootstrapping samples, 90% bias-corrected confidence interval) was undertaken:

Variables			Direct effect	Sign.	In-direct effect	Sign.	Total effect	Sign.
SUCC_BUDG	<---	DISJU_x_DISJCL	-0.01	ns	0.01	ns	0.00	ns
SUCC_CLIEN	<---	DISJU_x_DISJCL	0.02	ns	-0.01	ns	0.02	ns

Variables			Direct effect	Sign.	In-direct effect	Sign.	Total effect	Sign.
SUCC_OVERA	<--	DISJU_x_DISJCL	0.09	ns	0.00	ns	0.09	ns
SUCC_SPEC	<--	DISJU_x_DISJCL	0.00	ns	-0.03	ns	-0.03	ns
SUCC_TIME	<--	DISJU_x_DISJCL	-0.07	ns	-0.02	ns	-0.09	ns
SUCC_BUDG	<--	PROJU_x_PROJCL	0.03	ns	0.08	*	0.12	ns
SUCC_CLIEN	<--	PROJU_x_PROJCL	0.02	ns	0.04	ns	0.06	ns
SUCC_OVERA	<--	PROJU_x_PROJCL	-0.01	ns	0.05	ns	0.05	ns
SUCC_SPEC	**<--**	PROJU_x_PROJCL	0.02	ns	0.02	ns	0.04	ns
SUCC_TIME	<--	PROJU_x_PROJCL	0.06	ns	0.10	*	0.16	*

Table 5.27 – Structural model – Alternative model – Unstandardized effects

Again there is only a very small number of significant effects based on the interaction variables. These are:

PROJU_x_PROJCL → SUCC_BUDG

There is no significant direct and no significant total effect, but the net-mediated indirect effect between PROJU_x_PROJCL and SUCC_BUDG is significant, i.e. a 1-point increase in PROJU_x_PROJCL leads to a 0.08-point increase in SUCC_BUDG. The effect in absolute value is very small.

PROJU_x_PROJCL → SUCC_TIME

There is no significant direct effect, but there is a significant net-mediated and total effect between PROJU_x_PROJCL and SUCC_TIME. Regarding the net-mediated indirect effect a 1-point increase PROJU_x_PROJCL leads to a 0.10 increase in SUCC_TIME and regarding the total effect a 0.16-point increase in SUCC_TIME is expected with a 1-point increase in PROJU_x_PROJCL. The effects in absolute value are very small.

The alternative model doesn't show an improved model fit compared to the final structural model and there is only a very small number of significant relationships based on the interaction variables. It was therefore decided that the final structural model will be used as the result of this work. This model is shown in Figure 5.7

5.7 Structural regression model

The path analysis was conducted using the latent variables which were computed out of their indicators with AMOS. Therefore the structural model is identical to the structural regression model and all the conclusions made in the previous section are actually the final findings of the SEM analysis.

5.8 Hypotheses testing

As a final section of the data analysis the hypotheses developed in section 4.3.1.2 shall now be tested with the results of the SEM in order to see if they were supported or not.

Hypothesis 1

Organizational justice will be related to each antecedent of project performance.

This hypothesis is partly supported. There are significant positive direct effects with a number of antecedents for each dimension of organizational justice, but not each dimension is positively related to each antecedent (Table 5.19)

Hypothesis 2

Each antecedent of project performance will be related to project performance.

This hypothesis is partly supported. There are significant positive direct effects between the antecedents of project performance and different aspects of project performance, but there was no significant direct effect at all for the antecedent COMMU (Table 5.19).

Hypothesis 3

Organizational justice will be related to project performance.

This hypothesis is partly supported. Each dimension of organizational justice shows significant direct effects with SUCC_BUDG, SUCC_TIME, SUCC_CLIEN and SUCC_OVERA. But for SUCC_SPEC there are no significant direct effects at all (Table 5.19).

Hypothesis 4

Organizational justice will be related to project performance net-mediated through the antecedents of project performance

This hypothesis is partly supported. All dimensions of organizational justice have a significant net-mediated indirect effect with each aspect of project performance apart from INTJU – SUCC_SPEC, which is not significant (Table 5.21).

Hypothesis 5

Organizational justice climate will be related to each antecedent of project performance.

This hypothesis is partly supported. The variable INTJCL could not be tested due to poor data quality, but DISJCL and PROJCL show various significant direct effects with antecedents of project performance (Table 5.19).

Hypothesis 6

Each antecedent of project performance will be related to project performance.

This hypothesis is partly supported. There are significant positive direct effects between the antecedents of project performance and different aspects of project performance, but there was no significant direct effect at all for the antecedent COMMU (Table 5.19).

Hypothesis 7

Organizational justice climate will be related to project performance.

This hypothesis is partly supported. The variable INTJCL could not be tested due to poor data quality, but DISJCL and PROJCL show significant direct effects with all aspects performance apart from SUCC_SPEC (Table 5.19).

Hypothesis 8

Organizational justice climate will be related to project performance net-mediated through the antecedents of project performance

This hypothesis is partly supported. The variable INTJCL could not be tested due to poor data quality, but DISJCL and PROJCL show significant indirect net-mediated effects with each aspect of project performance apart from DISJCL – SUCC_SPEC, which is not significant (Table 5.21).

Overall it can be stated that the hypotheses are not fully supported by the data, but that a very high degree of conformity is present.

5.9 Summary

In total 194 cases were analysed. First of all, these cases were analysed with descriptive statistics in order to get an overview over the nature of the data. This included a univariate analysis which revealed that the cases provide a good representation of the construction industry as multiple roles, building types and project sizes were present. It also included the data screening which prepared the data for SEM. Afterwards the measurement model was tested and modified multiple times until a good model fit was achieved. The same procedure was undertaken for the structural model until a satisfactory model fit was achieved.

After the results of the SEM were available the hypotheses were tested. All of the eight hypotheses are partly supported with a very high degree of conformity.

The key findings based on the SEM are:

- There is a high number of significant relationships between organizational justice (climate) and the different aspects of project performance.
- These relationships become stronger with the antecedents of project performance present as net-mediators.
- There is a high number of significant relationships between organizational justice (climate) and the antecedents of project performance.

In chapter 7 it will be discussed how these findings relate to the hypotheses and the existing theory.

6 Supplementary findings

6 Supplementary findings

6.1 Introduction

The findings presented in this chapter are based on the supplementary data collection methods and they describe, help to understand and explain the findings from the core data collection in the previous chapter. As supplemental data collection methods focus groups and a case study were conducted.

It is the aim of the focus groups and the case study to collect data and evidence which are required to answer the research question and objectives. In particular it is intended to answer the following research objective:

- Objective 4: To obtain an understanding of how organizational justice influences the performance of construction projects in order to explain the previously identified relationships

The purpose of the focus groups was to obtain an understanding of the relationships between organizational justice (climate) and project performance and the purpose of the case study was to obtain an understanding of the relationships between organizational justice (climate) and the antecedents of project performance.

This chapter will provide detailed information over the findings of both supplemental data collection methods including their administration, processes of data analysis and descriptions of findings.

6.2 Focus groups

6.2.1 Administration of the focus groups

The focus groups were conducted as one part of the supplementary data collection to support and explain the findings of the questionnaire, which were used for primary data collection. The purpose of the focus groups was to understand how project team members experience the application of

organizational justice (climate) regarding their benefits and their influence on project performance. The method of data collection and analysis for the focus groups was explained in detail in chapter 4.3.

In March 2016 two focus groups were conducted in the UK, one in London and one in Liverpool. Each focus group was moderated by the researcher and an observer supported the moderator by taking notes and observing non-verbal behaviour. The duration of the focus groups was between 39 and 83 minutes. The discussions were recorded with two recording devices (iPhone and iPad) which were placed on the table. The layout of the two focus groups is shown in Figure 6.2

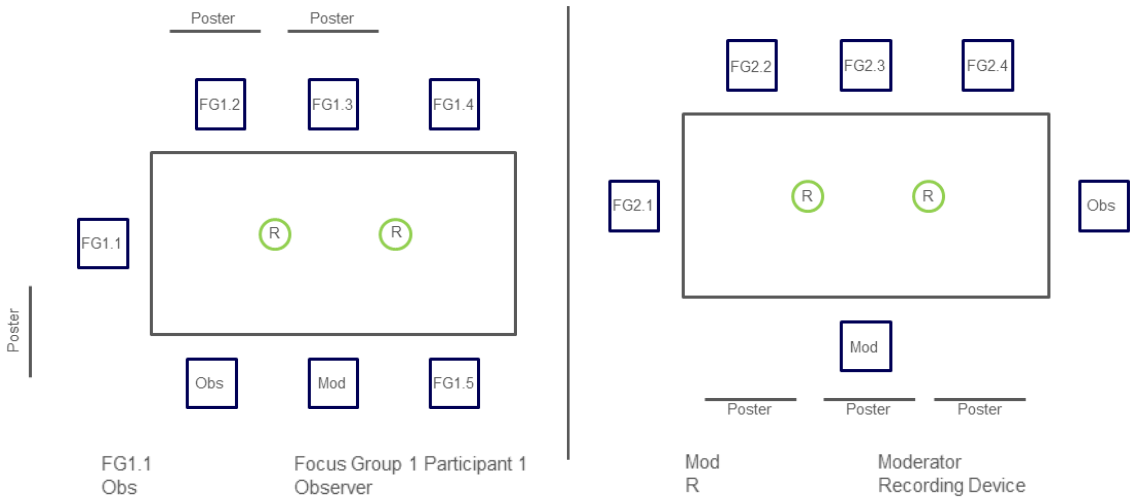

Figure 6.1 – Focus groups – Physical set up

The participants were recruited through professional bodies for project management and support networks in the construction industry. They had the opportunity to introduce themselves at the beginning of each focus group and they were asked to fill out a participant detail sheet. The participants were mainly managers and above in their respective organizations and have many years of experience in the construction industry, in total more than 150 years between them. They held different roles in the project team from consultant to contractor to project manager. The composition of the focus groups is therefore in accordance with the aims defined in the sampling strategy (Table 6.1).

Participant	Position	Experience (in years)	Role in project team
Focus Group 1			
FG1.1	Director	> 20	Contractor
FG1.2	Manager	> 20	Consultant
FG1.3	Manager	> 20	Education
FG1.4	Consultant	0 - 5	Consultant
FG1.5	Director	> 20	Consultant
Focus Group 2			
FG2.1	Manager	> 20	Project Manager
FG2.2	Managing Director	> 20	Consultant
FG2.3	Manager	6 - 10	Client
FS2.4	Director	> 20	Consultant

Table 6.1 – Focus groups – Participant profiles

6.2.2 Data analysis

The audio recordings of the two focus groups resulted in two verbatim transcripts with a total of over 22,400 words. The moderator's participation was 13%, i.e. the participants contributed with 87% predominantly to the discussion in the focus group. This shows that the moderator did not exert influence on the discussion apart from asking the questions and moderating.

The transcripts were checked for consistency and a partial retyping from the audio tapes took place to ensure that the transcribing process was conducted in a reliable way. The transcripts were then read through carefully several times including the observer's notes and a record about the general thoughts was kept. These insights were used to achieve an adequate sense and feeling for the data. After the familiarisation with the data the transcripts were imported into NVivo and the significant statements are identified manually. In total 304 significant statements were identified in the two transcripts. The significance of the statements was evaluated based on the relevant information they provide for the research. For illustration purposes a small selection of significant statements is displayed in Table 6.2.

Selection of significant statements
For me it's actually walking away from a scheme with everybody collectively being happy, to get the commendations from your client for everybody's relationships to be positive and to be showcasing a scheme that everybody is really proud of.
Failure on one discipline actually corrupts the rest of the team doesn't it I think and affects everybody.
Sometimes it's the specification or the budget you could be faltering on all of that with specification, you know any change or variation and then obviously it's not fair because there's complications further down the line that could be perceived as being somebody not meeting the client's expectations when it comes to budget.
Oh no, their expectations go beyond just the budget, their expectations are you know, they want quality, they want more than what they've paid for initially. They want to put these changes in, they don't consider you know maybe with the program even you know they don't consider any changes might have an effect.
But quite often you are not hearing or you are not even aware of what is going on in the outside world you know either in the world of business or the society outside which doesn't take very kindly to maybe having an airport put in their back garden.
Part of our job is to sort of change or try and change that approach you know and this is ethics and justice and getting people to be definitively sincere and authentic you know when they are making plans. But it is tremendously difficult because we live in a commercial world.
I think you have more chance of project success if your team, if your team has got the right behaviours right.
You want to do a good job and you want to get a fair thinking that you are doing a good job and actually your project manager says no we can't say that you have got to tell the client we are on time.

Table 6.2 – Focus groups – Significant statements

These significant statements were then coded and during this process 145 meaning units were identified through the analysis. These meaning units were grouped into 14 medium-level themes and seven high-level themes as shown in Figure 6.3. The grouping was undertaken based on characteristics the meaning units have in common and the overall purpose of the research. This means the questions which were asked during the focus groups and the conceptual framework which was developed in chapter 2 were taken into consideration as well. The structure of the table moves from the macro level, i.e. the wider context, on the left hand side to the micro level, i.e. the fair or unfair treatment, on the right hand side.

The high-level themes were set into context in a rich picture (Figure 6.2) which shows firstly how the high-level themes relate to each other and secondly the resemblance to the conceptual framework. First of all there is the overall context

in which the project takes place, secondly there are the performance measures which evaluate if the overall project was successful or not, thirdly there are benefits of organizational justice and the project environment which is divided into the social and the structural project environment and finally there is the fair or unfair treatment, which is the defining parameter for the previously mentioned factors.

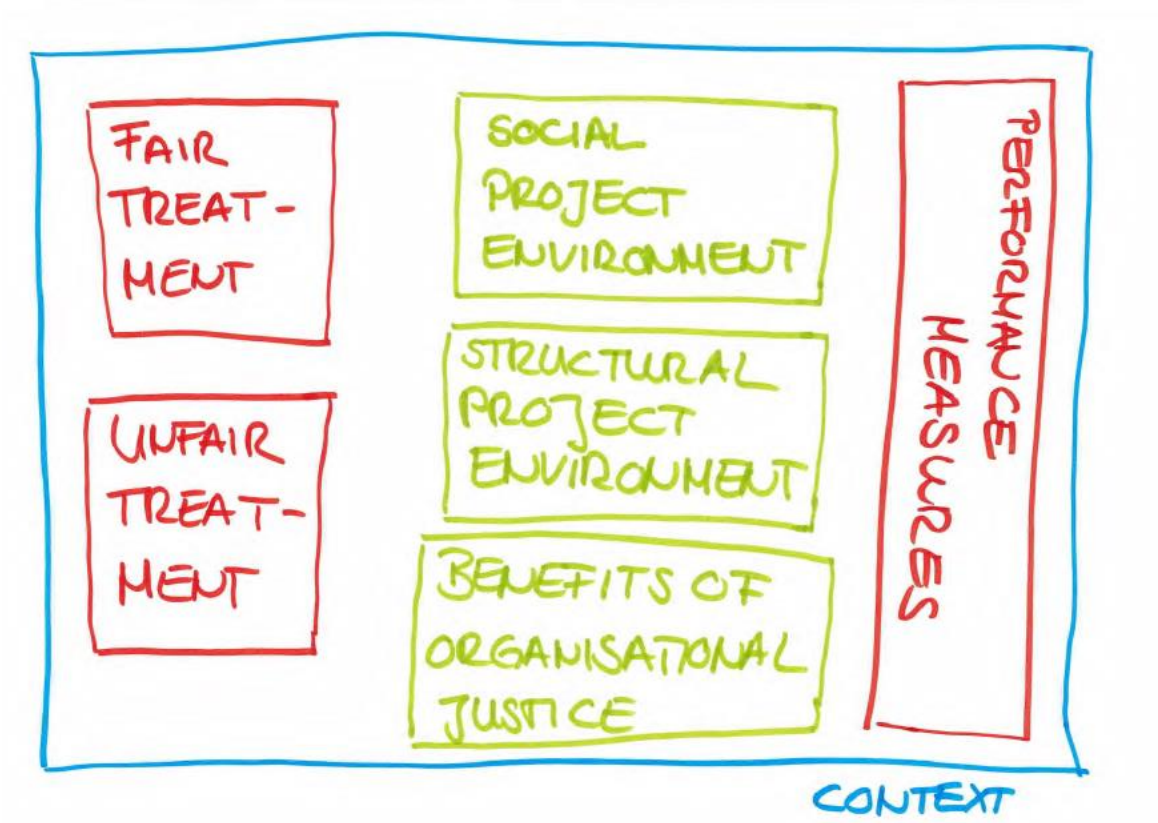

Figure 6.2 – Focus groups – Relationship of high level themes (rich picture)

Figure 6.3 – Focus groups – Themes and meaning units

6.2.3 Composite descriptions

The composite descriptions show how the perception of fairness is experienced in projects and how it influences their performance. In the remainder of this section the composite descriptions are presented in relation to the medium- and high-level themes, which are shown in Figure 6.3.

The composite descriptions reflect the findings of both focus groups together, i.e. an amalgamation of the two discussions was undertaken. The reason for this is, that both focus groups consisted of similar participants and similar ideas were shared. Therefore there is no differentiation between the two focus groups in the following composite description.

6.2.3.1 Context

The context describes the circumstances under which the project takes place. The context influences the project itself and what is happening in the project. Context is a high-level theme which consists of two middle-level themes (Figure 6.4):

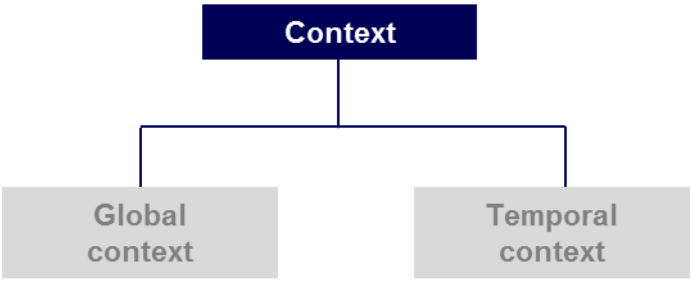

Figure 6.4 – Focus groups – High level theme "Context"

Global context

The focus groups discussed the broader, i.e. global, context in which projects take place. They highlighted that in projects the world outside, which is the overall economy and the society, often gets neglected (*"quite often you are not even aware of what is going on in the outside world")* despite its influence on the project. They also mentioned that the environment the construction industry is working in is *"some of the most punishing environments you have ever worked in"*. One of the reasons for this is that you often find a *"culture which is not going*

to be commensurate with good success" and that even the project team members ask themselves: *"is that the right way to conduct business?"* Additionally projects are often not undertaken in isolation, they are rather embedded in a portfolio, which dictates the broader objectives and defines the necessary benefits (*"manage benefit led portfolios"*).

Temporal context

The focus groups also emphasised the temporal context of projects, i.e. the impact of the project beyond its life span. It has been recognised that projects are often perceived differently many years after their completion (*"if you go through many years afterwards, then you will probably get a different story"*) and that it is necessary to look at the whole life cycle (*"ultimately now it is linking to whole life").*

6.2.3.2 Performance measures

Another focus of the discussions were the performance measures, i.e. what defines a successful project, who has interests in a project and what are impacts on the overall performance perception of projects? Performance measures is a high-level theme which consists of five middle-level themes (Figure 6.5):

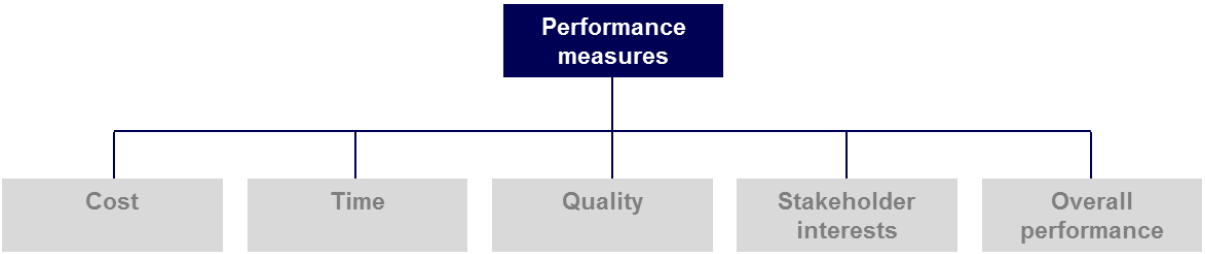

Figure 6.5 – Focus groups – High level theme "Performance Measures"

Cost

The cost of the project was seen as the most important performance measure by the focus groups. They emphasised that *"the big one is getting the budget right".* If the budget is not met or if there is the danger of cost overrun they expect *"a constant argument"* amongst the project team members, as well as with the client.

This is stressed with the background that the construction industry operates in a *"competitive market"* within a *"big commercial world".* Hence, it is the focus of the finance departments to get *"the cheapest job"* and to *"screw you down on price [as] price is king"*. This is in contrast to what the participants would like to experience in projects, but only rarely do: fair payment – which is viewed as highly motivating ("t*here are positive projects where everyone is paid fairly"* and *"that drive and enthusiasm when everybody is being paid a fair reasonable fee")*.

Time

As the second very important performance measure the timely completion was discussed by the focus groups. They stated that usually a project is seen as successful if it is *"finish[ed] on time and on budget".* As the budget was already covered in the previous section this section will focus on the time aspect. They argued that many projects are set up with an unrealistic schedule and therefore destined to *"start to fail"* and that they do not want to *"start knowing full well, that they are going to disappoint".*

As a performance measure it is also necessary to define the end of the project. The participants argued that nowadays it is not adequate anymore to define the handover of the project as the end date, rather they recommend to have a long-term perspective on the project ("w*hat is hard is to define the end of the project because historically it used to be [when] we have handed it over").* This is also in line with the temporal context outlined before.

Finally they claimed that a project can also be a success by focusing *"on mitigating the failure and closing it down and even in certain instances shutting down a project early."*

Quality

The quality was not rated as a very important performance measure by the focus groups, as it was hardly discussed. They only explained that in their opinion the clients *"want quality, they want more than what they've paid for"* and that clients even accept *"a substandard or a very low quality product"* as long as their *"bank account is fine*". It was also stated that clients *"are not good about specifying*

requirements" initially. This potentially causes cost and time overruns, which the clients are more concerned about.

Stakeholder interests

The meeting of the different interests of the various stakeholders was also discussed as a performance measure by the focus groups. There are different perspectives on this measure depending on the stakeholder. There is e.g. the client who has certain objectives and expectations towards the project. It was stated that *"making sure to meet all the client's objectives throughout the project"* as well as "*understanding what their brief really is and what their objectives are"* are crucial performance measures. But it was also emphasised that *"if the client's expectations are unrealistic, the chances of meeting a good specification on time and budget"* are very small. Therefore it is about advising the client, understanding what the client needs and making sure to have a common understanding at the beginning of the project.

Next to the client there are also users who are interested in the outcome of the project. The users might have different expectations towards the project from those of the client and if this is the case at the end of the project the users might say *"who the hell built this?"* Therefore it was emphasised that the expected benefits need to be synchronised and this includes *"benefits for the users, benefits for the citizens"*.

The other project team members like consultants and contractors are mainly interested in positive feedback and a subsequent re-assignment for the next job (*"when [you] start a new project [your] aim is [to] get the next job, because that says that you've done a good job"*). They highlighted that it is a successful project for them if they manage "*to get the commendation from the client*" and *"recognition*". They agreed that it doesn't make anyone work any harder if they are paid more money, but if they get the recognition they deserve during a project, it is highly motivating for them *("it's the recognition yeah, a simple thank you is a lot better than, you know, giving them more money"*).

Overall performance

The overall performance of a project was seen as two-sided by the focus groups. On the one hand side they explained that success *"is almost anything to anybody"* as there are different perspectives applicable which makes success difficult to define. On the other hand side they happily discussed positive and negative attributes of the overall success of a project. They e.g. highlighted that the performance of the team and the working together as a team as well as the team's behaviour are crucial factors for the overall project performance (*"if [the] team has got the right behaviour"* and *"then that's where collectively (…) they need to"*). But also the efficiency (*"try to do the best job"*) and effectiveness (*"doing the project right rather than doing the right project"*) in the project were emphasised as prominent components.

From the negative point of view they mentioned that they have been involved in *"some disaster projects"* where they tried to limit the disaster by doing *"a really good job"* and therefore achieving a *"qualified success"*. They additionally stated that *"the root cause of every project that [we] have seen fail"* is the highly competitive approach with the focus on the *"cheapest job"*, but they also emphasised that *"failure comes because of a lack of understanding"* and that *"the behaviour of the team has been a key element to success or failure"*.

6.2.3.3 Structural project environment

The structural project environment is concerned with the operational and formal relationships within a project. It is about the surrounding conditions under which the project is undertaken. Structural project environment is a high-level theme which consists of four middle-level themes (Figure 6.6):

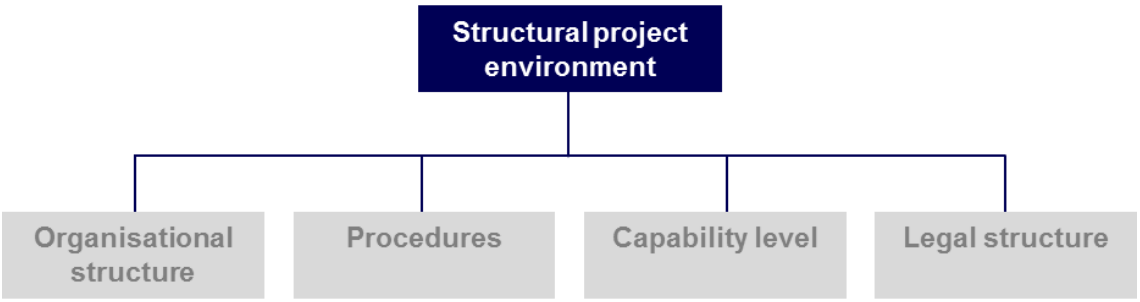

Figure 6.6 – Focus groups – High level theme "Structural project environment"

Organizational structure

The organizational structure is about the different roles and responsibilities as well as the project team and the formal relationships. The focus groups discussed in great length the client and his responsibilities. They emphasised that it is important for them *"having a client being part of the team"* and not two different parties who think *"us or them"*. They furthermore stressed that the client is in the position to shape the culture in the project and therefore to lay the foundation for success or failure (*"[the] client can end up then, setting a culture which is not going to be (…) commensurate with good success"* and *"the clients are still the driver").* In their opinion it's also the client's responsibility to introduce fairness into the project environment and to foster a behavioural change ("*It's the behavioural change of the client which dictates fairness throughout the rest of the project delivery").*

The consultants and advisors of the client are viewed as having the same responsibility regarding the required behavioural change (*"and again from the rest of the disciplines who are their advisors"),* whereas the contractors' role is more differentiated regarding their assignment (*"two stage"*). Overall the significance of considering the whole supply chain is emphasised because usually it is *"not just you, but your supply chain"* which is affected by events in the project. This also includes the *"apportion [of] the resources"* in order to fulfil the requirements.

Another important component in the organizational structure are the people and their personalities. It was pointed out that the individual people who are involved in the project are one key to the successful execution (*"it is the people and the skills"* and *"it comes down to the person and individuals")*. But the people involved can also cause problems when it comes to *"clashes of personalities"* and this potentially *"affects the team"*. Hence, the relationships in the project team are seen as a critical factor (*"relationships strengthen or fail"*) and to have *"everybody's relationship to be positive"* is a sign for a successful project according to the focus groups.

And finally it's the team as a whole which plays a crucial role in the organizational structure. *"Having the right team"* and *"working together"* were discussed and agreed on to be essential for a successful project. It is very much about the team members approach to solve problems *"as a collective"* and if there is *"a little bit of camaraderie"*.

Procedures

Within the structural project environment it is also the procedures which were accentuated by the focus groups. The unbiased development of processes and procedures is seen as highly important and influential on the performance of projects ("*You make procedures that are balanced and fair rather like the law [and they] should be perceived to be fair and equal").*

It was also emphasised that processes and procedures are only perceived to be fair, if their development *"was inclusive and collaborative"* and if they generate a fair distribution between the project team members. Examples for processes and procedures present in projects are the decision-making process and the problem-solving process. For the decision-making process it is relevant to which degree the project team members are involved (*"you need to be able to be involved in what decisions [the client] is making"*). For the process of problem-solving and how the project team members approach problems, the participants stated that according to their experience it is more successful to "*try and sort the problem out*" and *"be proactive"* instead of waiting and hiding.

The overall process of project delivery was also discussed by the focus groups. They highlighted that this process is dominated by the goal *"that you've delivered on everything that you have said"* and that the client gets someone *"[they] know can deliver"*.

Legal structure

The legal structure of the project is concerned with the procurement strategy and the contractual framework. The traditional procurement process was described as being *"commercial"* and *"competitive",* with contracts being *"awarded on costs"*. But they also experienced new and innovative ways of procurement which seem to be more promising regarding project performance. It was stated that

"*[they didn't] care what it costs because ultimately that was the value assessment they did and they scored on the one that gave them the most capacity, they then costed that and went with it. So that was this ridiculous forward thinking terrifying thing that [xxx] did but it was awesome to see that as kind of a very, very forward thinking".*

Contracts were often viewed to be confining ("*you will then be contractually obligated to do a [crap] job"*) and inflexible ("*but [the client] is not interested; get on with it; get on with it, you signed up for it"*). According to the participants contracts also gain importance as soon as there are problems in the project (*"if the project is going wrong the procedures become more up to the fore than they should really do"* and *"letters are starting to be written")*. But it is also remarkable that it is perceived to be fairer if any contract is present compared to no contract (*"that's why it feels fair I suppose, because there is a contract").*

The payment is usually also regulated in the contract and an important component of the legal structures of a project. The focus groups argued that it is not always helpful to raise the payment in order to achieve more commitment from the people involved (*"if you want someone to work harder (…), you don't pay them more money")*. But they also emphasised that it is important that the project team members feel that they are being paid fairly compared to each other (*"when setting out the project team, action number one is that you have to make sure everyone thinks they are getting paid fairly").*

If turbulences occur during the project it is also the legal structures which serve as a framework. It was stressed that *"when you deviate from [the contract] it all starts to fall to pieces"*, but despite this the clients often *"want to put these changes in"* although *"they don't consider [that] any changes might have an effect"*.

Capability level

And the final component in the organizational structure is the capability level which is present in the project team. *"The skills that are proportioned to the project"* are regarded as being a necessary prerequisite for project performance.

In this context it was highlighted that the client is often not an expert in construction projects, but has a completely different occupation (*"quite often the client is say a doctor's surgery")* and therefore needs competent people on the team from whom he can learn.

6.2.3.4 Social project environment

The social project environment is concerned with the relational and psycho-social aspects of the project and in particular about leadership, interaction and the emotional state of the project team members (Figure 6.7).

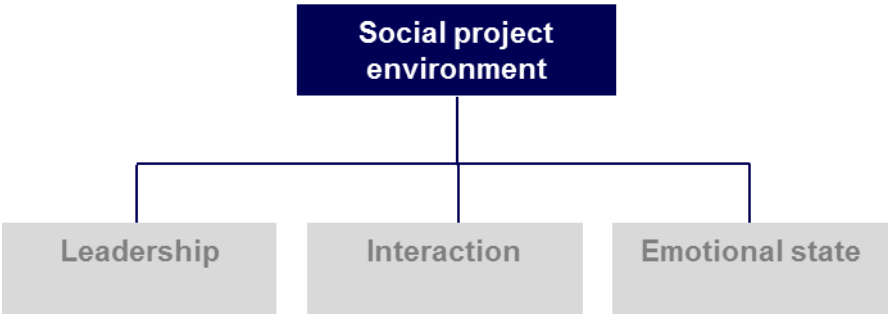

Figure 6.7 – Focus groups – High level theme "Social project environment"

Leadership

Leadership in the social project environment is about how the client leads the project team. "*You can have good leaders and bad leaders*" in projects and for the focus groups it is very much about motivating the team (*"he made us do transformational stuff because of the way he treated us")*. And it was emphasised by the participants that it is important that *"if you asked [the team] to do stuff they will do it for you"* if you are a good leader. Other significant characteristics of a good leader are inspiration (*"inspire your whole team")*, patience (*"he never lost his rag ever")*, defence (*"the knee jerk is to defend")*, protection (*"protect us from all the [crap]")* and reasoning (*"find out what it is that is really creating the situation").* But leadership is also about understanding what is needed in the project (*"have to understand your team")* and listening to project team members (*"if the client's not listening then you do sort of think: well, why am I bothering?")*. It was stated that it disturbs relationships if *"surprises"* are given during the project

or if the leader is *"incongruent"* in his behaviour and changes his mind without comprehensible reasons.

There was also a strong call for a *"behavioural change of the client [who] dictates fairness throughout the project delivery"* and the need of senior management support for relevant decision in the project.

Interaction

The social project environment also addresses the interaction between the project team members, i.e. their communication with and reaction to each other. *"The interaction between who is in charge"* and *"how [the people] interact and how they work together"* was mentioned as being important components of the social project environment. It was also explained that there is often a lack of collaboration in projects (*"there's just no collaboration")* and that more attempts should be undertaken to *"make sure we all work together"*. This also emphasises the sense of community which is a desired interaction (*"you never felt like you were alone"* and "*we wanted to do it for each other"*). In order to make the interaction work coordination is regarded to be necessary (*"coordination is a really big one")* and *"activities (…) that pull you together"* as well as *"socialising"* are also viewed to be beneficial.

The statement that *"information flow"* and *"everyone having the information does impact on performance"* highlights the importance of communication in the project team. This was also supported by the focus groups stating that the project team members *"must have input (…) in the first place"*. Which in turn also encourages the generation of new ideas which *"come from (…) that untainted, (…) free thinking view"*.

And finally the behaviour of the individuals and the team is regarded to be one of the most influential components as it was accentuated that *"behaviour is a key element to successful projects"*. The *"right behaviours"* in the project team can critically affect the success or failure of a project according to the focus groups.

Emotional state

The emotional state is another prominent topic in the social project environment and it is very much about how the project team members feel during the execution of the project. The focus groups agreed that it is important that the project team members are happy throughout the project (*"making sure that they are happy")* and that it can even be used as a performance measure if *"everybody [is] collectively (…) happy"* at the end of the project. Furthermore it is pride (*"everybody is really proud of")* and enthusiasm (*"that drive and enthusiasm")* which are developed if there is fair treatment in the project.

But there are also negative feelings present in projects like opposition (*"that sets up an absolutely adversarial environment")*, demotivation (*"it's a de-motivator")*, disappointment (*"we are going to disappoint")* and frustration (*"so frustrating")* which were mentioned in particular in the context of unfair treatment. And in addition it can happen in projects that a client or another project team member has *"a personal dislike of this individual"* which makes the overall project delivery more difficult and it needs to be accepted that *"we just have to go along with (…) the injustice of it"*.

6.2.3.5 Benefits of organizational justice

The focus groups were asked to discuss the influence of the benefits of organizational justice, which were displayed on a poster (Figure 6.8) on project performance. Overall it can be summarised that the focus groups concluded that the benefits *"are all really important"* and that *"nothing on there is like least important"* regarding its impact on project performance.

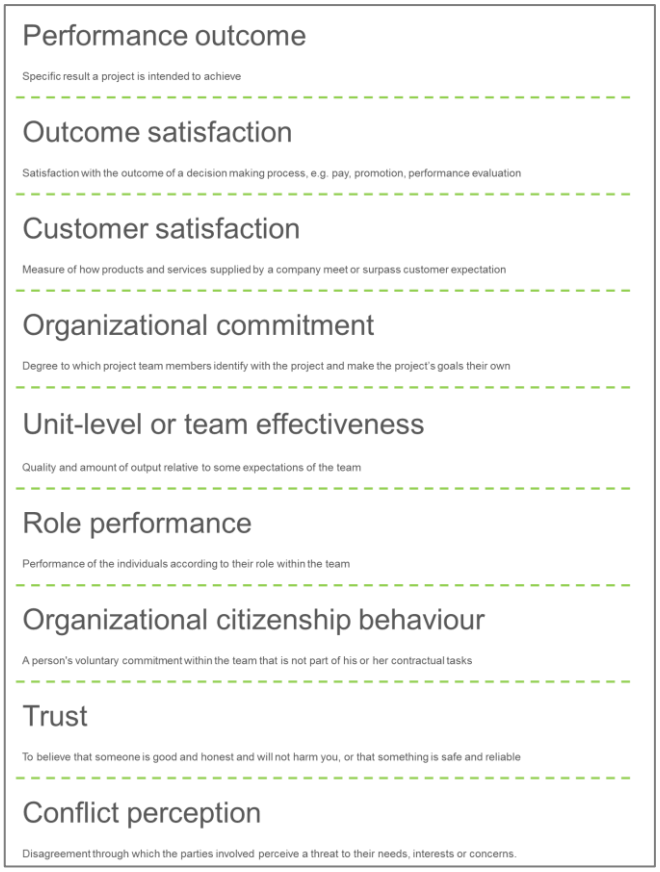

Figure 6.8 – Focus groups – Benefits of organizational justice (climate)

However, a particular focus during the discussion was on the following benefits:

- Performance outcome was seen as *"the ultimate goal"* of the project.
- Customer satisfaction was assumed to have a strong influence on performance. It was emphasised that *"customer satisfaction is going to be reasonably high"*.
- Role performance was regarded as being less important because it can be managed *("I see it as [low], because I can manage that").*
- Trust was rated as highly influential by all participants and it was emphasised that *"trust is obviously a biggie"*. It was furthermore stated that trust is *"absolutely lacking in the most"*.

6.2.3.6 Fair treatment

Fair treatment is concerned with treating everyone equitably and without favouritism and discrimination. Different examples for fair treatment were

discussed by the focus groups: authenticity and sincerity (*"getting people to be definitely sincere and authentic"*), conscientiousness (*"degrees of conscientiousness"*), consistency (*"need to be consistent"*), ethics and morality (*"it's a question for the ethics and morality"*), honesty (*"if somebody moves away from the understood truth"),* humility (*"there is not enough humility out there"),* integrity (*"leadership with integrity"*), professionalism (*"most people are quite professional"*), realism (*"people being realistic"),* respect (*"because we respected him"*), and unbiasedness (*"if every single one of your procedures were unbiased"*).

Fair treatment was regarded as being an important motivator for the project team members as it was stated that "*if everyone is being treated fairly, it makes you feel good about how you are delivering everything and you want to then continue to achieve the best you possibly can for the client".*

It was furthermore stated that it is particularly the client who promotes fairness in a project and in order to achieve fair treatment throughout a project the clients need to change their behaviour and adapt fair principles (*"it's the behavioural change of the client which dictates fairness throughout the rest of the project delivery"*). This is supported by the assumption that *"any fairness (…) has been probably instigated from the client in the first instance down the chain".*

The different dimensions of fair treatment, i.e. distributive, procedural and interactional, were also discussed during the focus groups. This discussion revealed that in general all three dimensions are viewed to be influential on project performance, but no consensus was achieved which of the dimensions is most influential. There were arguments for the procedural dimension (*"the key element is that I do have this set of procedures"*), but also for the interactional dimension *("that's communication")* and the distributive dimension (*"the distribution of the resources is one of the most important ones").*

6.2.3.7 Unfair treatment

Various examples were mentioned as unfair treatment, i.e. treatment which is not based on the principles of equality and justice: unauthenticity (*"so you're unauthentic in your behaviour"*), resistance *("it causes resistance to anybody else")*, incongruousness (*"be incongruent in what you say"*), grievances (*"this is when grievances start to happen"*), favouritism (*"they are treating the one individual more fairly than the others"*), dogmatism (*"there's been a dogmatic approach"),* disregard (*"they were just disregarded"*), disagreement *("disagreement to which the parties involved receive a threat")*, destruction (*"actively try and destroy people"*), aspiration (*"an awful lot of aspiration riding on a project")* and blame (*"there is a blame culture"*).

Unfair treatment causes different reactions in projects. It was e.g. described that if unfair treatment occurs towards an individual the other project team members think *"well, hang on, why are you doing that to that person?"* They also stressed, that it influences them if *"somebody else is treated unfairly (…) unless you are an asshole"* and it was mentioned that they *"hate that stuff"*. It was furthermore emphasised that unfairness *"sets up an absolutely adversarial environment".*

6.2.4 Answer to the focus group research problem

As a summary to the analysis of the focus group data the research problem which was developed in section 4.4.1.2 shall be tested. The research problem the focus groups intended to test was how the project team members experience the application of organizational justice and organizational justice climate regarding their benefits and their influence on project performance

Based on the statements of the participants it can clearly be argued that all the benefits of organizational justice are important to them and that all the benefits are expected to have an impact on project performance (*"are all really important"* and *"nothing on there is like least important"*). They furthermore requested *"a behavioural change of the client which dictates fairness throughout the rest of the project delivery"* and furthermore emphasised that *if everyone is being treated*

fairly, it makes you feel good about how you are delivering everything and you want to then continue to achieve the best you possibly can for the client".

6.3 Case study

6.3.1 Administration of the case study

The case study was conducted as the second part of the supplementary data collection to support and explain the findings of the questionnaire, which were used for primary data collection. The purpose of the case study was to understand how project team members experience the application of organizational justice and organizational justice climate regarding its influence on antecedents of project performance. The method of data collection and analysis for the case study was explained in detail in chapter 4.4.

The case for the research at hand was a laboratory refurbishment project in the UK. The client is a large organization which has an estate department with professional project managers representing the client's interests. The overall project duration was 12 months including design and execution. The specific challenge of this project was a very short programme due to external circumstances. A traditional contract was awarded to a main contractor based on certain criteria. For illustration purposes some photos and the floor plans of the project are pictured below (Figure 6.9, Figure 6.10and Figure 6.11).

Figure 6.9 – Case study – Photos of construction site

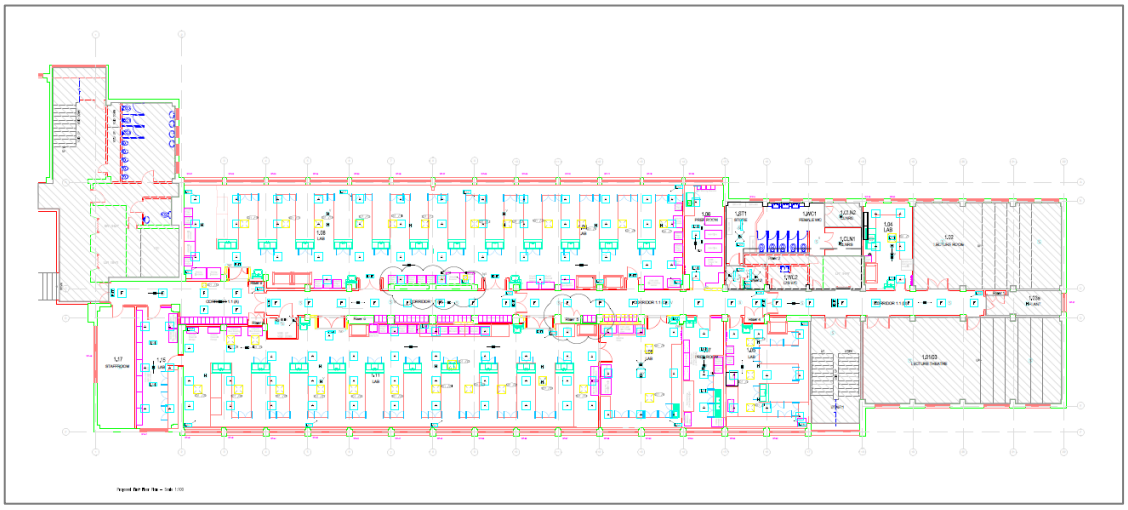

Figure 6.10 – Case study – Floor plan first floor

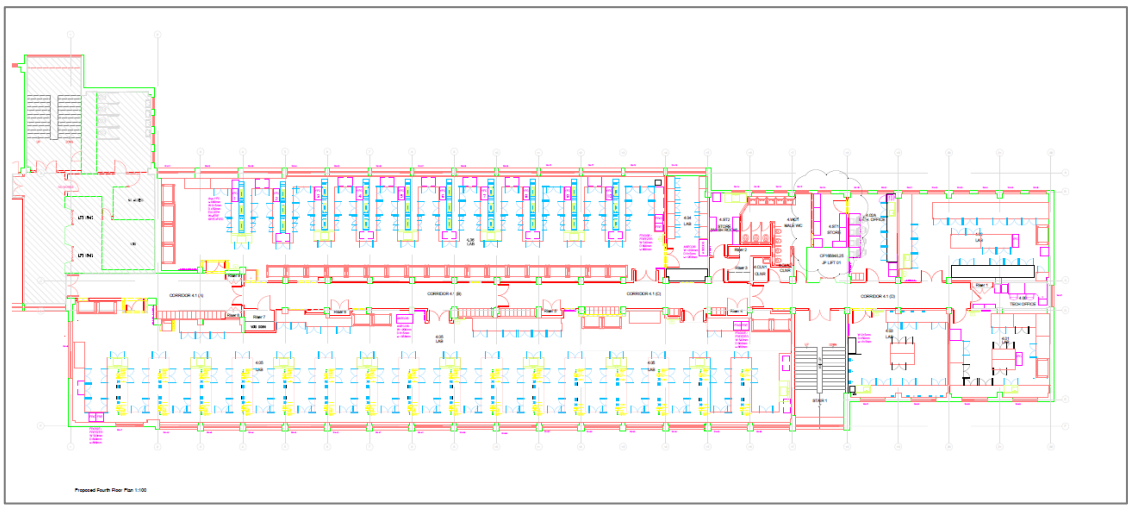

Figure 6.11 – Case study – Floor plan fourth floor

The project team consisted of the client's project manager, the end users, the client's contract administrator, the main contractor, the sub-contractors, and the M&E co-ordinator, who was contracted by the main contractor.

The case study was conducted from May to September 2016 and involved the observation of meetings, the collection of documents and four interviews with project team members:

- Observation of meetings: Three different types of meetings were observed (Client progress meeting, Contractor design team meeting, User engagement meeting) by the researcher. The meetings took place in the on-site meeting room provided by the main contractor. The researcher sat at the table with the other meeting participants and took field notes about verbal and non-verbal behaviour (Figure 6.12).

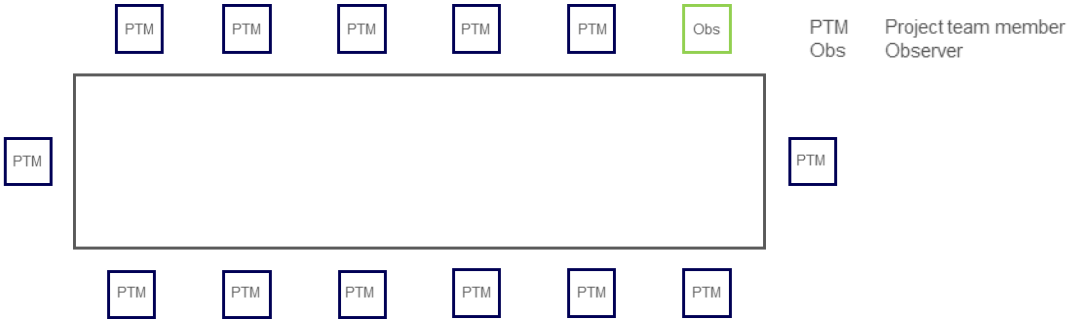

Figure 6.12 – Case study – Physical set up meeting observation

- Collection of documents: There is a huge variety of documents available and the access to these documents has been granted by the client and the contractor. Based on the researcher's experience the following documents were regarded as relevant and included in the data analysis: programme, meeting minutes, and project reports. Whilst no access was granted to the written contract – due to aspects of confidentiality – given its relevance to the research its constituent elements were verbally explained to the researcher by the contract administrator.
- Interviews: Four interviews with key people in the project were conducted by the researcher. The interviewees hold a relevant position regarding the management and execution of the project. They have all significant experience in the management of projects and conducted various construction and refurbishment projects prior to the case study (Table 6.3).

Participant	Position	Experience (in years)	Role in project team
CS_1	Site manager	> 20	Contractor
CS_2	Contract administrator	11-15	Consultant
CS_3	Contract manager	> 20	Contractor
CS_4	M&E coordinator	16-20	Contractor

Table 6.3 – Case study – Participant profiles interviews

6.3.2 Data analysis

The three different sources of evidence resulted in total in 25 different documents to analyse. The composition of these documents is shown in Table 6.4:

	Observation of meetings	Collection of documents	Interviews
Document type	Field notes	Progress reports, meeting minutes, schedule	Verbatim transcripts
No of documents	6	11	4
Words in total	1,889	n/a	12,840
File type	Written	Written	Audio recording

Table 6.4 – Case study – Composition of documents

The transcripts were checked for consistency and a partial retyping from the audio tapes took place to ensure that the transcribing process was conducted in a reliable way. All documents were then read through carefully several times and a record about the general thoughts was kept. These insights were used to achieve an adequate sense and feeling for the data.

After the familiarisation with the data all documents were imported into NVivo and analysed with pattern matching. The pre-defined pattern is based on the contextual framework and the findings from the survey questionnaire and shown in a rich picture (Figure 6.13). The focus of this case study is the relationship between the different dimensions of organizational justice (climate) and the antecedents of project performance. Therefore each dimension as well as each antecedent is present in the pattern matrix. The performance measures are added to complement the pattern and to set it in context with the other parts of the research.

Figure 6.13 – Case study – Data analysis pattern

The different documents were coded based on the pattern matrix and 202 meaning units were identified. These meaning units were grouped into 17 medium-level and 3 high-level themes as shown in Figure 6.14. The grouping was undertaken based on characteristics the meaning units have in common, the overall purpose of the research and the pattern items.

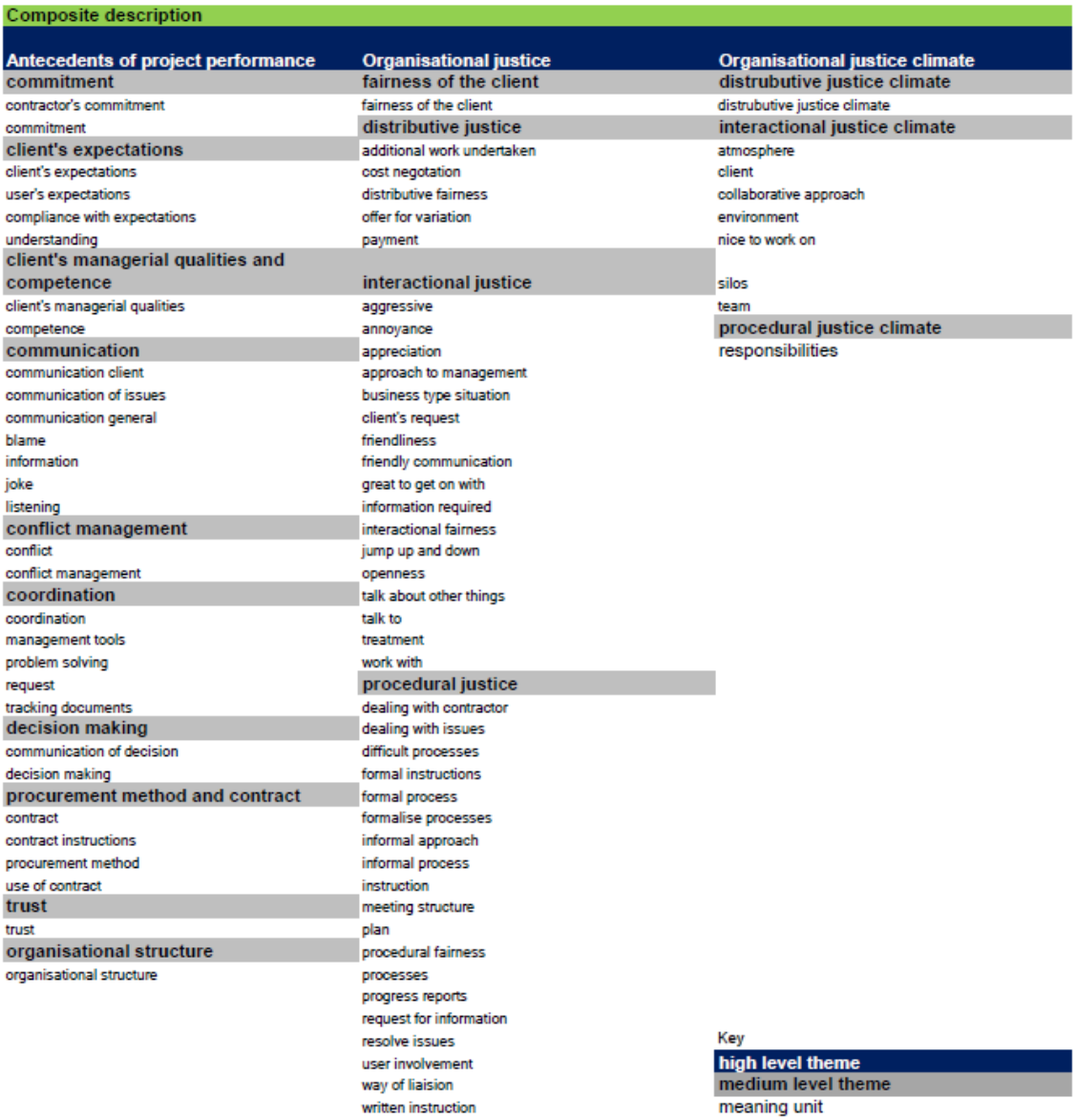

Figure 6.14 – Case study – Themes and meaning units

6.3.3 Description

The description shows how fair or unfair treatment is related to the antecedents of project performance. The structure of the description is based on the previously developed propositions which are:

1) Distributive justice positively influences commitment, competence and managerial qualities and coordination.
2) Interactional justice positively influences commitment, competence and managerial qualities, conflict management and compliance to client's expectations.

3) Procedural justice positively influences conflict management and efficacy of procurement method and contract.
4) Distributive justice climate positively influences commitment, competence and managerial qualities and coordination.
5) Procedural justice climate positively influences coordination, decision making and efficacy of organizational structures.

During the description the findings of the different documents are triangulated and observations, documents and interviews are used to come to a conclusion.

6.3.3.1 Organizational justice

The interviewees were asked if they perceive the client to be fair and in which way or through which actions. The researcher furthermore observed the client's behaviour during the meetings and how the participants perceived it. Additionally the documents were analysed for dimensions of fair treatment.

Overall the client was perceived to be predominantly fair and all the interviewees agreed on this topic (*"they are a fair client"* and *"the client is actually very fair")*. But there are slight differences in the different dimensions of how he is perceived to be fair therefore the findings of all three sources of evidence sorted by the dimensions are presented in the following.

Distributive justice

Regarding the fairness of the distribution of outcomes there were divergent opinions amongst the interviewees. First of all, the interviewees agreed that the client was *"very fair with the funding; if he thinks something is fair as a variation, then you will get paid for it".* This contributes to the way of collaborating with each other, as the project was seen *"as a team partnering exercise rather than a fight from start to finish"*. This was supported by the statement that if *"we are doing something that's out of our contract, they make sure we get paid for it"*. And also when there were difficulties at the beginning as not enough funding for the project was available, but there was work which had to be done, the client followed the

approach: *"we will get a budget together and we will find the money from a different pot"* instead of trying to squeeze it into the contract.

But the client was perceived to be *"a bit unfair"* in what he expects from the main contractor and what he expects him to do. This was in particular in reference to the schedule of the project as it was stated that *"his unfairness may have been at how realistic the plan was put out to start with"*, as time allowed was very, very short. Despite this, it was highlighted that "*they keep coming back to us"* and that the long-term relationship between client and main contractor is beneficial for both.

The researcher observed during the meetings that the client always tried to find a way to come to an agreement instead of arguing. She noted that *"he doesn't deny additional work which was done by the contractor*" and that there were only *"brief discussions on costs for additional work"*.

The meeting minutes reflect the previously described approach of the client. It is mentioned various times that the main contractor is asked to put together the costs for additional work (*"costs from XX awaited")* and the invoices and valuations were mutually agreed on (*"XX advised that valuation no. 3 had been agreed with YY")*. In case of disagreements regarding cost of any additional work a negotiation took place (*"XX have forwarded an assessment to YY for consideration")*.

Interactional justice

The interactional fairness of the client, i.e. how he treats the project team members and how he shares information with them, was also very much appreciated. *"The way they liaise and deal with the contractor*" as well as *"in the communication, how they do things and the way they speak to people*" was highlighted as perceived to be fair. Also that he recognised which effort everybody in the project team put into the project *("does he realise what we are doing? Of course, he does")* and that he appreciated this effort (*"does he appreciate what we are doing? I am damn sure, he does")* was perceived positively by the interviewees.

They also stressed that you know what to expect with the client, because *"when he's annoyed, he shows that he's annoyed"*, but he also says *"yeah, well done, thanks for that"* if the performance was according to his expectations. The interviewees describe the interaction and communication with the client as *"quite friendly"* and *"quite open"* as well as respectful (*"you are not just treated like 'just get on and do it because you haven't got a shirt and a tie on, I can tell you what to do'"*).

It was also stated in the meeting minutes that *"[the client is] impressed with the quality and progress of work on site"* and that he "*expresses his appreciation for the hard work and diligent manner in which [the main contractor] is managing the project"*. This underpins what the interviewees stated in regards to how the client treats the project team members.

Procedural justice

The processes which are applied by the client throughout the project are predominantly perceived to be fair (*"their approach, the way they liaise and deal with the contractor")*. Especially the client's approach to *"look at previous jobs, what went wrong and try to iron those out"* was appreciated. As a consequence of this the client appointed a number of consultants prior to the main contractor, which were later consigned to the main contractor. This saved time and facilitated the timely completion of the project (*"he actually took the trouble to appoint a number of people").* The overall set up of the project including its meeting structure and *"system of Requests for Information (RFIs)"* was also highlighted as *"one of the best I've seen".*

It was emphasised that the *"more informal approach to dealing with site variations, communications and instructions",* which is later backed up in writing, is perceived to be fair (*"additionally (…) in the processes")*. This was also the case when problems occurred as it was tried to solve them together *("we've got a problem, let's get together; how do we deal with it?")* and generally *"things seem to be getting resolved in an efficient and effective way"*. Furthermore the client's team has *"been fair to us with regards to access"* and they *"made sure everything is there for us (…), so they were very fair that way"* which is a crucial issue

considering the tight schedule. And additionally it was acknowledged that *"he understands that",* i.e. the processes of the project and the challenges the project team members are facing.

The researcher observed during the meetings that the process of dealing with issues is a collaborative process where everyone participates and contributes and *"if possible solutions which make everyone happy are tried to be achieved".* The process of reporting is also clear and organised and no critiques were raised.

All of the instructions given by the client during the meeting are documented in the meeting minutes. The documentation was simple and clear in order not to produce any doubt (*"XX confirmed (…)"; "YY advised (…)"; "ZZ to provide (…)").*

6.3.3.2 Organizational justice climate

Organizational justice climate, i.e. the team's perception of fairness in the project was also evaluated during the collection of evidence and analysed based on the three different dimensions.

Distributive justice climate

During the meeting observations the researcher noted that *"all participants seemed to be satisfied with the financial outcome of the project*", but it was criticised that the time allocated for the project was not sufficient. Therefore the distributive justice climate seems not to differ from the individuals' perception of fairness.

Interactional justice climate

The social environment of the project was described by the interviewees to be very good (*"the environment is very good")* with a *"collaborative approach to working with others"*. The client was described as being *"a good client*" who *"you can talk to and deal with".* Although there were some silos at the beginning, they were broken down over time as the goal was *"not having fragmented teams, not having silos"*. The importance of having the right team and the right people on

the project was also emphasised (*"having the right subcontractors"* and *"a lot of it is the team"*).

The researcher observed during the meetings that a *"relaxed atmosphere*" was present with jokes being made throughout the meeting. The researcher had the impression that the team as a whole felt treated fairly by the client. The interactional justice climate seems to be perceived similar to the individuals' perception of fairness.

Procedural justice climate

The team's perception of the fairness of the processes applied throughout the project did not generally differ from the individual's perception. It was highlighted during the interviews that *"everybody has to play their part"* and the researcher observed that generally *"procedures were applied consistently*".

Overall the three sources of evidence (interviews, documents and observations) proved that all three dimensions of organizational justice (climate) were present in the case study. The evidence also showed that a fairly strong perception of fairness is existent amongst the team members in this project.

6.3.3.3 Antecedents of project performance

The interviewees were asked to describe how the different antecedents of project performance work in the case study project. The researcher furthermore observed certain characteristics during the meetings and identified antecedents in the documents as well. The findings of all three sources of evidence are presented in the following.

Commitment

The interviewees felt *"one hundred per cent"* committed to the project and emphasised this (*"oh god yeah").* It was also stated by some of the interviewees that especially the contractor shows a high level of commitment and that they are *"doing all they can"* to successfully complete the project. This was congruent with the researcher's observations during different meetings as she concluded that *"the participants show commitment to do what they say"*.

Compliance to client's expectations

In the interviews it was explained that the aim of the project is clear to the participants and that they understood what the client expects of them (*"yeah, yeah I think we do")*. It was also added that expectations of the users were further detailed in dedicated meetings (*"very detailed in everything that they wanted")* and that it was important to *"ask the right questions"* during these meetings in order to further clarify the expectations. This was also observed during the meetings were it was stated by the contractor that *"they want to deliver a good quality"* and not fix something which is wrong or won't look right.

Client's managerial quality and competence

The interviewees agreed that the client showed a good level of competence regarding the technical background of the project *("he knows, what he is looking at; he knows, what he is doing"*) and that this was perceived to be *"a benefit"* for the project. The client was also described as being hands-on *("a guy who likes to touch and feel")* and a *"practical learner".* This is consistent with what the researcher observed during the meetings *("The client knows what he is talking about" and "He points out the next steps necessary"*).

In addition it was addressed that *"he probably puts too much effort into the day to day management of the job"* which was not regarded as necessary and that he asked for additional things which were not owed based on contractual agreements (*"the things he's asked for, we wouldn't have to give him legally"*). The engagement of the client was very high in the project and sometimes perceived to be too much *("He's been a little bit overkill"*).

Conflict management

The conflicts in this project were managed at a very early point, so that no real conflicts had arisen to this point (*"I wouldn't say we've had any real conflict"* and *"that hasn't been apparent here")*. If an issue arose, as *"there has been disagreement",* it was mostly regarding contractual issues and not regarding the design or coordination (*"by and large they are not design conflicts")*. However, these discussions *"haven't got heated"* and were resolved in a constructive way.

It was also emphasised that it was tried to solve issues in *"an educational manner"* in order to prevent future conflicts.

Decision making

The interviewees stated that the decision making process in the project was clearly defined (*"we have request for information forms")* and used throughout the project, although there are *"different decision trees"*. It sometimes was a long way as due to the large organization many stakeholders needed to be involved and therefore *"sometimes it took quite a while to get the decision back".* But it hasn't been *"apparent on this particular project"*, i.e. there haven't been any delays in the decision making process (*"we've not had any great delays, nothing has held us up")*. This was also due to *"setting deadlines on when we've got to make a decision"* and the close collaboration between the design team and the client and users (*"I know what they are trying to achieve (…) and I can say to them, the reason why we are doing this is because …").*

These findings from the interviews are consistent with the researcher's observation, as she noted during a meeting that a *"decision was made in order to not interrupt the building process"* as well as that the *"client reacted immediately and brought someone to solve this issue".* Furthermore, the decision was communicated clearly, the way forward with priorities was shown and, most important, the *"background on the decision process was provided"*.

The meeting minutes showed that all decisions made during the meetings are documented immediately and clearly and that all further actions required are highlighted (*"XX stated that YYY intend to instruct all remaining common works"* or *"XX confirmed that"* or *"XX advised that a pressure control manifold will be required"*).

Efficacy of procurement method and contract

In general the procurement method and contract were viewed to be appropriate for the project (*"they are"* and *"yeah, that's been ok")*, but there were also opinions that slight modifications would have been beneficial (*"I would have perhaps expected an intermediate form").* The decision to use a construction main

contractor instead of an M&E main contractor, despite the disproportionally high share of M&E work, was supported by the interviewees (*"I argued against using an M&E subcontractor as a manager, so I would not make them a main contractor").* It was also concluded that the procurement process produced the right result in the way that the selected main contractor *"is very good"*.

As mentioned before, the contract was not provided and could therefore not be analysed.

Trust

One interviewee stated that he doesn't think that he would *"ever trust the client a hundred per cent to be quite honest"*, which is mainly based on his long-term experience in the industry and many disappoints he experienced. But in general a high level of trust was present in the project as, apart from one, all interviewees confirmed to trust the client *("yeah, I do in this particular instance"* and *"yes"* and *"yeah"*). They trace that back to either a very long-term relationship with this client and that *"they have never let me down"* and to the client's behaviour that *"he has not done anything behind my back"*.

The researcher also had the impression during the observations that the participants of the meetings predominantly trusted the client and also each other. They *"don't insist on everything being written down"* and they *"don't show any fear of speaking up"*. Furthermore they *"rely on the other team members that everyone does what he or she says"*.

Efficacy of organizational structures

The organizational structures of the project were viewed to be appropriate (*"yeah, without a doubt (…) it's been very, very good"* and *"yeah, it is adequate for the value of it"*). It was emphasised that *"there are defined roles on both the client side and the contractor side and [they] are resourced appropriately for the level and type of project".* On top of that, *"everybody knows their rule of engagement"* and hence, what they have to do and what their roles are. Also the researcher observed that *"everybody knows his/her responsibility"* and that there is a clear meeting structure and responsibilities within the meeting.

Communication

"The way they speak to people" and the communication of the client is perceived to be *"very, very good"*. The interviewees emphasised that *"this has been one of the best I've seen"* in terms of how the communication was set up and how users were involved in the process. Most of the communication went through the M&E coordinator (*"90% of the communication tends to come through me"*) who was then responsible to distribute it to the affected parties. The participants also saw it as their job to communicate and to demonstrate their ability to successfully complete the job (*"I see it as my job to be that interface and not convince but show the client that we are in control"*). Part of the communication in general were also the meetings which were held on a regular basis in order to keep everyone up to date and resolve issues (*"we have the weekly meeting with all the subcontractors (…) and we've then got the client's meeting on a monthly basis"*) and *"informal conversations"* over a cup of coffee.

The researcher observed that the discussions in the meetings were in general very calm and constructive and that *"questions are asked and discussed openly"*. It also seemed that the communication was *"adequate, precise and friendly"* in the meetings and that only once a heated discussion occurred which yet let to a good solution, which everyone was happy with. The aim of the discussion was always to *"solve the issues"*. However, it was also stated during the meetings the client gets sometimes told too much and therefore gives *"too much hassle to the contractor"*.

The meeting minutes also demonstrated that the project participants were motivated to speak up and express themselves in order to avoid any disinformation (*"all specialists must advise of any issues they have, i.e. lack of information, issue which may potentially delay progress, etc.").*

The project reports showed that *"potential items affecting progress"* were communicated openly and regularly to the client. The *"weekly liaison with the client's representative"* was maintained and documented in the monthly reports. The sub-contractors also highlighted *"potential issues/risks*", *"concerns/queries/issues"* or *"matters to discuss"* in their weekly individual

reports in order to solve them together with the other project participants. Sometimes "*urgent*" items were highlighted specifically (Figure 6.15).

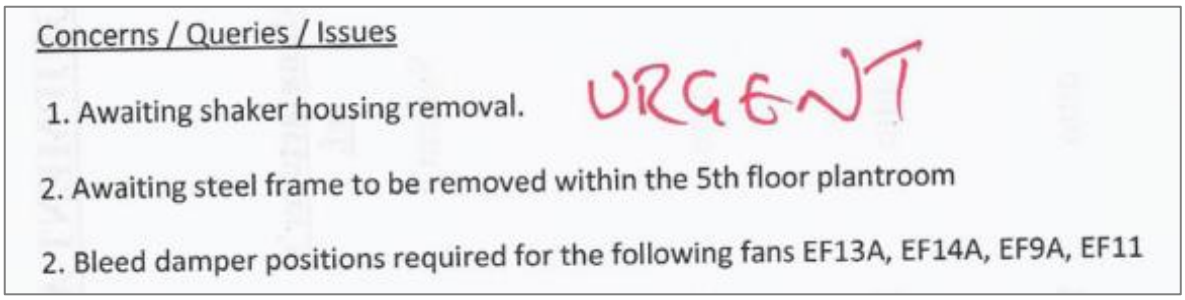

Figure 6.15 – Case study – Example document

Coordination

The coordination was viewed to be of highest importance in this type of project (*"coordination of M&E services within laboratories is paramount")* as *"everything that ever goes wrong is all about coordination"*. There was a dedicated M&E coordinator in the project and the other participants thought that *"he has coordinated it very, very well"*.

The researcher's observations confirmed this assessment as she noted in the field notes that *"coordination is of high priority for everyone because of the very tight schedule"*. It was emphasised during the meetings that "*no one wins here if anyone fails*" and that *"we need to work as a team"*. Due to the tight schedule and the high number of trades and workers on site certain situations arose where work couldn't be executed as planned, because previous work wasn't finished or other trades/workers were in the way. But solutions are found for these situations in the same meeting and the participants are constantly reminded that *"everybody is in the same boat"*.

For coordination purposes a progress report for each trade is included in the monthly project reports and a two week look-ahead plan is provided to harmonise the actions on site. The meeting minutes also reflect the emphasis on coordination as hundreds of items were discussed and documented over the period of the case study. Some of these items shall be highlighted in the following as they show the commitment to coordination:

- *"XX to issue the commissioning schedule around the end users to ensure demonstrations are attended by relevant personnel."*
- *"XX advised that a crane would be used on site on 20th June 2016. YYY to issue the relevant documents and lifting plans to ZZ prior to the lift."*
- *"XX to ensure this is passed to YY and ZZ."*
- *"It was agreed that XX will liaise with YY on his return from leave next week."*
- "*XX advised that builders work had commenced Wednesday, 08/06/16 and would be completed Thursday, 09/06/16 ready for AVSU installation from Friday, 10/06/16."*
- *"XX advised that the sections between the benches on the outside wall were fixed. YY asked about access to services, XX advised that it was only available from the bench areas."*

6.3.4 Answer to the case study research problem

As a summary to the analysis of the focus group data the focus group research problem which was stated in section 4.5.1.1 shall be tested. The research problem addressed with this study was how the different dimensions of organizational justice (climate) influence antecedents of project performance.

The analysis of the different sources of evidence of the case study showed that there are clear relationships between the different dimensions of organizational justice (climate) and the antecedents of project performance. The client was perceived to be mainly a "*fair to very fair client"* who is also concerned about the fair treatment of the project team members and subsequently positively influences e.g. coordination, commitment and the decision making process.

6.4 Summary

This chapter covered the findings of the two qualitative data collection methods, which were analysed with phenomenology. They provided additional information in order to better understand the relationships identified in the previous chapter. First, the two focus groups were analysed by identifying significant statements and grouping them into high- and medium-level themes as well as meaning units.

Seven high-level themes were created which are as follows: context, performance measures, structural project environment, social project environment, benefits of organizational justice, fair treatment and unfair treatment. A composite description was provided for each high-level theme including citations from the focus groups.

Second, the three different sources of evidence of the case study were analysed: observations, documents and interviews. Again, significant statements were identified and grouped into high- and medium-level themes as well as meaning units. The case study analysis identified three high-level themes: organizational justice, organizational justice climate and antecedents of project performance. For each of the high-level themes a description including citations was provided.

The key findings of the qualitative studies are:

- The client's fair or unfair treatment influences the benefits of organizational justice (climate), the social and the structural project environment including the antecedents of project performance which in turn influence project performance.
- The client's fair or unfair treatment as perceived by the project team members influences the antecedents of project performance.

In chapter 7 it will be discussed how these findings relate to the propositions and the existing theory.

7 Discussion

7.1	Introduction	The purpose and content of the chapter is explained and the objective addressed is highlighted.
7.2	Organisational justice (climate) and project performance	The relationship between organisational justice (climate) and project performance is discussed based on the results of the three studies conducted in this work
7.3	Theoretical contextualisation	The research findings are set into context with the theories and models which are present in organisational justice research
7.4	Explanatory framework	A three level explanatory framework is proposed which integrates the research findings of all three studies.
7.5	Summary	The key points of the chapter are summarised.

7 Discussion

7.1 Introduction

The purpose of this chapter is to bring together and reflect on the findings of the different data collection methods conducted for this work (chapter 5 and 6). Furthermore it is intended to discuss these findings against the existing literature and theory which was introduced in chapter 2 and therefore to highlight the overall outcomes of this research. On the basis of the overall findings an explanatory framework will be proposed at the end. This chapter will therefore particularly answer the following research objective:

- Objective 5: To propose an explanatory framework which explains organizational justice (climate), antecedents of project performance and the different aspects of construction project performance in order to summarise and visualise the findings.

This chapter will provide detailed information on the triangulation of the data from the questionnaire, the focus groups and the case study. It will be discussed how the different dimensions of organizational justice (climate) are related to antecedents of project performance, how the benefits of organizational justice (climate) are related to project performance, how the different dimensions of organizational justice (climate) are related to the different aspects of project performance and how various parameters influence these relationships. Furthermore the theories and models used in organizational justice theory will be utilised to explain some of the research's findings. This information will be used to suggest an explanatory framework, which will provide a comprehensive picture about these relationships and help researchers and practitioners to better understand the concept and impact of organizational justice (climate) in the context of projects and how it can enhance the project performance.

7.2 Organizational justice (climate) and project performance

The central question of this work sort to examine how organizational justice (climate) influences the performance of construction projects. Overall the three

different studies conducted within this work highlighted that the adoption of fair principles by the client has various positive effects on project performance and that it improves the performance of construction projects. However, with these three studies it became also clear that this relationship cannot be simplified in one sentence, but that it is rather a complex relationship with multiple dimensions to be considered for each variable.

Therefore the impact of organizational justice (climate) on the different aspects of project performance will be discussed in the following.

7.2.1 Project performance

7.2.1.1 The different aspects of project performance

The different aspects of project performance are all but one significantly related to distributive (DISJU), interactional (INTJU) and procedural justice (PROJU) as well as to distributive (DISJCL) and procedural justice climate (PROJCL). These relationships are significant as direct relationships but become predominantly stronger when the antecedents of project performance are present as net-mediators. Although for each relationship different mediators produce indirect effects, the presence of all nine mediators is necessary for the net-mediated effect. The different aspects of performance include compliance to budget (SUCC_BUDG) and to time (SUCC_TIME) as well as client's satisfaction (SUCC_CLIEN) and the overall performance (SUCC_OVERA). These relationships were not only positive in the quantitative study, but it was also supported by the qualitative studies, i.e. focus groups and case study, that organizational justice (climate) has a positive impact on various aspects of project performance.

The one aspect of performance, which is unusual and divergent from the others, is the performance regarding compliance to quality/specification (SUCC_SPEC). SUCC_SPEC is not at all related to INTJU and to DISJCL and holds only a net-mediated indirect significant relationship with DISJU, PROJU and PROJCL, but no indirect effects with significant mediators. This was a surprising fact as some of the mediators used, showed in other studies a qualitative improvement (Jha

and Iyer, 2007). However this might be explained based on the additional focus group study conducted for this work. It became clear during this study, that the quality is not really of high importance to the project team members and that there is no emphasis whatsoever on the qualitative aspect of project performance. Therefore it is assumed that this aspect is simply not viewed as important and hence, does not hold many significant relationships.

7.2.1.2 The antecedents of project performance

The relationship between organizational justice (climate) and project performance is mediated by the antecedents of project performance. The significance of these mediators can be explained through the mediators themselves. Different reviews on antecedents of project performance and critical success factors for construction projects have shown that the mediators used in this work have a high impact on the overall performance of projects (Chan et al., 2004; Fellows and Liu, 2012; Jha and Iyer, 2007; Tabish and Jha, 2012). However, it is worth emphasising that one mediator does not hold any significant relationship with any aspect of project performance, which is communication (COMMU). Communication is generally viewed as being influential on performance (Aljassmi and Han, 2013; Atkinson, 1999; Doloi, 2013), but this study doesn't reflect the previous results. It assumed that the positive effects of communication are substituted by other mediators, for which communication is also essential and that therefore communication itself does not contribute any additional impact to these relationships.

The more interesting aspect is, however, that the different dimensions of organizational justice (climate) are significantly related to the mediators, i.e. the antecedents of project performance, as most of these relationships haven't been investigated before and this work provides therefore new insights into benefits of organizational justice (climate). Each mediator will be discussed in the following.

Organizational commitment

This research showed that organizational commitment (COMMI) is significantly influenced by distributive justice (DISJU), interactional justice (INTJU) and

distributive justice climate (DISJCL). Previous studies on organizational commitment found it is predicted by all three dimensions of organizational justice (Greenberg, 1994), but predominantly influenced by procedural justice (Folger and Konovsky, 1989; McFarlin and Sweeney, 1992). This supports only partly the findings of this research as procedural justice (climate) does not significantly influence organizational commitment. However, the case study, which acted as the supplemental study, showed that with a client who is generally perceived to be a fair to very fair client in all three dimensions the commitment in the project was very high. Therefore it can be assumed that by focussing on all three dimensions of organizational justice on the individual and the team level clients can improve the organizational commitment of their project team members.

Communication

This research delivered a very surprising fact which was already mentioned above: there was no significant relationship between any of the dimensions of organizational justice (climate) and communication (COMMU) and the different aspects of project performance. The adequate communication was expected to be at least partly influenced by organizational justice (climate) as especially for the interactional dimension it is very much about how the project team members are treated and how information is shared (Greenberg, 2009b). Also the supplemental study showed that the client's communication was received very positively and it was directly linked to how the project team members perceive the client's fair treatment. The relationship between organizational justice (climate) and communication started just recently to gain more attention and its potential beneficial use for communicating bad news was highlighted (Richter et al., 2016). Therefore the role of communication in relationship to organizational justice (climate) and project performance needs to be further explored and more research on this topic is needed.

Client's competence and managerial qualities

The client's competence and managerial qualities (COMP) are significantly related to distributive justice (DISJU), interactional justice (INTJU) and distributive justice climate (DISJCL). There hasn't been any previous study which investigated these particular relationships, but they provide useful insights into

how distributive justice (climate) and interactional justice can influence the perception of the client's competence and managerial qualities, i.e. if fair principles are adopted by the client, he/she is perceived to be more competent and with higher managerial qualities. This is also supported by the case study as supplemental study, because it was highlighted that the client knows what he is doing, but that he probably puts a bit too much effort into the day to day management.

Conflict management

Interactional (INTJU) and procedural justice (PROJU) have been found to be the significant influencers for conflict management (CONF). These relationships appear to make sense as the management of conflicts is highly about the procedures applied and the information shared during the process as well as the respectful treatment of people involved. This implies that if conflicts occur during the project the client should focus on interactional and procedural fairness in order to enhance the project's performance (Fenn et al., 1997).

Coordination

This research revealed that coordination (COOR) is significantly influenced by distributive justice (DISJU) as well as distributive (DISJCL) and procedural justice climate (PROJCL). This means in order to enhance the coordination in a project team, clients should enhance the level of distributive justice (climate) and procedural justice climate. This is of particular importance as previous research has shown that coordination is one of three highly important factors for project performance (Jha and Iyer, 2007). During the supplemental study the importance of the coordination was also emphasised and it was highlighted that it is regarded to be absolutely crucial for achieving the project's goals.

Decision making

Procedural justice climate (PROJCL) is the only dimension of organizational justice (climate) which has a significant relationship with decision making (DESC). Therefore it seems to be highly important to the project team members that the procedures used for decision making are fair and in particular fair on a team level. Enhanced procedures for decision making allow the clients to actively

influence the performance of their projects. The case study revealed that the decision making process was perceived to be very fair and efficient on this particular project and that it supported the progress of the project as decisions were made when necessary.

Compliance with client's expectations

Compliance with client's expectations (EXPE) is significantly related to interactional justice (INTJU). This means that by treating the project team members in an adequate and fair way and by sharing information with them satisfactorily the client can increase the level to which the project team members comply with his expectations. This was also supported by the case study findings as they emphasised on the one hand that they clearly understood, what the client expected from them and on the other hand, that they perceived the client to be fair especially in the way he treats the people involved in the project.

Efficacy of organizational structures

Once more procedural justice climate (PROJCL) is the only dimension of organizational justice (climate) which has a significant relationship with a mediator, in this case efficacy of organizational structures (ORGST).The organizational structures are obviously very much concerned with the different roles and responsibilities in the project and also with the processes and procedures implemented. For the case study it was highlighted that the organizational structures were very good and adequate for the project characteristics. Hence, it makes sense that PROJCL is the main influencer of ORGST, as it addresses how the project team perceives the procedures used in the project.

Efficacy of procurement method and contract

The only significant relationship between efficacy of procurement method and contract (PROCO) is with procedural justice (PROJU). The efficacy of procurement method and contract has an impact on every single project team member. The procurement method as well as the contract in a way pre-define which processes and procedures will be applied during the project, therefore it can be explained that there is a significant relationship particularly between these

two variables. In the case study slight criticism was expressed, but overall it was agreed that the procurement method and contract were suitable and adequate for the project and it was also highlighted that the procedures and processes used by the client were fair.

Trust

The variable of trust could not be tested during the quantitative study due to the poor quality of the data, but during the case study it was highlighted that the project team members' trust towards the client was based on fair behaviour and treatment. This is supported by previous research which identified trust as a benefit of organizational justice (Lui and Ngo, 2004; Zaghloul and Hartman, 2003).

As mentioned at the beginning of this section these antecedents of project performance can also be viewed as benefits of organizational justice (climate) as they have one or more significant relationships with one or more dimension of organizational justice (climate) and this research showed their potential beneficial impact.

7.2.1.3 The benefits of organizational justice

However, this research went even one step further and used an additional approach to see how organizational justice (climate) influences the construction project performance. Previous studies have identified numerous benefits of organizational justice (climate) and the favourable impact of nine of them was discussed during the focus groups. The study showed that all of the benefits are viewed to be really important in order to achieve a successful project and that none can be ignored or excluded. In particular, the following benefits were discussed:

- Performance outcome (Luo, 2007; Poppo and Zhou, 2013)
- Outcome satisfaction (Folger and Konovsky, 1989; Sweeney and McFarlin, 1993)
- Customer satisfaction (Simons and Roberson, 2003)

- Organizational commitment (Folger and Konovsky, 1989)
- Unit-level or team effectiveness (Whitman et al., 2012)
- Role performance (Colquitt, 2004)
- Organizational citizenship behaviour (Ehrhart, 2004)
- Trust (Lui and Ngo, 2004; Zaghloul and Hartman, 2003)
- Conflict perception (Colquitt, 2004)

These findings of the supplemental study support and strengthen the statement that the client's adoption of fair principles significantly improves the performance of construction projects.

7.2.2 Organizational justice (climate)

It is also worth having a closer look at which dimension of organizational justice (climate) has a significant impact on project performance. Unfortunately due to poor data quality it was not possible to test interactional justice climate (INJCL) quantitatively, but apart from that all dimensions show significant influence on almost all aspects of project performance (also previous section). In the following these relationships will be discussed from an organizational justice point of view in order to highlight the impact of each single dimension.

7.2.2.1 Organizational justice

This research presented that the adoption of fair principles regarding the distribution of outcomes on the individual level enables clients to significantly improve the performance of their projects. Therefore the clients are advised to consider a fair distribution of fees and time allocations between the project team members. In order to achieve this they need to evaluate the individual's contribution to the project, their effort, their performance and their results (Colquitt, 2001). By doing so, they will improve the project team members' commitment, their own competence and managerial qualities, the overall coordination in the project and, most importantly, they will enhance all different aspects of performance of their projects.

The interpersonal treatment of project team members with regard to respect, propriety and dignity as well as the information sharing in terms of truthfulness and justification significantly improves all aspects of construction project performance, except SUCC_SPEC. By treating the project team members in a polite manner, with dignity and respect, by refraining from improper remarks and being candid in their communication, by explaining procedures thoroughly and reasonably and by communicating in a timely manner and according to the individual's needs, clients can make a real difference (Colquitt, 2001). The commitment within the project team will improve, just as the perception of the client's competence and managerial qualities, the conflict management and the compliance with client's expectations, which subsequently have a favourable impact on the performance of the project regarding the compliance to budget and to time, the client's satisfaction and also the overall performance.

Fair processes and procedures, i.e. processes which are consistent and without bias, which are accurate, represent the relevant stakeholders and conform with ethical norms (Cropanzano et al., 2007), significantly enhance the performance of projects. Hence, clients who allow the project team members to express their own views and feelings and to have an influence over the outcome, who establish procedures based on accurate information and who uphold ethical and moral standards, directly improve the project performance as well as the conflict management in the project and the efficacy of the procurement method and the contract.

This discussion shows once more, that all three dimensions of organizational justice are influential on project performance and the focus group participants fully confirmed this. Procedural justice can clearly be identified as the key element with the strongest impact on project performance based on the quantitative findings and the focus group study. However, no ranking can be established between distributive and interactional justice as both of them were viewed as really important during the focus group discussion and the strength of the relationships is in the same range as well. This is not unusual as the ranking of the different dimensions is highly dependent on the different variables within the study (Colquitt and Rodell, 2011).

7.2.2.2 Organizational justice climate

The team's perception of the distribution of outcome is also a significant parameter regarding the project performance. Therefore the client needs to pay attention to not only allocate fees and time fairly to key individuals in the project team, but to everyone, as the individuals' perception of the treatment of the others has an impact on the performance as well. By focusing on the appropriate distribution of outcomes for the overall team the commitment within the team, the client's competence and managerial qualities and the coordination is enhanced which in turn has favourable impact on all aspects of project performance, but SUCC_SPEC.

The team's perception of the fairness of the process and procedures used throughout the project, i.e. are they applied consistently, without bias and has everybody been able to express their views and feelings, significantly influences all aspects of project performance. This perception particularly impacts the coordination within the project, the decision making process and the efficacy of the organizational structure.

Procedural justice climate seems to be again the most influential dimension as the strength of the relationships is clearly stronger than those of the distributive justice climate. Overall the importance of considering the organizational justice climate and its potentially negative impact if ignored was particularly highlighted during the focus group discussions. This confirmed once more that not only the individual level, i.e. how is each individual treated, but also the team level, i.e. how is the team treated and what is the set of shared perceptions, has a considerable impact and needs more in-depth research in order to better understand it in more detail.

7.3 Theoretical contextualisation

In addition to answer the central question of this research it is also viewed to be of importance to set the findings into context regarding the most important and

influential models around organizational justice (climate), which were introduced in chapter 2.

This research found that project team members respond to the different dimensions of fair treatment and that this treatment makes them change their behaviour which in turn leads to enhanced project performance. One potential reason for this is that individuals use the perception of fairness as a heuristic substitute in order to find out if an authority, in this case the client, can be trusted (Lind, 2001). This is only one example of uncertainty, but particularly in TMOs project team members need to deal with a lot of uncertainty, as they often do not know the other parties involved and as projects are always concerned with change which also produces uncertainty. Their judgment on fairness is then used to substitute these uncertainties. The uncertainty management theory has found that with an increasing level of uncertainty in an organization individuals tend to need more fairness and with a decreasing level of uncertainty individuals tend to need less fairness (Van den Bos, 2001b). Therefore based on the uncertainty management theory it makes perfect sense why there is such strong evidence of the positive relationships between organizational justice (climate) and the performance of projects.

In the previous section it was also explained that this research found that on the individual as well as on the team level procedural justice seems to be the most important or strongest driver of project performance. A potential reason for this is that team members heavily use the project's procedures to evaluate their identity towards the project team (Tyler and Blader, 2003). These identity assessments are in turn used to establish psychological and behavioural relationships in the team and their degree determines if the project team members show supportive attitudes and engage in the project. Furthermore it provides individuals with a sense of identity security, which supports the psychological and behavioural engagement in the team (ibid).

The strong relationships between the different dimensions of organizational justice (climate) and the different aspects of project performance identified in this research can also be explained with the social exchange theory (Cropanzano

and Mitchell, 2005). According to the social exchange theory several types of resources are exchanged between parties based on certain rules and these exchanges have the potential to create high-quality relationships. Anything interpersonal can be exchanged as a resource, the rules are normative definitions which can vary from competition to reciprocity to altruism and the relationships are formations between two interacting partners (Colquitt et al., 2013). Therefore the reciprocal exchange of fairness between the client and the project team members can be viewed as social exchange which explains why favourable actions by the client result in favourable actions by the project team members.

This theoretical contextualisation shows that the results of this research are in line with previous findings and can be explained with existing theories. The novelty in this research is, that it proves that the theories and models related to organizational justice (climate) are also applicable for TMOs in a complex social and structural environment. These theories and models help to explain the findings of the three different studies conducted in this research and more importantly, they support these findings.

7.4 Explanatory framework

Numerous relationships were discussed in the previous sections. In order to set these relationships into context and to advance the initial conceptual framework, which was developed in chapter 2, an explanatory framework will be proposed in the following. The explanatory framework is supposed to give a comprehensive picture about the relationships between organizational justice (climate), the antecedents of project performance and the different aspects of project performance. It will help researchers and practitioners to better understand the concept and impact of organizational justice (climate) in the context of projects and its relationship with project performance.

The explanatory framework is a three dimensional framework which consists of different items and levels. The items represent the different units which were

identified during this research to be of relevance for the relationship between organizational justice (climate) and project performance. The levels represent the different levels of detail and each item will be broken down into multiple factors as the level of detail increases. The system sketch in
Figure 7.1 explains the structure of the strategic framework:

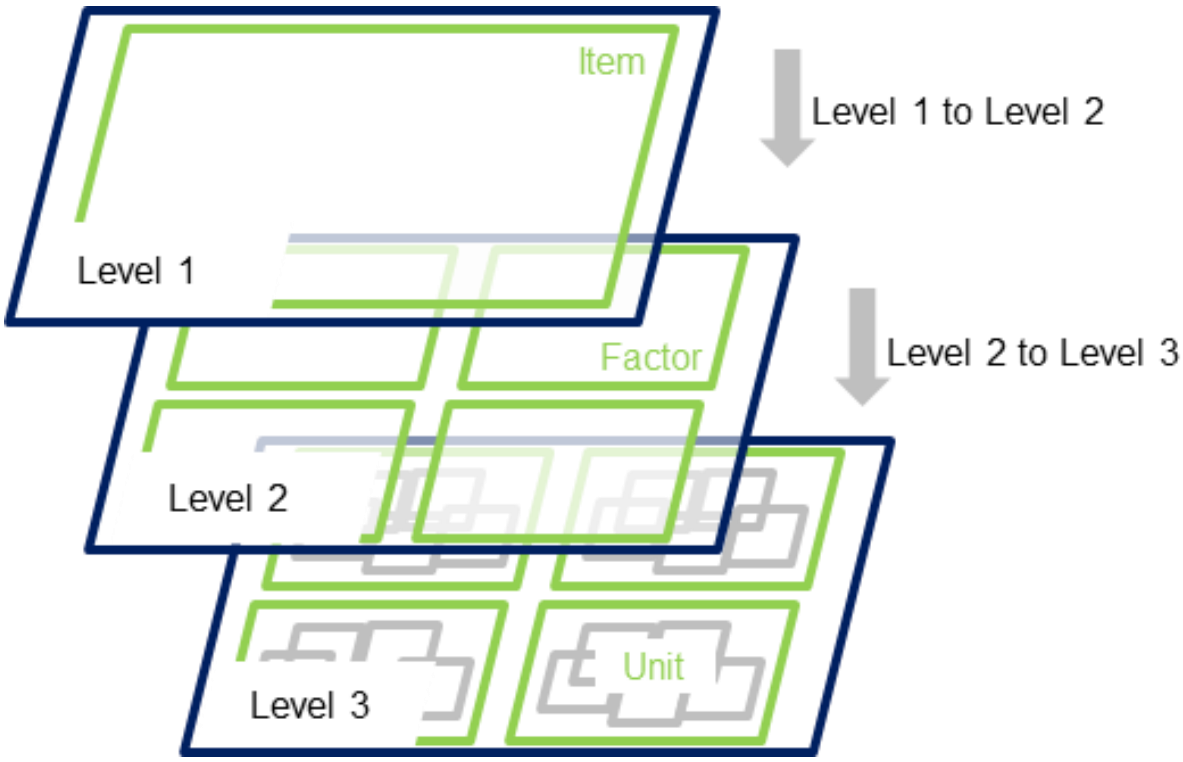

Figure 7.1 – Explanatory framework – System sketch

7.4.1 Levels of the explanatory framework

As mentioned previously with each level the level of detail increases and more detailed information is provided. The relationships illustrated in the strategic framework are based on the findings of all three studies conducted in this work. The different items will be described with their three levels in more detail in the next section. This section introduces the definition of the levels and the relationships between the items.

Level 1 – generic description

Level 1 of the strategic framework provides a generic description of the relevant items for organizational justice (climate) and performance and how they are related to each other (Figure 7.2). It does not provide any in-depth information, as its purpose is to give a general overview. Level 1 consists of five different items, which are context, organizational justice (climate), project environment, benefits of organizational justice (climate) and performance. Based on the previous explanations and discussions the framework shows that the context surrounds the other items and provides a frame under which the project is undertaken. Organizational justice (climate) is placed on the left hand side of the framework as it is the starting point of the investigation and the item which influences all the following items. Project environment and benefits of organizational justice (climate) are in the centre of the framework because they act as mediators, i.e. they are influenced by one item and on the other hand exert influence on another item. And finally performance is placed on the right hand side of the framework as it is the central question of this research how performance is influenced by the other items.

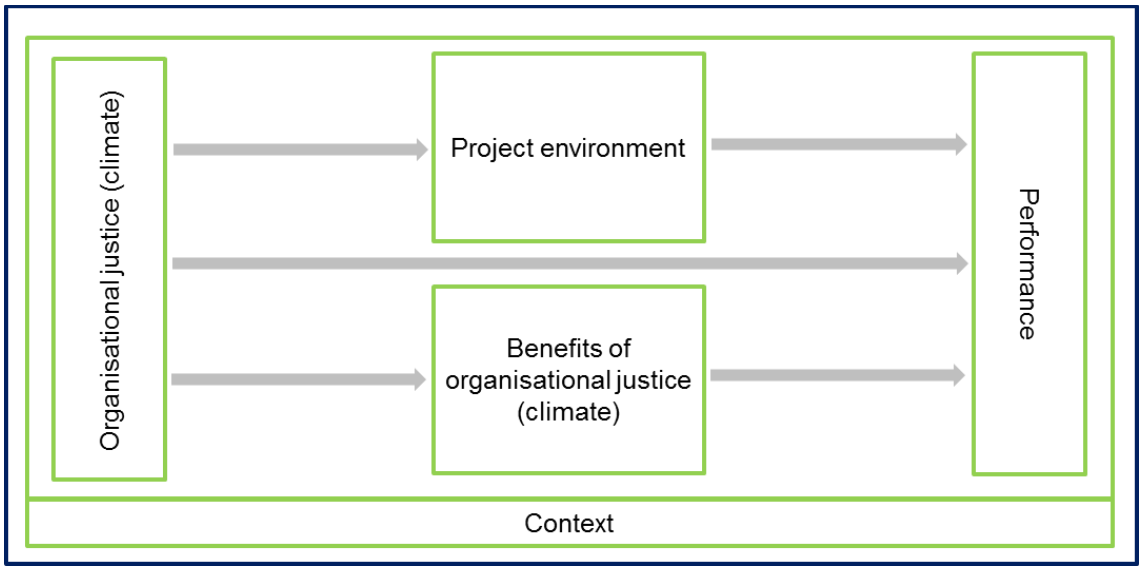

Figure 7.2 – Explanatory framework – Level 1

Level 1 provides a first overview for an interested researcher or practitioner to get a basic understanding of the idea of how organizational justice (climate) influences the performance of projects.

Level 2 – detailed description

Level 2 of the strategic framework provides a detailed description of the different relevant items and breaks them down into factors in order provide a comprehensive insight (Figure 7.3). The overall structure of the framework is identical to level 1.

Level 2 provides a more detailed insight into the relationship of organizational justice (climate) and project performance and helps researchers and practitioners to understand the mechanisms behind them.

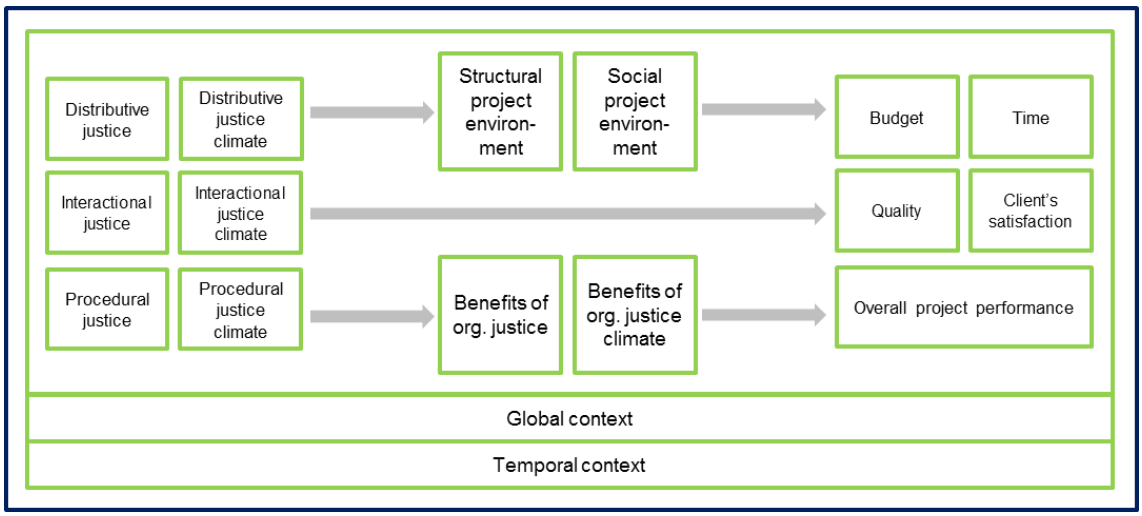

Figure 7.3 – Explanatory framework – Level 2

Level 3 – in-depth description

In level 3 of the strategic framework the factors from level 2 are broken down even further into units (Figure 7.4). These units provide in-depth information about the background and composition of each factor and are examples of structures, behaviours or measures which are to be considered in order to adapt fair principles or to evaluate the environment or performance of a project.

Therefore level 3 provides academics and practitioners with the details of what to consider in order to adopt fair principles and shows examples of the different items.

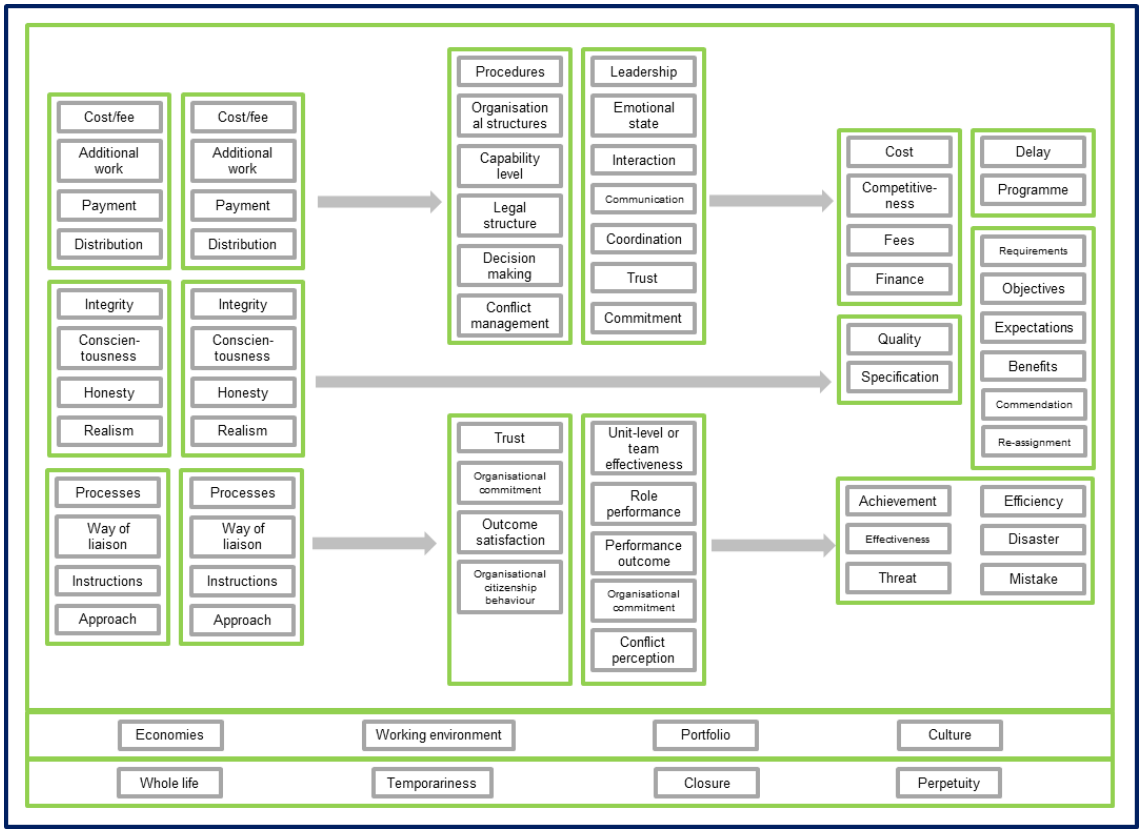

Figure 7.4 – Explanatory framework – Level 3

7.4.2 Items of the explanatory framework

In this section for each item of the strategic framework a three level description will be provided. This three level description explains further the composition of the strategic framework and how the units, factors and items are interrelated.

7.4.2.1 Context

It was found that not only the project itself, but also the context, i.e. the circumstances under which the project is undertaken, is important as it influences the project and what is happening in there. The context is split into two factors: the global context, which is concerned with the general way of conducting business and the outside world, as well as the temporal context, which is concerned with the whole life cycle of the project. It is furthermore broken down into various units which give more detailed examples of the factors (Figure 7.5).

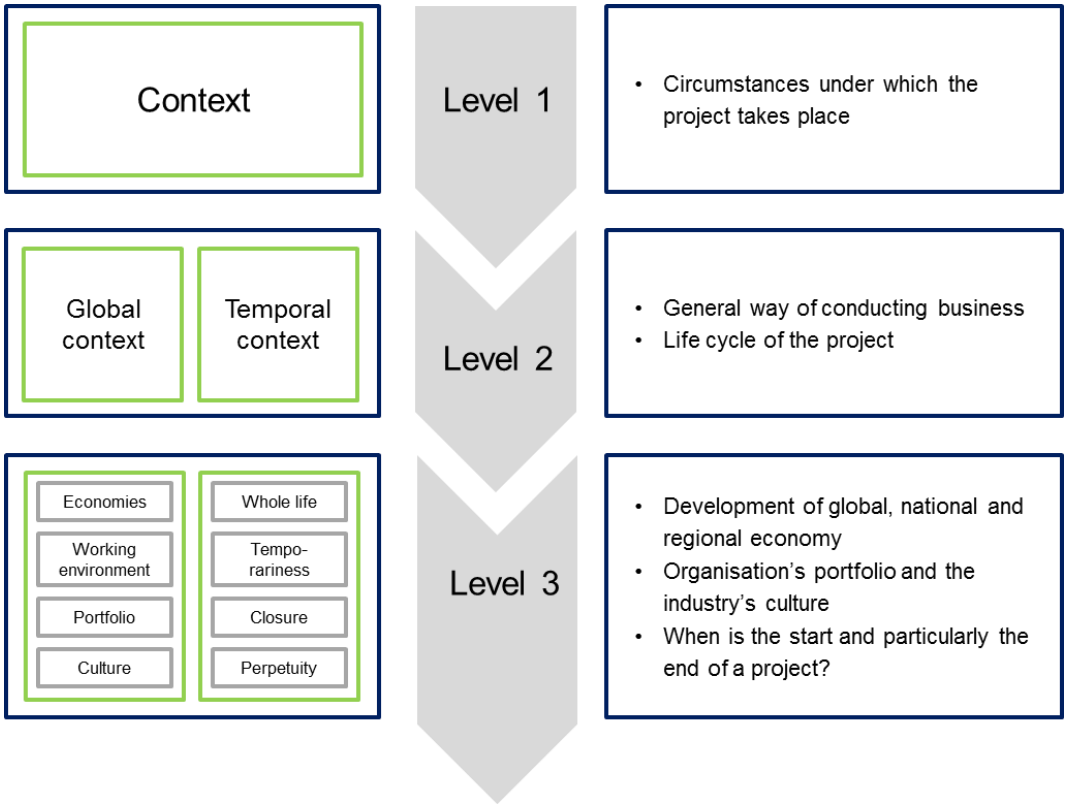

Figure 7.5 – Explanatory framework – Context

7.4.2.2 Organizational justice (climate)

Organizational justice (climate) is the point of origin of this research and it is the item which influences all subsequent items. It is composed of the different dimensions of organizational justice and organizational justice climate. They are distributive, interactional and procedural justice on the individual level and distributive, interactional and procedural justice climate on the team level. The differentiation into the dimensions provides deeper insight into the relationships as different dimensions have varying impacts on performance. Examples for each of the different dimensions are provided (Figure 7.6). These examples were identified during the focus groups and case study of this research.

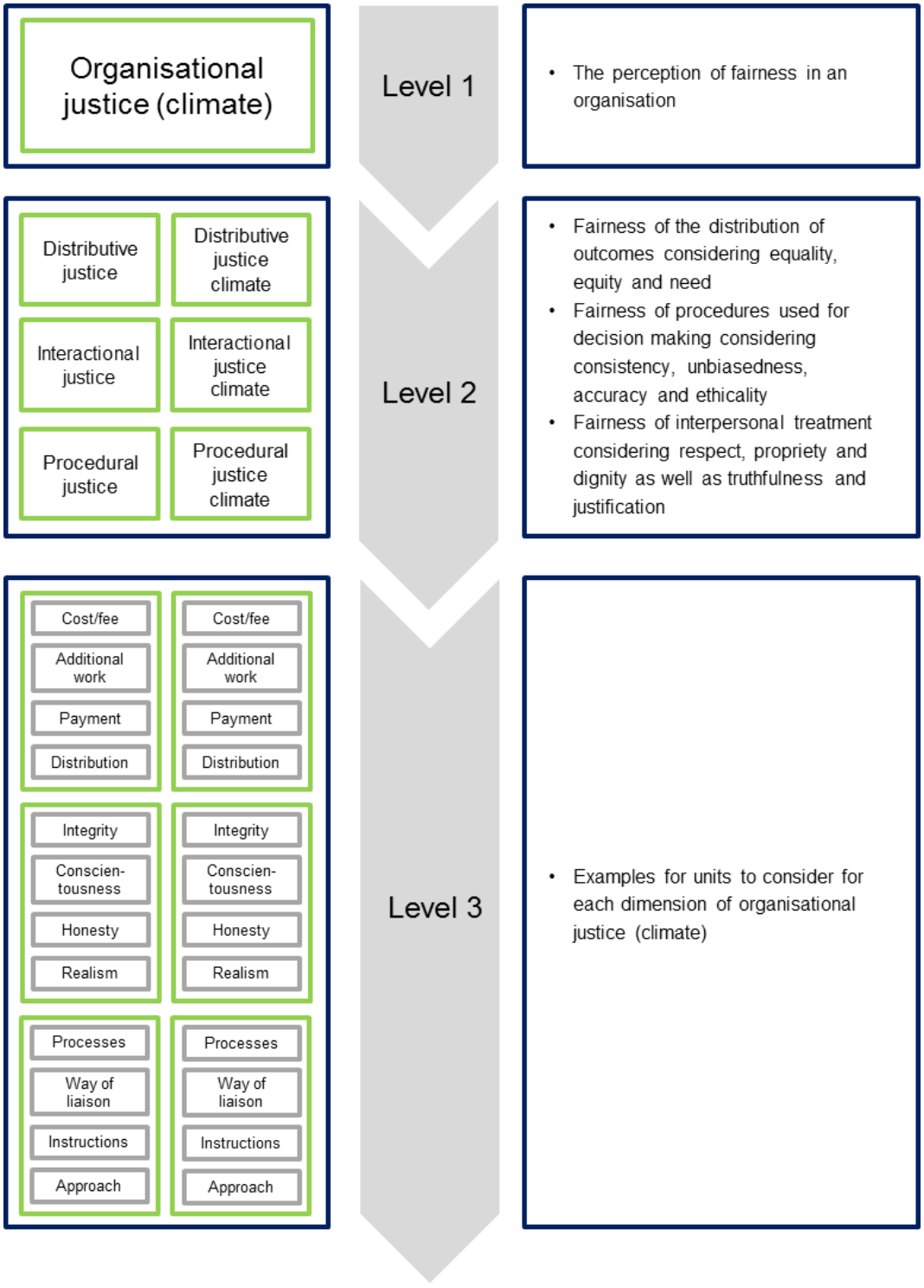

Figure 7.6 – Explanatory framework – Organizational justice (climate)

7.4.2.3 Project environment

The project environment represents the different structures which are present in a project and it was found that different aspects of the project environment are frequently influenced by organizational justice (climate) and that they have a huge impact on the performance of projects. The project environment is

comprised of the structural and social project environment and includes also the antecedents of project performance. This research showed that the chosen antecedents of project performance are important factors, but that other factors related to the project environment, e.g. the capability level of the project team members, the legal structure or the leadership, also need to be taken into consideration (Figure 7.7). Further research is therefore needed in this area in order to incorporate these additional factors into the quantitative study as well.

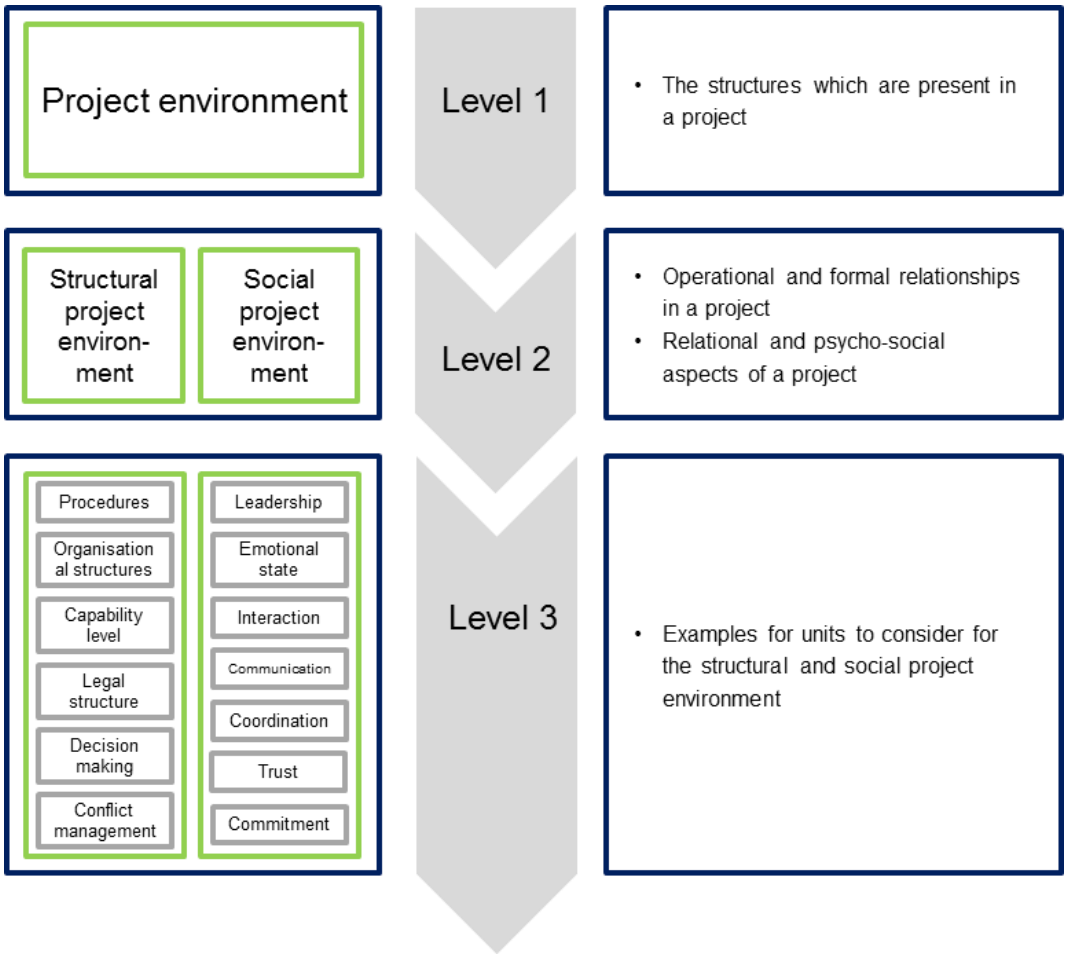

Figure 7.7 – Explanatory framework – Project environment

7.4.2.4 Benefits of organizational justice (climate)

Previous research has identified various benefits of organizational justice (climate) and this research showed that these benefits have a favourable impact on project performance. The benefits range from trust to unit-level effectiveness to conflict perception and show once more the broad impact of organizational justice (climate). The new contribution of this research is to link these benefits to

the performance of projects and to show that they enhance it. Examples of benefits, which were investigated in the scope of this work are provided (Figure 7.8).

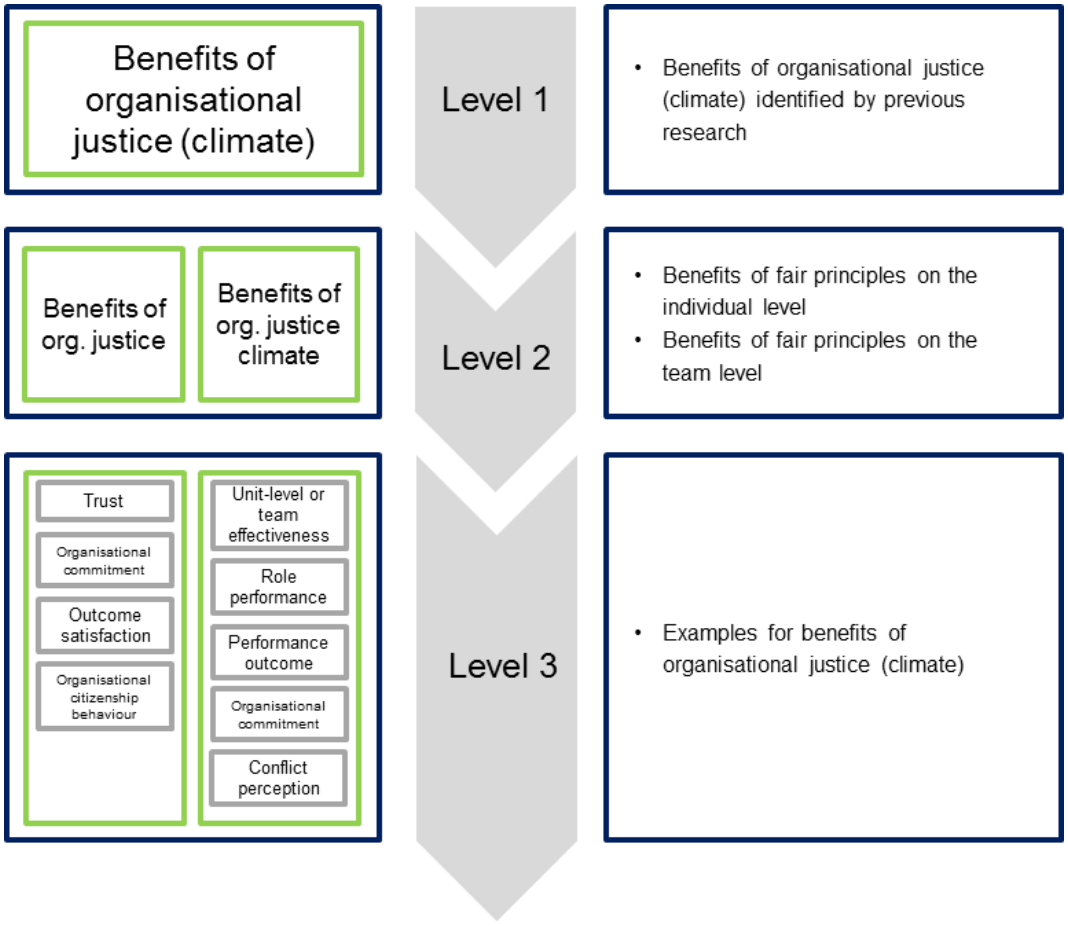

Figure 7.8 – Explanatory framework – Benefits of organizational justice (climate)

7.4.2.5 Performance

The central question of this research is, how organizational justice (climate) influences project performance. Therefore different aspects of performance were identified at the beginning of this research. These aspects are not limited to the traditional “iron triangle” of cost, time and quality, but are extended to the client’s satisfaction and the overall project performance and examples for each of these aspects are provided (Figure 7.9).

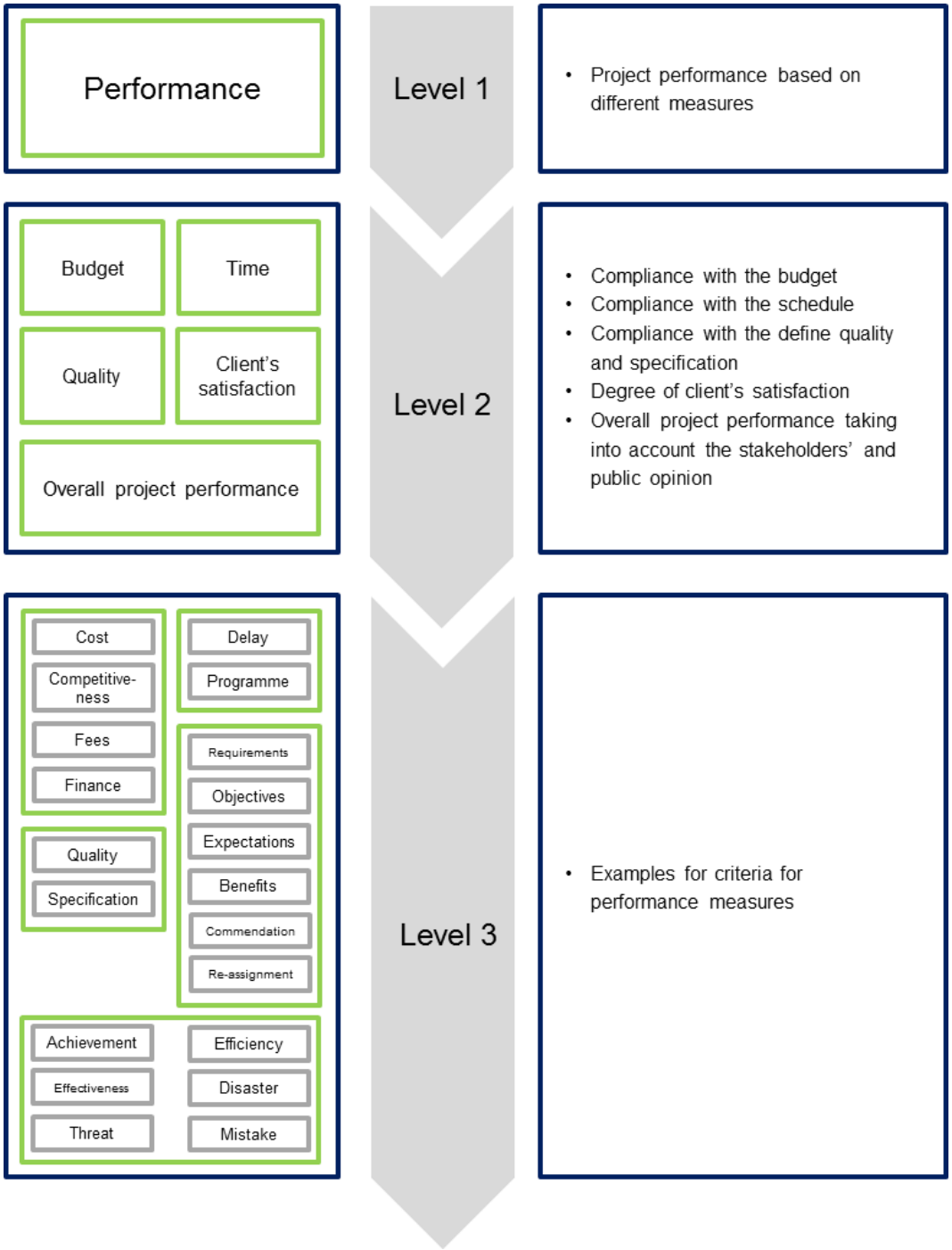

Figure 7.9 – Explanatory framework – Performance

7.5 Summary

This chapter discussed the findings of this research and set them into context with existing knowledge and theory. The findings were discussed first, from the perspective of project performance and second, form the perspective of organizational justice (climate) in order to address the central question of this work, which sort to examine how organizational justice (climate) influences the performance of construction projects. In summary, all three studies suggested, that fair treatment, principles and procedures by the client have positive effects on project performance. They suggested furthermore that apart from interactional justice climate, which could not be tested due to poor data quality, all dimensions show a significant impact on almost all aspects of project performance. However, it became clear that the detailed relationships are complex and cannot be simplified. For example, not every dimension of organizational justice (climate) is related to each antecedent of project performance, which means that the different antecedents need to be addressed with different actions.

Next a theoretical contextualisation was undertaken and the findings were explained with the uncertainty management and social exchange theory as well as the group engagement model.

Finally, an explanatory framework was proposed which summarises the findings of the three studies. The explanatory framework is divided into three levels of detail in order not to overwhelm the reader with information. The first level provides only a general overview, whereas the second level gives some more background information and the third level is very detailed. The explanatory framework shows, that the context under which the project is undertaken needs to be considered, because it has an impact on how performance is perceived. It furthermore shows the differentiation between organizational justice and organizational justice climate, the project environment and the benefits of organisational justice (climate) as well as the different aspects of project performance. Furthermore it also depicts the direct and indirect relationships between organizational justice (climate) and project performance and hence, summarises the findings of this work.

In essence it can be concluded, that strong evidence was provided that organizational justice (climate) has a positive impact on the performance of construction projects and that clients can actively influence the performance of their projects by adopting fair principles.

8 Conclusion

8.1	Introduction	An overview of the structure of the chapter is provided.
8.2	Summary of the research project	A chapter by chapter summary of the overall research project is given.
8.3	Research aim, objectives and question	The research aim, objectives and questions are discussed, tested and answered.
8.4	Contribution to the body of knowledge	The expected contribution to the body of knowledge regarding theory, methodology and practice is compared to what has been achieved.
8.5	Research limitations	The limitations of the research are stated.
8.6	Suggestions for future work	Some suggestions for future work are highlighted.
8.7	Context of the work	The work undertaken is set into a wider context and its academic and practical importance is highlighted.
8.8	Summary	A summary of the key points of the chapter is provided.

8 Conclusion

8.1 Introduction

This chapter sets out the overall findings of the research in relation to the aims and objectives that were stated at the outset of this work. It concludes the overall thesis.

First of all, the aims and objectives, which were described in chapter 1 of this thesis, are repeated within this chapter for the purpose of clarity. Next, the contribution to knowledge from a theoretical, methodological and practical point of view will be discussed and the limitations of the research will be stated. Additionally, some suggestions for future work will be presented and finally the wider context of the work and its appearance in publications and dissemination in general will be highlighted.

8.2 Research aim, objectives and question

At the beginning of this work the research aim, objectives and question were defined in chapter 1. This conclusion chapter now intends to test if the research aim and objectives have been achieved and to answer the research question.

8.2.1 Research aim

The aim of this research project was to develop an explanatory framework to explain of the relationship of organizational justice (climate) and construction project performance.

→ This aim was fully achieved as an explanatory framework was developed in chapter 7 (Figure 8.1).

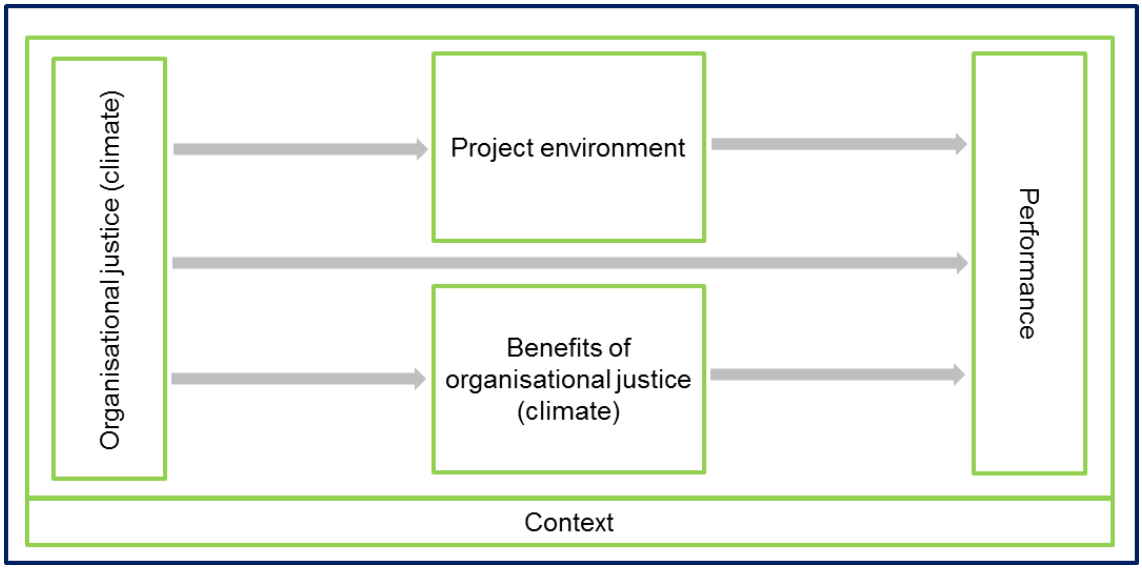

Figure 8.1 – Explanatory framework

8.2.2 Research objectives

In the following the five research objectives and the results based on the discussed findings are contrasted:

Objective 1 – To synthesize the literature of organizational justice and construction project management in order to develop a sound theoretical justification of the research

→ The literature was synthesized in chapter 2 of this research and a clear need to investigate the psycho-social relationships in the project environment, in particular organizational justice (climate), was identified. The gap in the literature was highlighted and a conceptual framework was developed to guide this research.

Objective 2 – To identify the influence of organizational justice (climate) on different aspects of construction project performance in order to highlight the potentially positive impact on performance.

→ In chapter 5 the relationship between organizational justice (climate) and project performance was investigated and the quantitative data were

analysed using SEM. It was proven that there are various beneficial effects of organizational justice (climate) on the performance of projects.

Objective 3 – To explore the mediating effect of antecedents of project performance on the identified relationships between organizational justice (climate) and construction project performance in order to investigate these relationships in more detail.

→ The mediating effect of the antecedents of project performance was also investigated in chapter 5. All but one antecedent was significantly influenced by organizational justice (climate) and had a subsequent significant impact on project performance. Therefore this effect was explored in detail.

Objective 4 – To obtain an understanding of how organizational justice influences the performance of construction projects in order to explain the previously identified relationships.

→ In chapter 6 the findings of the focus groups and case study were presented. These findings provide an in depth understanding of how organizational justice (climate) influences project performance.

Objective 5 – To develop an explanatory framework which explains organizational justice (climate), antecedents of project performance and the different aspects of construction project performance in order to summarise and visualise the findings.

→ The explanatory framework was developed and discussed in chapter 7 (Figure 8.1).

8.2.3 Research question

How do the three dimensions of organizational justice and organizational justice climate influence construction project performance?

→ The impact of the different dimensions of organizational justice (climate) on project performance is complex and manifold. This was discussed and highlighted in chapter 7. In summary due to poor data quality only five of the six different dimensions could be analysed, but these five dimensions (distributive, interactional and procedural justice as well as distributive and procedural justice climate) significantly influence all aspects of project performance. These relationships were enhanced when the social and structural environment, including the antecedents of project performance, were considered as the project environment is also influenced by organizational justice (climate).

8.3 Contribution to the body of knowledge

This chapter outlines the contribution to the body of knowledge, which is divided into two areas: the contribution to theory and the contribution to practice.

8.3.1 Contribution to theory

Prior literature has addressed the need for improvements in the construction process and has tried to identify the reasons for dysfunctionalities during the process (e.g. Latham, 1994; Egan, 1998; Atkin, Borgbrant and Josephson, 2003; Baiden, Price and Dainty, 2006; Fenn, Lowe and Speck, 1997; Bristow, 1995; Diekmann and Girard, 1995; Kumaraswamy, 1997; Rhys Jones, 1994; Sykes, 1996; Zaghloul and Hartman, 2003; Bresnen, 2010). They have contributed to the construction project management body of knowledge by enhancing our understanding of the singularity of the construction process, its strengths and weaknesses, as well as the methods for process improvement and, hence, enhanced project performance.

Yet the research to date has mainly focused on the management perspective of construction projects. An important perspective that has received very little attention relates to the social relations to which the construction process is embedded (Bresnen, Goussevskaia and Swan, 2005). Research on organizational behaviour shows that the social patterns i.e. organizational justice

has a huge impact on the behaviour of people and a significant effect on the working environment (Greenberg, Colquitt and Scott, 2005). Aibinu, Ling and Ofori (2011, p. 465) narrowed the gap in construction research by investigating how "organizational justice account[s] for conflict and dispute behaviour exhibited by contractors during the administration of claims on building and civil engineering". This study narrows the gap further through the testing and extending of the theory of organizational justice (climate) in other contexts of the construction project besides claims management. In doing so, it contributes to knowledge and to the further development of the construction project management discipline by enhancing our understanding of how organizational justice (climate) influences collaboration within project teams and more specifically its impact on project performance. In addition the theory of organizational justice, which was introduced by Greenberg in 1987, is enhanced through its application to a new context, namely: the management of construction projects. Construction projects in this context are examples of temporary multi-organizations (TMO) which are characterised by their temporary nature, i.e. they have a defined start and end date, and by the involvement of various organizations, i.e. different firms and companies work together, in order to execute the project (Hobday, 1998).

8.3.2 Contribution to practice

From a practical point of view the research helps to raise the awareness of clients that fair treatment is important in projects. It promotes the adoption of fair principles in order to enhance the performance of construction projects and therefore contribute to the development of the project management profession. And particularly with the dissemination endeavours planned and undertaken by the researcher the project management profession will be developed further (section 8.7).

8.4 Research limitations

Like all research projects, this research has certain limitations which need to be acknowledged and addressed:

- The study was focused only on the construction industry. No other project based industries were investigated. This is seen as a limitation as the findings of this research cannot be generalized for temporary multi organizations over different industries.
- The participants of the focus groups were mainly high-profile representatives of their organizations. This can be viewed as a limitation as the shop floor level was not included in the study.
- The case study was a project with a long-term relationship between the client and the main contractor which is based on mutual trust. This is a limitation as the results can be potentially different from a project where the two parties do not know each other.
- The overall study included certain antecedents of project performance as mediators, which were selected by the researcher based on a literature review. This is only a limited focus as other mediators and characteristics of the social and structural project environment might be significant.

8.5 Suggestions for future work

This work is a starting point for research on organizational justice in the environment of temporary multi organizations (TMOs). Therefore there are multiple areas of future work and some of the most important ones according to the researcher's opinion will be highlighted in the following:

1) It is necessary to identify the motives and drivers for managers and organizations as to why to adopt fair principles in the project environment. Only if we understand and know why managers and organizations adopt fair principles we can further enhance their application. This area of further research will be conducted as part of a successful Horizon 2020 RISE project (section 8.7).
2) It is furthermore recommended to conduct similar studies on projects in other industries than the construction industry in order to make the research more generalizable.

3) Certain variables were identified during this research which require further research. These were interactional justice climate and trust, which could not be used due to poor data quality, and communication, which did not show any significant relationships. The reasons for these issues need to be investigated further.
4) Other characteristics of the social and structural project environment need to be included as mediators in future studies in order to see if and how they relate to organizational justice (climate) and project performance.
5) Clients need to be trained how to adopt fair principles in the project environment. Therefore a training programme should be developed which provides guidance on the adoption and an introduction to the favourable impact of organizational justice (climate).

This list of potential future work is non-exhaustive, but highlights potential areas which are important and interesting according to the researcher's opinion.

8.6 Context of the work

This research has not been undertaken in isolation, but the researcher tried to disseminate it and produce some academic publications to set the work into context.

The academic endeavours are highlighted in the following:

- Unterhitzenberger, C., Bryde, D., Damian, F. (2016) *Organizational Justice and Construction Project Performance* 23rd European Operations Management Association Conference, Trondheim, Norway
- Unterhitzenberger, C., Bryde, D. (2016) *The Impact of Organizational Justice on the Performance of Projects* 2nd British University of Dubai Doctoral Research Conference, Dubai, UAE
- Unterhitzenberger, C., Bryde, D. (2016) *Temporary and Complex Organizations: The Relationship between Organizational Justice and*

Performance Outcomes Faculty Research Week, Liverpool John Moores University, Liverpool, UK

- Unterhitzenberger, C. Bryde, D. (2014) *Development of a Conceptual Framework for Organizational Justice and Construction Project Performance* Built Environment and Sustainable Technologies Conference, Liverpool, UK

At the Doctoral Research Conference of the British University of Dubai the researcher won the "Best Paper Award" for the previously mentioned paper. More than 60 doctoral students from different universities in UAE, UK, Italy and Russia participated in the conference. The conference covered the areas of Business & Law, Engineering & IT and Education.

In order to continue the research on organizational justice (climate) and project performance the researcher also identified areas of further research (previous section) and included some parts of it as a work package in an EU Horizon 2020 Marie Sklodowska Curie Research and Innovation Staff Exchange (RISE) grant application. The grant application with a total funding of € 324,000 was according to the researcher's knowledge the first ever successful application to this programme in the area of project management. The researcher is coordinator of this project and leads nine other academic and industry partners from the UK, Germany and Malaysia.

From a dissemination point of view the researcher has prepared the path to achieve major impact in a non-academic community: She has been invited as one of seven speakers to one of the biggest annual celebrations of project management in the UK organised by the Project Management Institute, i.e. Synergy 2016, taking place in Central Hall Westminster, London on 3rd November 2016 with an expected audience of around 400 industry professionals. Furthermore she has had or planned the following endeavours:

- Speaker at Ignite Liverpool on 27th July 2016

- Interview by the award-winning blog “A Girl’s Guide to Project Management” (http://www.girlsguidetopm.com/2016/05/inspiring-women-in-pm-christine-unterhitzenberger/)
- Article in the “Project” magazine, a monthly publication by the Association for Project Management (planned)

These endeavours highlight the context of this work and show that there is an interest from the academic as well as the non-academic audience. The researcher intends to continue to work on the psycho-social relationships in projects and particularly on the impact of organizational justice (climate) on performance.

8.7 Summary

This concluding chapter provided an overview of the results of the different studies conducted in this research and the subsequently developed explanatory framework. It showed that the research aim, objective and question were covered and addressed by this work and that hence, the research delivered what it intended to.

The chapter also highlighted how this research and in particular the explanatory framework presents a unique contribution to the existing body of knowledge in the areas of theory and practice. By acknowledging the limitations of this work and areas of future research it is demonstrated how this field can be developed further in order to gain acceptance and attention within the project management community.

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Appendix 1 – Questionnaire

A1.1 – Final questionnaire

Organizational Justice and Construction Project Performance

Page 1

Welcome

The following questionnaire is part of a research project undertaken by Liverpool John Moores University (LJMU) to examine the relationship between organizational justice and construction project performance. It is concerned with the perception of fairness within construction project teams and its repercussions on the construction project performance.

You are being invited to take part in this research project which is an essential component to my dissertation.

Why is this research being undertaken?
Various research in the past has addressed the need for improvements in the construction industry. In addition it can be observed that in practice many construction projects suffer under dysfunctionalities during the construction process which often lead to delays, cost overruns or quality constraints.

As cooperation and collaboration within construction project teams can have impact on the construction project performance it is assumed that in general the social settings and relations of project teams will have a significant impact hereon. Therefore a specific field of organizational behaviour research, namely organizational justice, will be investigated. It is expected that on the basis of this research a theory will be developed that associates organizational justice with construction project performance and therefore contributes to knowledge in construction management research as well as in organizational justice reserach.

What do I get out of participating in this research study?
You will contribute to the development of theory regarding organizational justice in the context of construction project performance. If you are interested in receiving a copy of the results of this survey (abstract) you can get this upon request (fill in your e-mail address at the end of the questionnaire).

Do I have to take part in this research?
It is up to you if you would like to complete the questionnaire or not. The survey is entirely anonymous and therefore it cannot be traced if you took part or not.

How long does it take to complete the questionnaire?
The questionnaire should take about 20 minutes to complete.

Can the data be traced back to me?
The data collection will be completely anonymous. All responses will be treated in the strictest confidence and results will not be published in any form that allows the identification of individual organisations or respondents. However, if you feel that any particular question poses problems of confidentiality, please omit it and complete the remainder.

Instruction for participation
The survey is in five sections and it is possible to return to a section once it has been completed.

When you arrive at the final **Thank you** page, you will know that your responses have been recorded on our database.

Once you click **Next** below you will be directed to the first section of the survey.

If you have any queries please do not hesitate to contact me.

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Page 2: Section 1 - Project Details

Please answer all the following questions from the perspective of a **recently completed project** you were involved in.

1 Please specify the project type. ✱ *Required*

- ☐ Office
- ☐ Education
- ☐ Sports and leisure
- ☐ Culture
- ☐ Housing
- ☐ Health Care
- ☐ Industry
- ☐ Infrastructure
- ☐ Other

1.a If you selected Other, please specify:

2 Please indicate the size of the project by its construction cost (in million £) ✱ *Required*

- ○ 0 - 25
- ○ 26 - 50
- ○ 51 - 75
- ○ 76 - 100
- ○ 101 - 150

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- 151 - 200
- > 200

3 What was your role in the construction project team? * *Required*

4 In which country was the project executed? * *Required*

- United Kingdom
- Ireland
- Germany
- Switzerland
- Austria
- France
- Australia
- United States
- Other

4.a If you selected Other, please specify:

5 Please give your opinion of how the project performed:

5 = strongly agree and 1 = strongly disagree * *Required*

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	5	4	3	2	1
The project was completed within the scheduled time.	○	○	○	○	○
The project was completed within the budget.	○	○	○	○	○
The project specifications have been met by the time of handover.	○	○	○	○	○
The client is satisfied with the project.	○	○	○	○	○
Overall it was a successful project.	○	○	○	○	○

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Page 3: Section 2 - Cooperation and Collaboration

Please answer the following questions keeping in mind your chosen project.

6 The statements below are concerned with cooperation and collaboration within the construction project team. Please indicate your level of agreement in relation to the statements (part 1).

	5 = strongly agree and 1 = strongly disagree				
	5	4	3	2	1
The client communicated in an open and honest way.	○	○	○	○	○
The client communicated in a timely manner.	○	○	○	○	○
The client used adequate language and volume to communicate.	○	○	○	○	○
I received all information I needed during the project.	○	○	○	○	○
I enjoyed discussing my project with people outside it.	○	○	○	○	○
I really felt this project's goals are my own ones.	○	○	○	○	○
I did not feel emotionally attached to this project.	○	○	○	○	○
I felt a strong sense of belonging to this project team.	○	○	○	○	○
The coordination between the different parties in the project worked sufficient.	○	○	○	○	○
It was clearly defined who is responsible for the coordination.	○	○	○	○	○
There was additional workload produced because the individual tasks were not adjusted on each other.	○	○	○	○	○
Everybody in the project knew the organisational interfaces between the different parties.	○	○	○	○	○
I would have been comfortable giving the client a task or problem that was critical to me, even if I could not monitor his/her actions.	○	○	○	○	○

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If someone questioned the client's motives, I would have given the client the benefit of the doubt.	○	○	○	○	○
I really wished I had a good way to keep an eye on the client.	○	○	○	○	○
If I had my way, I wouldn't let the client have any influence over issues that are important to me.	○	○	○	○	○
The client showed integrity and reliability.	○	○	○	○	○
The client was highly capable in his/her field of expertise.	○	○	○	○	○
The client had the ability to react quickly to a changing environment.	○	○	○	○	○
The client treated the project team members with respect.	○	○	○	○	○

7 The statements below are concerned with cooperation and collaboration within the construction project team. Please indicate your level of agreement in relation to the statements (part 2).

	5 = strongly agree and 1 = strongly disagree				
	5	4	3	2	1
The process of decision making was clearly defined.	○	○	○	○	○
The process of decision making was transparent and comprehensible.	○	○	○	○	○
Decisions were being made as soon as all necessary information was available.	○	○	○	○	○
To obtain a decision many different parties and hierarchies had to be involved which lead to long and time consuming ways in decision making.	○	○	○	○	○
The aim of the project was clearly defined and updated if necessary.	○	○	○	○	○

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A project specification was drawn and used as tool throughout the project.	○	○	○	○	○
I had the feeling that I really understood what the client wants.	○	○	○	○	○
I always tried to comply with the client's expectation although it wasn't always my preferred solution.	○	○	○	○	○
In case conflicts arose, the process of dealing with these conflicts was clearly defined.	○	○	○	○	○
The responsible persons for dealing with conflicts were defined.	○	○	○	○	○
Conflicts were seen as a chance to develop the project further.	○	○	○	○	○
I had the feeling that in case of a conflict I can talk to the client faithfully.	○	○	○	○	○
Everybody in the project team knew his/her role.	○	○	○	○	○
If I had a question to a specific topic during the project I knew immediately whom to talk to.	○	○	○	○	○
The organizational structure was clear and comprehensible to the people inside and outside the project.	○	○	○	○	○
The defined communication channels were followed throughout the project.	○	○	○	○	○
The procurement method was suitable for the project type.	○	○	○	○	○
The procurement method was suitable for the client.	○	○	○	○	○
The client negotiated fairly during the procurement process.	○	○	○	○	○
The rights and duties were equally distributed between the parties.	○	○	○	○	○
The clauses of contract were unambiguously phrased.	○	○	○	○	○
The fundamental idea of the contract was applied throughout the project by the involved parties.	○	○	○	○	○

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Page 4: Section 3 - Organizational Justice

Please answer the following questions keeping in mind your chosen project.

Furthermore please answer the following question with the sole focus on **your personal** experience and/or treatment. Please do not take into consideration how others have been treated during the project.

8 The following items refer to the client's procedures during the project execution. To what extent:

	5 = to a large extent and 1 = to a small extent				
	5	4	3	2	1
Have you been able to express your views and feelings during the project execution?	○	○	○	○	○
Have you had influence over the outcomes arrived at by those procedures?	○	○	○	○	○
Have those procedures been applied consistently?	○	○	○	○	○
Have those procedures been free of bias?	○	○	○	○	○
Have those procedures been based on accurate information?	○	○	○	○	○
Have you been able to appeal your outcomes form the project arrived by those procedures?	○	○	○	○	○
Have those procedures upheld ethical and moral standards?	○	○	○	○	○

9 The following items refer to the outcomes you received from the project (e.g. fees, follow-up order, credential, etc.). To what extent:

	5 = to a large extent and 1 = to a small extent

9 / 17

	5	4	3	2	1
Did your outcomes from the project reflect the effort you have put into your work?	○	○	○	○	○
Were your outcomes from the project appropriate for the work you have completed?	○	○	○	○	○
Did your outcomes from the project reflect what you have contributed to the project?	○	○	○	○	○
Were your outcomes from the project justified, given your performance?	○	○	○	○	○

10 The following items refer to the client of your chosen project. To what extent:

	5 = to a large extent and 1 = to a small extent				
	5	4	3	2	1
Has he/she treated you in a polite manner?	○	○	○	○	○
Has he/she treated you with dignity?	○	○	○	○	○
Has he/she treated you with respect?	○	○	○	○	○
Has he/she refrained from improper remarks or comments?	○	○	○	○	○
Has he/she been candid in his/her communications with you?	○	○	○	○	○
Has he/she explained the procedures thoroughly?	○	○	○	○	○
Were his/her explanations regarding the procedures reasonable?	○	○	○	○	○
Has he/she communicated details in a timely manner?	○	○	○	○	○
Has he/she seemed to tailor his/her communication to individuals' specific needs?	○	○	○	○	○

10 / 17

Page 5: Section 4 - Organizational Justice Climate

Please answer the following question keeping in mind your chosen project.

Furthermore please answer the following question with the focus on the expercience and/or treatment of the **whole project team** (project manager, architect, engineer, consultant, contractor, subcontractor, etc.). Please do not take into consideration how you experienced your personal treatment.

11 The following items refer to the client's procedures during project execution. To what extent:

	5 = to a large extent and 1 = to a small extent				
	5	4	3	2	1
Has the team been able to express their views and feelings during project execution?	○	○	○	○	○
Has the team had influence over their outcomes from the project arrived at by those procedures?	○	○	○	○	○
Have those procedures been applied consistently?	○	○	○	○	○
Have those procedures been free of bias?	○	○	○	○	○
Have those procedures been based on accurate information?	○	○	○	○	○
Has the team been able to appeal the outcomes from the project arrived by those procedures?	○	○	○	○	○
Have those procedures upheld ethical and moral standards?	○	○	○	○	○

12 The following items refer to the outcomes the whole project team received from the project (e.g. fees, follow-up order, credentials, etc.). To what extent:

11 / 17

	5 = to a large extent and 1 = to a small extent				
	5	4	3	2	1
Did their outcomes from the project reflect the effort they have put into their work?	○	○	○	○	○
Were their outcomes from the project appropriate for the work they have completed?	○	○	○	○	○
Did their outcomes from the project reflect what they have contributed to the project?	○	○	○	○	○
Were their outcomes from the project justified, given their performance?	○	○	○	○	○

13 The following items refer to the client of your chosen project. To what extent:

	5 = to a large extent and 1 = to a small extent				
	5	4	3	2	1
Has he/she treated the project team in a polite manner?	○	○	○	○	○
Has he/she treated the project team with dignity?	○	○	○	○	○
Has he/she treated the project team with respect?	○	○	○	○	○
Has he/she refrained from improper remarks or comments?	○	○	○	○	○
Has he/she been candid in his/her communications with the project team?	○	○	○	○	○
Has he/she explained the procedures thoroughly?	○	○	○	○	○
Were his/her explanations regarding the procedures reasonable?	○	○	○	○	○
Has he/she communicated details in a timely manner?	○	○	○	○	○

12 / 17

Has he/she seemed to tailor his/her communication to individuals' specific needs?	○	○	○	○	○

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Page 6: Section 5 - Personal Data and Conclusion

14 What is your position in your organization? * *Required*

15 For how long have you been working in the industry or for how long have you been in charge of construction projects (in years)? * *Required*

16 What is your level of education?

17 If you have any other comments you would like to add about organizational justice and construction project performance please provide them here:

18 Would you like to receive a summary of the results of this study?

- Yes
- No

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18.a If you selceted Yes, please provide your e-mail address

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Your completed questionnaire has been received.

Thank you for your participation.

If you have any querries please do not hesitate to contact Christine Unterhitzenberger by emailing c.unterhitzenberger@2012.ljmu.ac.uk.

Key for selection options

3 - What was your role in the construction project team?

Client
Occupant
Client's representative
Project Manager
Architect or engineer
Consultant
Contractor
Subcontractor
Supplier
Other

14 - What is your position in your organization?

Administrator
Assistant
Project Leader
Manager
Director
Managing Director
Partner/Owner
Other

16 / 17

15 - For how long have you been working in the industry or for how long have you been in charge of construction projects (in years)?

0 - 5
6 - 10
11 - 15
16 - 20
> 20

16 - What is your level of education?

Below Degree level (or equivalent)
Degree level (or equivalent)
Beyond Degree level (or equivalent)

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A1.2 – Coding table questionnaire

The questions and items of the questionnaire need to be coded in order to be used with SPSS and AMOS. In the following the coding table is presented:

Code latent variable	Latent variable (factor)	Question (item, observed variable)	Code observed variable
COMMI	Commitment	I enjoyed duscussing my project with people outside it.	COMMI_DISS
		I really felt this project's goals are my own ones.	COMMI_GOAL
		I did not feel emotionally attached to this project team.	COMMI_EMO
		I felt a strong sense of belonging to this project team.	COMMI_BEL
COMMU	Communication	The client communicated in an open and honest way.	COMMU_OHW
		The client communicated in a timely manner.	COMMU_TM
		The client used adequate language and volume to communicate.	COMMU_ALV
		I received all information I needed during the project.	COMMU_INFO
COMP	Competence and managerial qualities	The client showed integrity and reliability.	COMP_INTE
		The client was highly capable in his/her field of expertise.	COMP_CAPA
		The client had the ability to react quickly to a changing environment.	COMP_CHANG
		The client treated the project team members with respect.	COMP_RESP
CONF	Conflict management	In case conflicts arose, the process of dealing with these conflicts was clearly defined.	CONF_PROC
		The responsible persons for dealing with conflicts were defined.	CONF_PERS
		Conflicts were seen as a chance to develop the project further.	CONF_DEVE
		I had the feeling that in case of a conflict I can talk to the client faithfully.	CONF_FAITH
COOR	Coordination	The coordination between the different parties in the project worked sufficient.	COOR_SUF

Code latent variable	Latent variable (factor)	Question (item, observed variable)	Code observed variable
		It was clearly defined who is responsible for the coordination.	COOR_RESP
		There was additional workload produced because the individual tasks were not adjusted to each other.	COOR_ADDIT
		Everybody in the project new the organizational interfaces between the different parties.	COOR_INTERF
DESC	Decision making	The process of decision making was clearly defined.	DESC_DEFI
		The process of decision making was transparent and comprehensible.	DESC_TRANS
		Decisions were being made as soon as all necessary information was available.	DESC_SOON
		To obtain decisions many different parties and hierarchies had to be involved which lead to time consuming ways in decision making.	DESC_WAY
EXPE	Compliance to client's expectations	The aim of the project was clearly defined and updated if necessary.	EXPE_DEF
		A project specification was drawn and used as tool throughout the project.	EXPE_SPEC
		I had the feeling that I really understood what the client wants.	EXPE_WANT
		I always tried to comply with the client's expectation although it wasn't always my prefered solution.	EXPE_COMPL
ORGST	Efficacy of the organizational structure	Everybody in the project team knew his/her role.	ORGST_ROLE
		If I have a question to a specific topic during the project I knew immediately whom to talk to.	ORGST_TALK
		The organizational structure was clear and comprehensible to the people inside and outside the project.	ORGST_CLEAR
		The defined communication channels were followed throughout the project.	ORGST_COMM
PROCO	Efficacy of procurement method and contract	The procurement method was suitable for the client.	PROCO_SUITC
		The procurement method was suitable for the project.	PROCO_SUITP

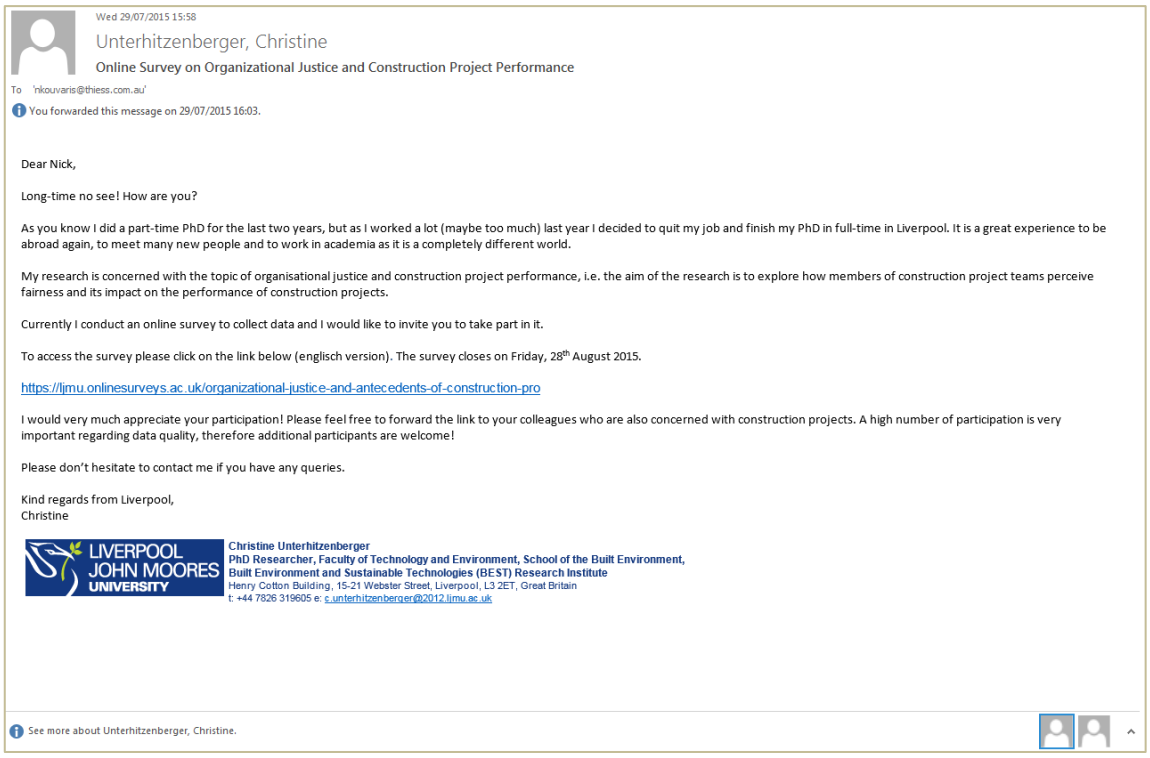
Code latent variable	Latent variable (factor)	Question (item, observed variable)	Code observed variable
		The client negotiated fairly during the procurement process.	PROCO_NEGOT
		The rights and duties were equally distributed between the parties.	PROCO_EQUAL
		The clauses of contract were unambiguously phrased.	PROCO_CLAUSE
		The fundamental idea of the contract was applied throughout the project by the involved parties.	PROCO_IDEA
TRUST	Trust	I would have been comfortable giving the client a task or problem that was critical to me, even if I could not monitor his/her actions.	TRUST_PROB
		If someone questioned the client's motives, I would have given the client the benefit of the doubt.	TRUST_MOTI
		I really wish I had a good way to keep an eye on the client.	TRUST_EYE
		If I had my way, I wouldn't let the client have any influence over issues that are important to me.	TRUST_INFLU
DISJU	Distributive justice	Did your outcomes from the project reflect the effort you have put into your work?	DISJU_EFFO
		Were your outcomes from the project appropriate for the work you have completed?	DISJU_COMPL
		Did your outcomes form the project reflect what you have contributed to the project?	DISJU_CONTR
		Were your outcomes from the project justified, given your performance?	DISJU_PERFO
INTJU	Interactional justice	Has he/she treated you in a polite manner?	INTJU_POLIT
		Has he/she treated you with dignity?	INTJU_DIGN
		Has he/she treated you with respect?	INTJU_RESP
		Has he/she refrained from improper remarks or comments?	INTJU_IMPROP
		Has he/she been candid in his/her communications with you?	INTJU_CANDID
		Has he/she explained the procedures thoroughly?	INTJU_PROCE
		Were his/her explanations regarding the procedures reasonable?	INTJU_REAS

Code latent variable	Latent variable (factor)	Question (item, observed variable)	Code observed variable
		Has he/she communicated details in a timely manner?	INTJU_TIME
		Has he/she seemed to tailor his/her communication to individuals' specific needs?	INTJU_NEED
PROJU	Procedural justice	Have you been able to express your views and feelings during the project execution?	PROJU_VIEW
		Have you had influence over the outcomes arrived at by those procedures?	PROJU_INFL
		Have those procedures been applied consistently?	PROJU_CONSIS
		Have those procedures been free of bias?	PROJU_BIAS
		Have those procedures been based on accurate information?	PROJU_ACCUR
		Have you been able to appeal your outcomes from the project arrived by those procedures?	PROJU_APPEAL
		Have those procedures upheld ethical and moral standards?	PROJU_ETHIC
DISJCL	Distributive justice climate	Did their outcomes from the project reflect the effort they have put into your work?	DISJCL_EFFO
		Were their outcomes from the project appropriate for the work they have completed?	DISJCL_COMPL
		Did their outcomes form the project reflect what they have contributed to the project?	DISJCL_CONTR
		Were their outcomes from the project justified, given their performance?	DISJCL_PERFO
INTJCL	Interactional justice climate	Has he/she treated the project team in a polite manner?	INTJCL_POLIT
		Has he/she treated the project team with dignity?	INTJCL_DIGN
		Has he/she treated the project team with respect?	INTJCL_RESP
		Has he/she refrained from improper remarks or comments?	INTJCL_IMPROP
		Has he/she been candid in his/her communications with the project team?	INTJCL_CANDID
		Has he/she explained the procedures thoroughly?	INTJCL_PROCE

Code latent variable	Latent variable (factor)	Question (item, observed variable)	Code observed variable
		Were his/her explanations regarding the procedures reasonable?	INTJCL_REAS
		Has he/she communicated details in a timely manner?	INTJCL_TIME
		Has he/she seemed to tailor his/her communication to individuals' specific needs?	INTJCL_NEED
PROJCL	Procedural justice climate	Has the team been able to express their views and feelings during the project execution?	PROJCL_VIEW
		Has the team had influence over their outcomes arrived at by those procedures?	PROJCL_INFL
		Have those procedures been applied consistently?	PROJCL_CONSIS
		Have those procedures been free of bias?	PROJCL_BIAS
		Have those procedures been based on accurate information?	PROJCL_ACCUR
		Have you been able to appeal your outcomes from the project arrived by those procedures?	PROJCL_APPEAL
		Have those procedures upheld ethical and moral standards?	PROJCL_ETHIC
SUCC	Project success	The project was completed within the scheduled time.	SUCC_TIME
		The project was completed within the budget.	SUCC_BUDG
		The project specifications have been met by the time of handover.	SUCC_SPEC
		The client is satisfied with the project.	SUCC_CLIEN
		Overall it was a successful project.	SUCC_OVERA
		Please specify the project type.	PRO_TYPE
		Please indicate the size of the project by its construction cost.	PRO_SIZE
		What was your role in the project team?	ROLE_TEAM
		In which country was the project executed?	PRO_CONTR
		What is your position in your organization?	ORG_POSI
		For how long have you been working in the industry or for how long have you been in charge of construction projects (in years)?	WORK_EXPER
		What is your level of education?	EDU_LEVEL

A1.3 – Administration of the questionnaire

Examples for personalised e-mails to business contacts of the researcher:



Wed 29/07/2015 15:58

Unterhitzenberger, Christine

Online Survey on Organizational Justice and Construction Project Performance

To 'nkouvaris@thiess.com.au'

You forwarded this message on 29/07/2015 16:03.

Dear Nick,

Long-time no see! How are you?

As you know I did a part-time PhD for the last two years, but as I worked a lot (maybe too much) last year I decided to quit my job and finish my PhD in full-time in Liverpool. It is a great experience to be abroad again, to meet many new people and to work in academia as it is a completely different world.

My research is concerned with the topic of organisational justice and construction project performance, i.e. the aim of the research is to explore how members of construction project teams perceive fairness and its impact on the performance of construction projects.

Currently I conduct an online survey to collect data and I would like to invite you to take part in it.

To access the survey please click on the link below (englisch version). The survey closes on Friday, 28th August 2015.

https://ljmu.onlinesurveys.ac.uk/organizational-justice-and-antecedents-of-construction-pro

I would very much appreciate your participation! Please feel free to forward the link to your colleagues who are also concerned with construction projects. A high number of participation is very important regarding data quality, therefore additional participants are welcome!

Please don't hesitate to contact me if you have any queries.

Kind regards from Liverpool,
Christine

LIVERPOOL JOHN MOORES UNIVERSITY

Christine Unterhitzenberger
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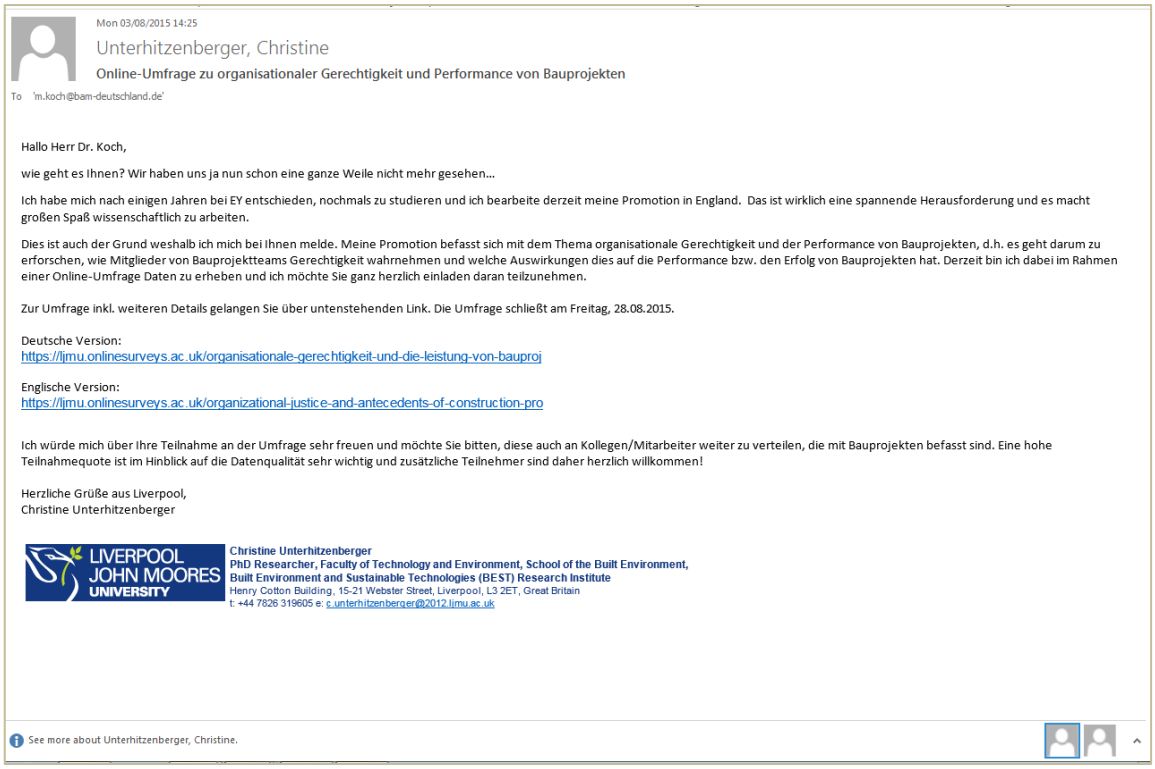
t: +44 7826 319605 e: c.unterhitzenberger@2012.ljmu.ac.uk

See more about Unterhitzenberger, Christine.



Mon 03/08/2015 14:25

Unterhitzenberger, Christine

Online-Umfrage zu organisationaler Gerechtigkeit und Performance von Bauprojekten

To 'm.koch@bam-deutschland.de'

Hallo Herr Dr. Koch,

wie geht es Ihnen? Wir haben uns ja nun schon eine ganze Weile nicht mehr gesehen...

Ich habe mich nach einigen Jahren bei EY entschieden, nochmals zu studieren und ich bearbeite derzeit meine Promotion in England. Das ist wirklich eine spannende Herausforderung und es macht großen Spaß wissenschaftlich zu arbeiten.

Dies ist auch der Grund weshalb ich mich bei Ihnen melde. Meine Promotion befasst sich mit dem Thema organisationale Gerechtigkeit und der Performance von Bauprojekten, d.h. es geht darum zu erforschen, wie Mitglieder von Bauprojektteams Gerechtigkeit wahrnehmen und welche Auswirkungen dies auf die Performance bzw. den Erfolg von Bauprojekten hat. Derzeit bin ich dabei im Rahmen einer Online-Umfrage Daten zu erheben und ich möchte Sie ganz herzlich einladen daran teilzunehmen.

Zur Umfrage inkl. weiteren Details gelangen Sie über untenstehenden Link. Die Umfrage schließt am Freitag, 28.08.2015.

Deutsche Version:
https://ljmu.onlinesurveys.ac.uk/organisationale-gerechtigkeit-und-die-leistung-von-bauproj

Englische Version:
https://ljmu.onlinesurveys.ac.uk/organizational-justice-and-antecedents-of-construction-pro

Ich würde mich über Ihre Teilnahme an der Umfrage sehr freuen und möchte Sie bitten, diese auch an Kollegen/Mitarbeiter weiter zu verteilen, die mit Bauprojekten befasst sind. Eine hohe Teilnahmequote ist im Hinblick auf die Datenqualität sehr wichtig und zusätzliche Teilnehmer sind daher herzlich willkommen!

Herzliche Grüße aus Liverpool,
Christine Unterhitzenberger

LIVERPOOL JOHN MOORES UNIVERSITY

Christine Unterhitzenberger
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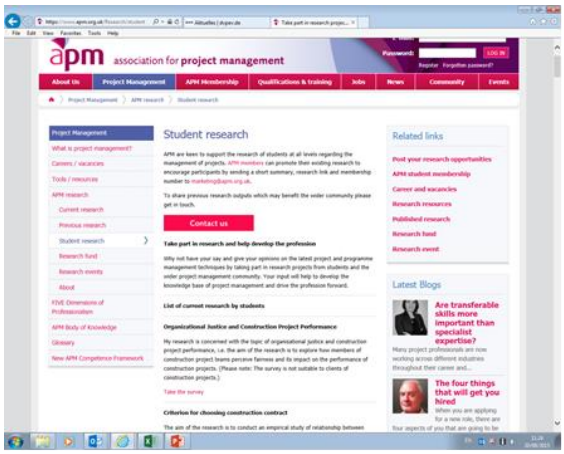
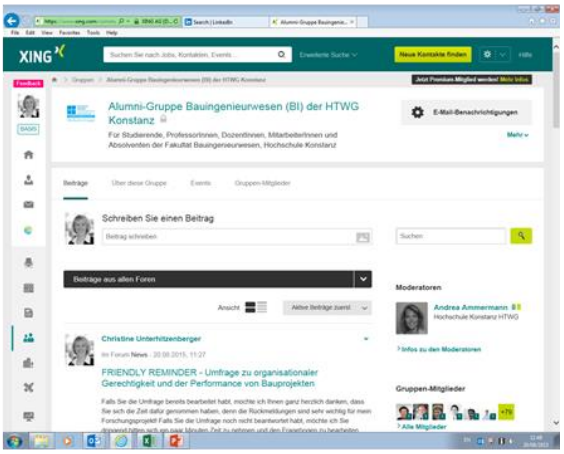
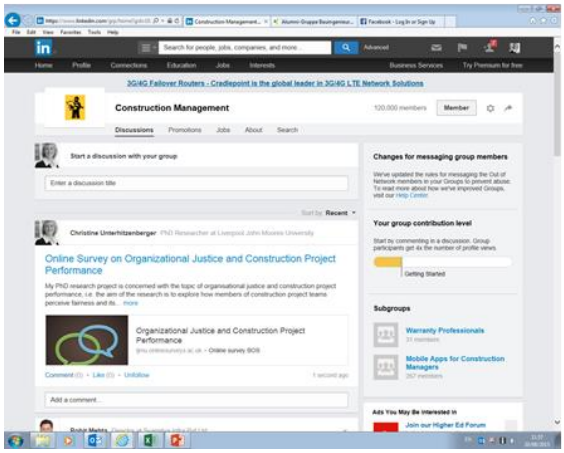
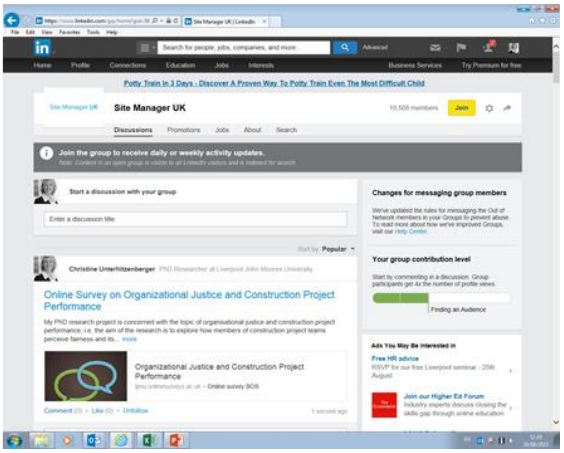
See more about Unterhitzenberger, Christine.

Screenshots of the publication of the survey on web-pages and social networks:









Appendix 2 – Focus group

A2.1 – Final focus group guide

Focus group guide (60 min)

How do project team members experience the application of organisational justice and organisational justice climate regarding their benefits and their influence on the different dimensions of project performance?

Introduction (4 min)

- social relationships in construction project teams and construction performance

- focus on fair treatment of the project team members as individuals and as a group

- duration: 60 minutes

- no test regarding knowledge, more about your personal experience

- goal: talk to each other and discuss

Opening question (5 min)

1) Tell us your name, a brief outline of your professional background and what you particularly like about your job.

Introductory question (3 min)

2) What defines a successful project for you?
   Probe: - iron triangle (time, cost, quality)
   - client's satisfaction
   - sustainability goals
   - zero accidents/safety

Transition question (3 min)

3) What do you think are reasons for a project being successful or not?
   Probe: - clear goal definition
   - clear organisational structures
   - communication
   - client's managerial competence
   - ways of decision making
   - trust
   - fair treatment

Key questions (5 min, 5 min, 5min, 10 min, 5 min, 5 min = 30 min)

The focus of our discussion today is on the social relationships in projects, especially the fair treatment of the project team members by the client, and the impact on project performance. In my research I have defined five aspect of project performance: compliance to budget, to client's expectations, to specifications and to time requirements as well as overall project success. Furthermore I have defined three dimensions of fair treatment:

- Perception of fairness of distributions of resources between parties
- Perception of fairness of the procedures used as the basis for making decisions
- Perception of fairness regarding the manner in which outcomes and procedures are communicated

4) For which aspect of project performance would you expect the influence of fair treatment to be the strongest and for which the weakest? What makes you think so?

5) Regarding the different dimensions of fair treatment: Do you think there are differences in their impact on the different aspects of project performance? What makes you think so?

6) Research showed that there are various benefits connected to the adoption of fair treatment. Please indicate your opinion regarding the degree of influence on project performance

- **Performance outcome** = Specific result a project is intended to achieve.
- **Outcome satisfaction** = Satisfaction with the outcome of a decision making process, e.g. pay, promotion, performance evaluation.
- **Customer satisfaction** = Measure of how products and services supplied by a company meet or surpass customer expectation.
- **Organisational commitment** = The degree to which project team members identify with the project and make the project's goals their own.
- **Unit-level or team effectiveness** = Quality and amount of output relative to some expectations of the team.
- **Role performance** = Performance of the individuals according to their role within the team.
- **Organisational citizenship behaviour** = A person's voluntary commitment within the team that is not part of his or her contractual tasks.
- **Trust** = To believe that someone is good and honest and will not harm you, or that something is safe and reliable.
- **Conflict perception** = Disagreement through which the parties involved perceive a threat to their needs, interests or concerns.

7) Please share your rating with the other participants and state your opinion.
- Where do we agree?
- Are there differences of opinion?
- Did anything surprise you?
- Would you change any of your scores now, after you've listened to others?

8) Does it influence you if the other project team members are treated fairly or unfairly? In which way does it influence you or not?

9) Do you think the individual's or the team's treatment has more influence on project performance? What are the reasons for that?

Ending questions (5 min, 10 min = 15 min)

10) Have we missed anything?
11) *Give a short summary of the discussion.* How well does that capture what was said here?

Thank you very much for your participation in this focus group! Total: 60 min, 11 questions

Appendix 3 – Case study

A3.1 – Case study protocol

Case Study Protocol

This Case Study Protocol gives a brief overview over the case study itself, the data collection procedures, the data collection questions and the guide for the case study report. It summarises the main points to provide a structure for the case study. It is based on the recommendations by (Yin 2014).

For further information it is recommended to read the main body of the PhD thesis in order to obtain the full and comprehensive background and reasoning.

1. Overview of the Case Study

1.1 Mission and goals reflecting the interests of the case study's sponsor and audience

The case study is part of a PhD thesis which explores the impact of organisational justice (climate) on construction project performance. The case study is conducted as a supplementary data collection method to refine the strategic framework developed based on the questionnaire findings. The data/evidence collection needs to be completed by end of June 2016 and the analysis by end of July 2016. The results will be integrated in the PhD thesis.

1.2 Case study questions, hypotheses, and propositions

The following research question for the case study has been developed:

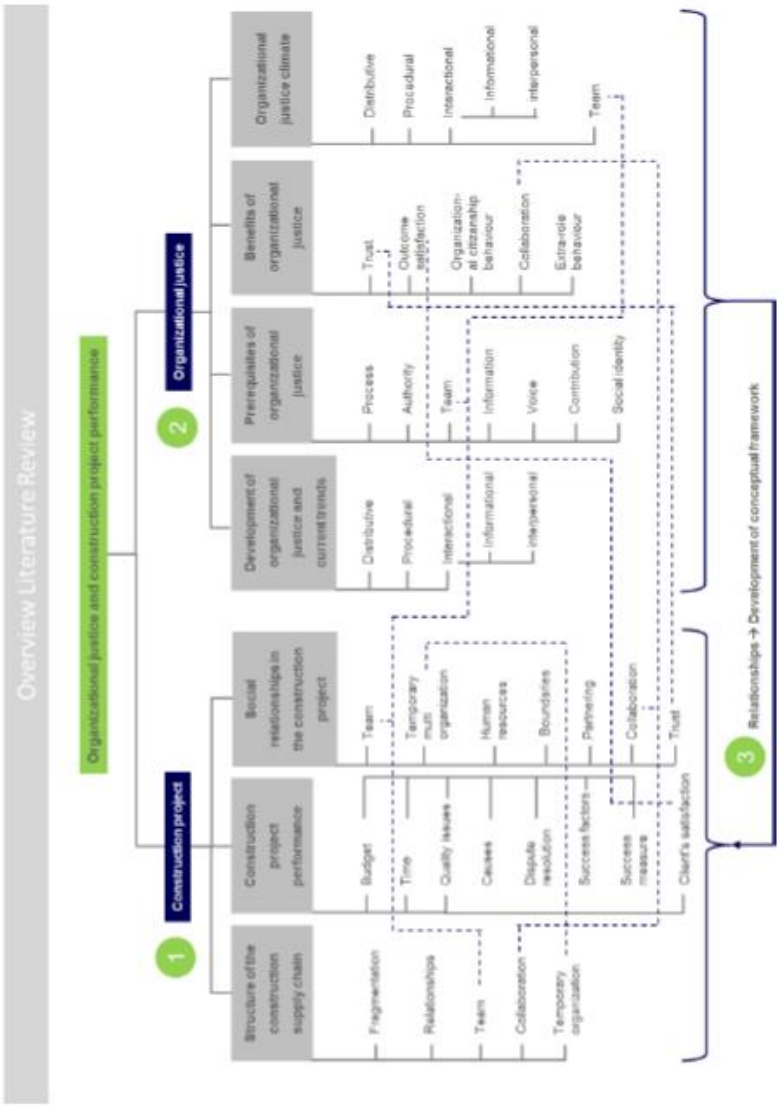
Research question: How do the different dimensions of organisational justice (climate) influence antecedents of project performance?

The following propositions have been developed:

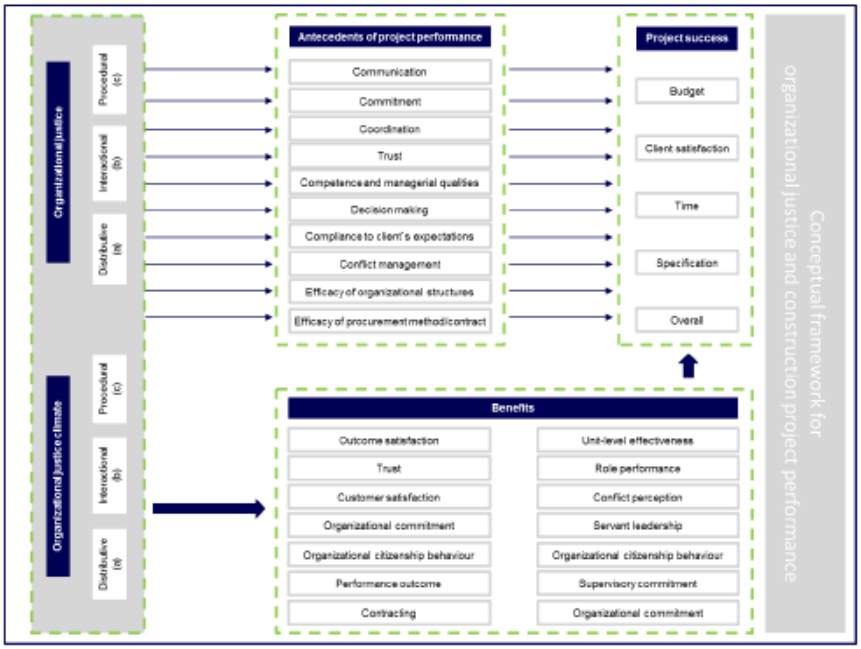
1) Distributive justice positively influences commitment, competence and managerial qualities and coordination.
2) Interactional justice positively influences commitment, competence and managerial qualities, conflict management and compliance to client's expectations.
3) Procedural justice positively influences conflict management and efficacy of procurement method and contract.
4) Distributive justice climate positively influences commitment, competence and managerial qualities and coordination.
5) Procedural justice climate positively influences coordination, decision making and efficacy of organisational structures.

1.3 Theoretical framework for the case study

The theoretical framework for the study was developed based on an extensive literature review. The literature review was conducted in the field of project management and organisational justice.



A conceptual framework has been developed to integrate the two areas of expertise and to illustrate the hypothesised relationships:



1.4 Role of protocol in guiding the case study researcher

The protocol supports the researcher to conduct the case study. It provides her with a guideline which is to be followed throughout the collection and analysis process.

1.5 The case

For the research at the unit of analysis shall be a construction project, and more specifically a construction project team. This team is a case of the social relationships in project settings, especially organisational justice (climate), and their influence on antecedents of project performance.

2. Data/evidence collection procedure

2.1 Names of contact persons for doing fieldwork

[redacted]

2.2 Data/evidence collection plan

The data collection plan is put in place to ensure that the major tasks are conducted in a professional way.

Gaining access to key organisations or interviewees:

- Approval of LJMU Estates to conduct the case study
- Introduction to the project team by LJMU Estates

Having sufficient resources while doing fieldwork:

- Resources like computer, paper for note taking and a working space are available for the researcher

Developing a procedure for calling for assistance and guidance, if needed, from other team members or colleagues:

- The DoS of the PhD can be contacted at any time and supports the researcher if required.

Making a clear schedule of the data collection activities that are expected to be completed within specified periods of time:

- 18.05.2016 – 15.06.2016 Meeting observations
- 18.05.2016 – 15.06.2016 Collection of documents
- 16.06.2016 – 30.06.2016 Interviews
- 16.06.2016 – 30.06.2016 Questionnaire

Providing for unanticipated events, including changes in the availability of interviewees as well as changes in your own energy, mood, and motivation while doing fieldwork:

- Sufficient time for the observation and document collection is scheduled including certain buffers, so that a cancelled event doesn't have a lot of influence.

- Sufficient time for the interview and questionnaire is scheduled. If necessary this time can be expanded by one week.

2.3 Expected preparation prior to fieldwork

Prior to the fieldwork the following tasks need to be undertaken:

- Development of research questions and propositions
- Development of field note spread sheet
- Development of Participant Information Sheet in order to comply with ethical guidelines
- Identify required documents
- Identify areas for observation

3. Data/evidence collection questions

3.1 The antecedents of project performance

a) Define the ways and types of communication
   - Are they structured?
   - Are they adequate?
   - Are they timely?
   - Are there any regulations in place?

b) Are the project team members committed to the project?
   - Do they show a sense of belonging to the project team?
   - Do they show that the project's goals are their goals?

c) How does the coordination within the project team work?
   - Does everybody know his/her responsibilities?
   - Is it clear who is responsible for coordination?
   - Is there a clear structure in place?

d) Evaluate the competence and managerial qualities of the client
   - Does he show knowledge about the topic?
   - Does he make decisions?
   - Does he delegate work?

e) How does the way of decision making work?
   - Is there a clear way of decision making?
   - Are decisions made when necessary?
   - Are the decision communicated?

f) Do the participants try to comply with the client's expectations?
   - Is there a clear aim stated by the client?

- Do the participants understand what the client wants?
- Do they do what the client wants?

g) Define the procedure how it is dealt with conflicts?
- Is there a formal procedure in place how to deal with conflicts?
- Is someone responsible to solve conflicts?
- Are conflicts solved or postponed?

h) Define the organisational structures and evaluate if they are efficacious.
- Is there an organigram available?
- Does the organisational structure work or is it only on the paper?
- Do the participants stand behind this structure?

i) Evaluate the suitability of the procurement method and the contract for the project.
- How did the procurement process work?
- Was the procurement process successful?
- Is the contract adversarial?
- Is the contract used?

3.2 Organisational justice (climate)

a) Identify the presence of distributive justice in the project
- Is the outcome distributed according to the effort which is put into the work?
- How do the team members perceive this?

b) Identify the presence of interactional justice in the project
- How are the team members treated by the client?
- How does the communication work between the client and the team members?

c) Identify the presence of procedural justice in the project
- Is everyone being heard during the project?
- Are the procedures used in project fair?

d) Identify the presence of distributive justice climate in the project
- Were all team members treated the same way regarding the distribution of outcomes?

e) Identify the presence of procedural justice climate in the project
- Where all team members treated the same way regarding the procedures applied?
- Did they perceive it as fair?

4. Guide for the case study report

4.1 Audience for the report and stylistic preferences for communicating with the audience

The main report will be part of the PhD thesis of the researcher. The guidelines regarding the format of a PhD thesis at LJMU need to be followed.

Furthermore it is planned to write one academic journal paper based on the results of the questionnaire and the case study. The guidelines of the specific journal need to be followed.

4.2 Structure of the report

The report will first present the findings based on the research questions and propositions and then discuss the findings in connection with the findings obtained from the other data collection methods.

Yin, R. K. (2014). Case study research : design and methods. Los Angeles, Sage Publications Inc.

Appendix 4 – Measurement model

A4.1 – Measurement error variances and covariances

The unstandardized variance estimates of the measurement errors are shown in the following table:

Measurement error		Variance estimate unstandardized	SE	Significance
PROJU_ACCUR	e1	0.269	0.034	***
PROJU_APPEAL	e2	0.669	0.072	***
PROJU_BIAS	e3	0.562	0.062	***
PROJU_CONSIS	e4	0.417	0.046	***
PROJU_ETHIC	e5	0.606	0.069	***
PROJU_INFL	e6	0.53	0.057	***
PROJU_VIEW	e7	0.506	0.055	***
DISJU_COMPL	e8	0.171	0.024	***
DISJU_CONTR	e9	0.165	0.024	***
DISJU_EFFO	e10	0.439	0.05	***
DISJU_PERFO	e11	0.189	0.026	***
INTJU_CANDID	e12	0.358	0.04	***
INTJU_IMPROP	e13	2.237	0.228	***
INTJU_NEED	e14	0.578	0.063	***
INTJU_PROCE	e15	0.302	0.037	***
INTJU_REAS	e16	0.264	0.033	***
INTJU_TIME	e17	0.336	0.04	***
PROJCL_ACCUR	e18	0.285	0.033	***
PROJCL_APPEAL	e19	0.527	0.058	***
PROJCL_BIAS	e20	0.478	0.053	***
PROJCL_CONSIS	e21	0.363	0.041	***
PROJCL_ETHIC	e22	0.519	0.058	***
PROJCL_INFL	e23	0.395	0.044	***
PROJCL_VIEW	e24	0.3	0.034	***
DISJCL_COMPL	e25	0.133	0.019	***
DISJCL_CONTR	e26	0.163	0.022	***
DISJCL_EFFO	e27	0.184	0.023	***
DISJCL_PERFO	e28	0.165	0.022	***
INTJCL_CANDID	e29	0.284	0.034	***
INTJCL_IMPROP	e30	1.968	0.2	***
INTJCL_NEED	e31	0.525	0.057	***
INTJCL_PROCE	e32	0.197	0.027	***
INTJCL_REAS	e33	0.215	0.028	***
INTJCL_TIME	e34	0.276	0.034	***

Measurement error		Variance estimate unstandardized	SE	Significance
INTJUCL_COLLI	e35	0.358	0.039	***
COMMI_BEL	e36	0.662	0.08	***
COMMI_DISS	e37	0.822	0.104	***
COMMI_GOAL	e38	0.514	0.079	***
COMMU_ALV	e39	0.52	0.059	***
COMMU_INFO	e40	0.475	0.054	***
COMMU_OHW	e41	0.286	0.038	***
COMMU_TM	e42	0.483	0.056	***
COMP_CAPA	e43	0.645	0.073	***
COMP_CHANG	e44	0.636	0.07	***
COMP_INTE	e45	0.34	0.043	***
COMP_RESP	e46	0.456	0.053	***
CONF_FAITH	e47	0.536	0.073	***
CONF_DEVE	e48	0.855	0.093	***
CONF_PERS	e49	0.829	0.09	***
CONF_PROC	e50	0.546	0.063	***
COOR_INTERF	e51	0.405	0.052	***
COOR_RESP	e52	0.57	0.069	***
COOR_SUF	e53	0.44	0.055	***
DESC_DEFI	e54	0.196	0.031	***
DESC_SOON	e55	0.795	0.086	***
DESC_TRANS	e56	0.173	0.034	***
EXPE_DEF	e57	0.399	0.053	***
EXPE_SPEC	e58	0.896	0.107	***
EXPE_WANT	e59	0.414	0.055	***
ORGST_CLEAR	e60	0.359	0.048	***
ORGST_COMM	e61	0.595	0.067	***
ORGST_ROLE	e62	0.497	0.057	***
ORGST_TALK	e63	0.38	0.045	***
PROCO_CLAUSE	e64	0.823	0.088	***
PROCO_EQUAL	e65	0.449	0.056	***
PROCO_IDEA	e66	0.544	0.065	***
PROCO_NEGOT	e67	0.466	0.059	***
PROCO_SUITC	e68	0.664	0.077	***
PROCO_SUITP	e69	0.579	0.065	***
SUCC_BUDG	e70	0.956	0.106	***
SUCC_CLIEN	e71	0.309	0.037	***
SUCC_OVERA	e72	0.191	0.037	***
SUCC_SPEC	e73	0.57	0.06	***
SUCC_TIME	e74	1.025	0.112	***

Measurement error		Variance estimate unstandardized	SE	Significance
TRUST_EYE	e75	1.114	0.115	***
TRUST_INFLU	e76	1.054	0.148	***
TRUST_MOTI	e77	1.081	0.113	***
TRUST_PROB	e78	1.259	0.128	***

All measurement error variances are significant at a $p < 0.001$ (***) level.

The unstandardized measurement error covariances are shown in the following table:

Measurement error			Covariance estimate	SE	Significance
e1	<-->	e18	0.072	0.025	0.003
e2	<-->	e19	0.237	0.049	***
e3	<-->	e20	0.066	0.041	0.105
e4	<-->	e21	0.081	0.031	0.01
e5	<-->	e22	0.397	0.054	***
e6	<-->	e23	0.061	0.036	0.087
e8	<-->	e25	-0.001	0.015	0.929
e9	<-->	e26	0.012	0.016	0.449
e10	<-->	e27	0.107	0.025	***
e12	<-->	e29	0.111	0.028	***
e13	<-->	e30	1.548	0.188	***
e14	<-->	e31	0.255	0.046	***
e15	<-->	e32	0.047	0.022	0.038
e16	<-->	e33	0.043	0.022	0.048

Six measurement error covariances are significant at a $p < 0.001$ (***) level, four are significant at a $p < 0.05$ level and four are not significant.

A4.2 – Factor variances and covariances

The unstandardized variance estimates of the factors are shown in the following table:

Factor	Variance estimate	SE	Significance
PROJU	0.497	0.076	***
DISJU	1.092	0.129	***
INTJU	0.625	0.094	***
PROJUCL	0.337	0.058	***
DISJCL	0.881	0.103	***
INTJCL	0.01	0.019	0.588
COMMI	0.353	0.09	***
COMMU	0.67	0.112	***
COMP	1.007	0.158	***
CONF	0.961	0.15	***
COOR	0.563	0.095	***
DESC	0.714	0.094	***
EXPE	0.371	0.075	***
ORGST	0.683	0.104	***
PROCO	0.354	0.09	***
SUCC	0.637	0.136	***
TRUST	0.061	0.042	0.145

All factor variances are significant at a $p < 0.001$ (***) level, apart from the factors of INTCL and TRUST. It has already been decided that the factor TRUST has low quality and needs to be deleted.

The unstandardized covariance estimates for the factors are shown in the following table:

Factors			Covariance estimate	SE	Significance
PROJU	<-->	DISJU	0.45	0.071	***
PROJU	<-->	INTJU	0.36	0.058	***
PROJU	<-->	PROJUCL	0.37	0.054	***
PROJU	<-->	DISJCL	0.39	0.063	***
PROJU	<-->	INTJCL	0.04	0.041	0.285
PROJU	<-->	COMMI	0.27	0.053	***
PROJU	<-->	COMMU	0.40	0.064	***
PROJU	<-->	COMP	0.44	0.074	***

Factors			Covariance estimate	SE	Significance
PROJU	<-->	CONF	0.54	0.079	***
PROJU	<-->	COOR	0.33	0.057	***
PROJU	<-->	DESC	0.34	0.058	***
PROJU	<-->	EXPE	0.25	0.048	***
PROJU	<-->	ORGST	0.40	0.063	***
PROJU	<-->	PROCO	0.301	0.055	***
PROJU	<-->	SUCC	0.333	0.063	***
PROJU	<-->	TRUST	-0.086	0.035	0.013
DISJU	<-->	INTJU	0.339	0.07	***
DISJU	<-->	PROJUCL	0.354	0.059	***
DISJU	<-->	DISJCL	0.744	0.095	***
DISJU	<-->	INTJCL	0.036	0.035	0.293
DISJU	<-->	COMMI	0.288	0.066	***
DISJU	<-->	COMMU	0.455	0.08	***
DISJU	<-->	COMP	0.508	0.095	***
DISJU	<-->	CONF	0.429	0.093	***
DISJU	<-->	COOR	0.411	0.075	***
DISJU	<-->	DESC	0.303	0.073	***
DISJU	<-->	EXPE	0.255	0.061	***
DISJU	<-->	ORGST	0.364	0.077	***
DISJU	<-->	PROCO	0.307	0.065	***
DISJU	<-->	SUCC	0.586	0.096	***
DISJU	<-->	TRUST	-0.086	0.042	0.04
INTJU	<-->	PROJUCL	0.314	0.05	***
INTJU	<-->	DISJCL	0.38	0.067	***
INTJU	<-->	INTJCL	0.07	0.065	0.283
INTJU	<-->	COMMI	0.271	0.056	***
INTJU	<-->	COMMU	0.548	0.078	***
INTJU	<-->	COMP	0.689	0.095	***
INTJU	<-->	CONF	0.622	0.089	***
INTJU	<-->	COOR	0.29	0.058	***
INTJU	<-->	DESC	0.321	0.061	***
INTJU	<-->	EXPE	0.296	0.054	***
INTJU	<-->	ORGST	0.353	0.064	***
INTJU	<-->	PROCO	0.302	0.058	***
INTJU	<-->	SUCC	0.29	0.062	***
INTJU	<-->	TRUST	-0.139	0.049	0.004
PROJUCL	<-->	DISJCL	0.355	0.055	***
PROJUCL	<-->	INTJCL	0.04	0.037	0.285
PROJUCL	<-->	COMMI	0.205	0.043	***

Factors			Covariance estimate	SE	Significance
PROJUCL	<-->	COMMU	0.348	0.055	***
PROJUCL	<-->	COMP	0.381	0.063	***
PROJUCL	<-->	CONF	0.424	0.066	***
PROJUCL	<-->	COOR	0.31	0.051	***
PROJUCL	<-->	DESC	0.3	0.05	***
PROJUCL	<-->	EXPE	0.212	0.041	***
PROJUCL	<-->	ORGST	0.33	0.053	***
PROJUCL	<-->	PROCO	0.241	0.046	***
PROJUCL	<-->	SUCC	0.292	0.054	***
PROJUCL	<-->	TRUST	-0.092	0.034	0.006
DISJCL	<-->	INTJCL	0.051	0.048	0.285
DISJCL	<-->	COMMI	0.21	0.056	***
DISJCL	<-->	COMMU	0.433	0.074	***
DISJCL	<-->	COMP	0.477	0.086	***
DISJCL	<-->	CONF	0.48	0.087	***
DISJCL	<-->	COOR	0.324	0.066	***
DISJCL	<-->	DESC	0.281	0.066	***
DISJCL	<-->	EXPE	0.234	0.055	***
DISJCL	<-->	ORGST	0.327	0.069	***
DISJCL	<-->	PROCO	0.292	0.06	***
DISJCL	<-->	SUCC	0.475	0.081	***
DISJCL	<-->	TRUST	-0.115	0.045	0.011
INTJCL	<-->	COMMI	0.025	0.024	0.295
INTJCL	<-->	COMMU	0.062	0.057	0.284
INTJCL	<-->	COMP	0.077	0.072	0.283
INTJCL	<-->	CONF	0.069	0.065	0.284
INTJCL	<-->	COOR	0.036	0.034	0.289
INTJCL	<-->	DESC	0.042	0.039	0.287
INTJCL	<-->	EXPE	0.03	0.029	0.290
INTJCL	<-->	ORGST	0.043	0.04	0.287
INTJCL	<-->	PROCO	0.036	0.034	0.288
INTJCL	<-->	SUCC	0.033	0.032	0.292
INTJCL	<-->	TRUST	-0.016	0.015	0.313
COMMI	<-->	COMMU	0.284	0.06	***
COMMI	<-->	COMP	0.308	0.069	***
COMMI	<-->	CONF	0.378	0.076	***
COMMI	<-->	COOR	0.264	0.057	***
COMMI	<-->	DESC	0.218	0.054	***
COMMI	<-->	EXPE	0.195	0.047	***
COMMI	<-->	ORGST	0.229	0.056	***

Factors			Covariance estimate	SE	Significance
COMMI	<-->	PROCO	0.198	0.047	***
COMMI	<-->	SUCC	0.256	0.059	***
COMMI	<-->	TRUST	-0.056	0.028	0.047
COMMU	<-->	COMP	0.778	0.107	***
COMMU	<-->	CONF	0.647	0.096	***
COMMU	<-->	COOR	0.331	0.064	***
COMMU	<-->	DESC	0.371	0.067	***
COMMU	<-->	EXPE	0.324	0.059	***
COMMU	<-->	ORGST	0.399	0.07	***
COMMU	<-->	PROCO	0.333	0.063	***
COMMU	<-->	SUCC	0.401	0.075	***
COMMU	<-->	TRUST	-0.158	0.055	0.004
COMP	<-->	CONF	0.801	0.116	***
COMP	<-->	COOR	0.36	0.075	***
COMP	<-->	DESC	0.426	0.08	***
COMP	<-->	EXPE	0.399	0.072	***
COMP	<-->	ORGST	0.469	0.084	***
COMP	<-->	PROCO	0.395	0.075	***
COMP	<-->	SUCC	0.46	0.088	***
COMP	<-->	TRUST	-0.243	0.08	0.002
CONF	<-->	COOR	0.472	0.082	***
CONF	<-->	DESC	0.563	0.087	***
CONF	<-->	EXPE	0.44	0.075	***
CONF	<-->	ORGST	0.566	0.09	***
CONF	<-->	PROCO	0.418	0.078	***
CONF	<-->	SUCC	0.434	0.086	***
CONF	<-->	TRUST	-0.179	0.063	0.005
COOR	<-->	DESC	0.467	0.07	***
COOR	<-->	EXPE	0.267	0.053	***
COOR	<-->	ORGST	0.53	0.077	***
COOR	<-->	PROCO	0.281	0.056	***
COOR	<-->	SUCC	0.405	0.073	***
COOR	<-->	TRUST	-0.064	0.032	0.049
DESC	<-->	EXPE	0.364	0.06	***
DESC	<-->	ORGST	0.572	0.078	***
DESC	<-->	PROCO	0.302	0.058	***
DESC	<-->	SUCC	0.364	0.07	***
DESC	<-->	TRUST	-0.064	0.033	0.056
EXPE	<-->	ORGST	0.363	0.062	***
EXPE	<-->	PROCO	0.236	0.049	***

Factors			Covariance estimate	SE	Significance
EXPE	<-->	SUCC	0.264	0.057	***
EXPE	<-->	TRUST	-0.071	0.031	0.022
ORGST	<-->	PROCO	0.321	0.062	***
ORGST	<-->	SUCC	0.367	0.072	***
ORGST	<-->	TRUST	-0.088	0.038	0.022
PROCO	<-->	SUCC	0.288	0.061	***
PROCO	<-->	TRUST	-0.093	0.035	0.009
SUCC	<-->	TRUST	-0.065	0.033	0.05

A high number of factor covariances is significant at a $p < 0.001$ (***) level, 14 are significant at a $p < 0.05$ level and 18 are not significant.

A4.3 – Factor correlations

The standardized correlation estimates of the factors are shown in the following table:

Factors			Covariance estimate	SE	Significance	Correlation estimate
PROJU	<-->	DISJU	0.453	0.071	***	0.61
PROJU	<-->	INTJU	0.364	0.058	***	0.65
PROJU	<-->	PROJUCL	0.365	0.054	***	0.89
PROJU	<-->	DISJCL	0.39	0.063	***	0.59
PROJU	<-->	INTJCL	0.044	0.041	0.285	0.61
PROJU	<-->	COMMI	0.266	0.053	***	0.64
PROJU	<-->	COMMU	0.401	0.064	***	0.70
PROJU	<-->	COMP	0.442	0.074	***	0.63
PROJU	<-->	CONF	0.535	0.079	***	0.77
PROJU	<-->	COOR	0.334	0.057	***	0.63
PROJU	<-->	DESC	0.335	0.058	***	0.56
PROJU	<-->	EXPE	0.246	0.048	***	0.57
PROJU	<-->	ORGST	0.397	0.063	***	0.68
PROJU	<-->	PROCO	0.301	0.055	***	0.72
PROJU	<-->	SUCC	0.333	0.063	***	0.59
PROJU	<-->	TRUST	-0.086	0.035	0.013	-0.50
DISJU	<-->	INTJU	0.339	0.07	***	0.41
DISJU	<-->	PROJUCL	0.354	0.059	***	0.58
DISJU	<-->	DISJCL	0.744	0.095	***	0.76
DISJU	<-->	INTJCL	0.036	0.035	0.293	0.34
DISJU	<-->	COMMI	0.288	0.066	***	0.46
DISJU	<-->	COMMU	0.455	0.08	***	0.53
DISJU	<-->	COMP	0.508	0.095	***	0.49
DISJU	<-->	CONF	0.429	0.093	***	0.42
DISJU	<-->	COOR	0.411	0.075	***	0.53
DISJU	<-->	DESC	0.303	0.073	***	0.34
DISJU	<-->	EXPE	0.255	0.061	***	0.40
DISJU	<-->	ORGST	0.364	0.077	***	0.42
DISJU	<-->	PROCO	0.307	0.065	***	0.49
DISJU	<-->	SUCC	0.586	0.096	***	0.70
DISJU	<-->	TRUST	-0.086	0.042	0.04	-0.34
INTJU	<-->	PROJUCL	0.314	0.05	***	0.69
INTJU	<-->	DISJCL	0.38	0.067	***	0.51
INTJU	<-->	INTJCL	0.07	0.065	0.283	0.87
INTJU	<-->	COMMI	0.271	0.056	***	0.58
INTJU	<-->	COMMU	0.548	0.078	***	0.85

Factors			Covariance estimate	SE	Significance	Correlation estimate
INTJU	<-->	COMP	0.689	0.095	***	0.87
INTJU	<-->	CONF	0.622	0.089	***	0.80
INTJU	<-->	COOR	0.29	0.058	***	0.49
INTJU	<-->	DESC	0.321	0.061	***	0.48
INTJU	<-->	EXPE	0.296	0.054	***	0.62
INTJU	<-->	ORGST	0.353	0.064	***	0.54
INTJU	<-->	PROCO	0.302	0.058	***	0.64
INTJU	<-->	SUCC	0.29	0.062	***	0.46
INTJU	<-->	TRUST	-0.139	0.049	0.004	-0.72
PROJUCL	<-->	DISJCL	0.355	0.055	***	0.65
PROJUCL	<-->	INTJCL	0.04	0.037	0.285	0.67
PROJUCL	<-->	COMMI	0.205	0.043	***	0.60
PROJUCL	<-->	COMMU	0.348	0.055	***	0.73
PROJUCL	<-->	COMP	0.381	0.063	***	0.65
PROJUCL	<-->	CONF	0.424	0.066	***	0.75
PROJUCL	<-->	COOR	0.31	0.051	***	0.71
PROJUCL	<-->	DESC	0.3	0.05	***	0.61
PROJUCL	<-->	EXPE	0.212	0.041	***	0.60
PROJUCL	<-->	ORGST	0.33	0.053	***	0.69
PROJUCL	<-->	PROCO	0.241	0.046	***	0.70
PROJUCL	<-->	SUCC	0.292	0.054	***	0.63
PROJUCL	<-->	TRUST	-0.092	0.034	0.006	-0.65
DISJCL	<-->	INTJCL	0.051	0.048	0.285	0.53
DISJCL	<-->	COMMI	0.21	0.056	***	0.38
DISJCL	<-->	COMMU	0.433	0.074	***	0.56
DISJCL	<-->	COMP	0.477	0.086	***	0.51
DISJCL	<-->	CONF	0.48	0.087	***	0.52
DISJCL	<-->	COOR	0.324	0.066	***	0.46
DISJCL	<-->	DESC	0.281	0.066	***	0.35
DISJCL	<-->	EXPE	0.234	0.055	***	0.41
DISJCL	<-->	ORGST	0.327	0.069	***	0.42
DISJCL	<-->	PROCO	0.292	0.06	***	0.52
DISJCL	<-->	SUCC	0.475	0.081	***	0.63
DISJCL	<-->	TRUST	-0.115	0.045	0.011	-0.50
INTJCL	<-->	COMMI	0.025	0.024	0.295	0.42
INTJCL	<-->	COMMU	0.062	0.057	0.284	0.74
INTJCL	<-->	COMP	0.077	0.072	0.283	0.75
INTJCL	<-->	CONF	0.069	0.065	0.284	0.70
INTJCL	<-->	COOR	0.036	0.034	0.289	0.47
INTJCL	<-->	DESC	0.042	0.039	0.287	0.48

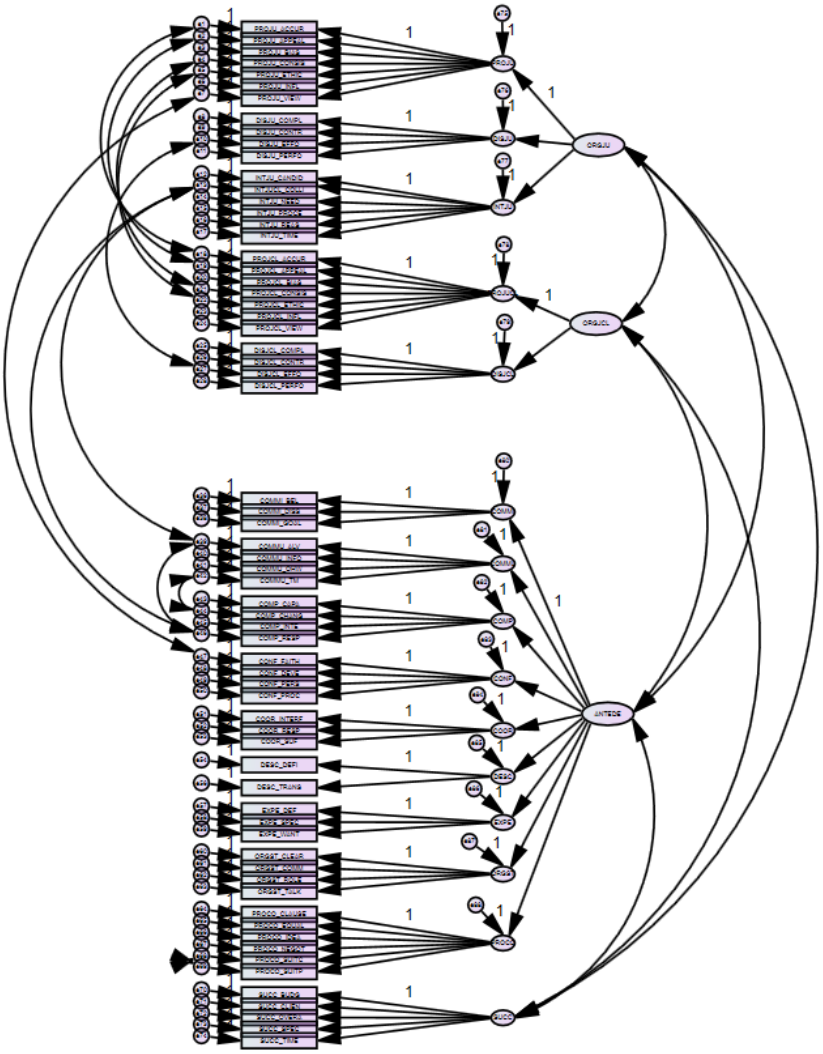
Factors			Covariance estimate	SE	Significance	Correlation estimate
INTJCL	<-->	EXPE	0.03	0.029	0.29	0.49
INTJCL	<-->	ORGST	0.043	0.04	0.287	0.51
INTJCL	<-->	PROCO	0.036	0.034	0.288	0.60
INTJCL	<-->	SUCC	0.033	0.032	0.292	0.41
INTJCL	<-->	TRUST	-0.016	0.015	0.313	-0.62
COMMI	<-->	COMMU	0.284	0.06	***	0.59
COMMI	<-->	COMP	0.308	0.069	***	0.52
COMMI	<-->	CONF	0.378	0.076	***	0.65
COMMI	<-->	COOR	0.264	0.057	***	0.59
COMMI	<-->	DESC	0.218	0.054	***	0.44
COMMI	<-->	EXPE	0.195	0.047	***	0.54
COMMI	<-->	ORGST	0.229	0.056	***	0.47
COMMI	<-->	PROCO	0.198	0.047	***	0.56
COMMI	<-->	SUCC	0.256	0.059	***	0.54
COMMI	<-->	TRUST	-0.056	0.028	0.047	-0.39
COMMU	<-->	COMP	0.778	0.107	***	0.95
COMMU	<-->	CONF	0.647	0.096	***	0.81
COMMU	<-->	COOR	0.331	0.064	***	0.54
COMMU	<-->	DESC	0.371	0.067	***	0.54
COMMU	<-->	EXPE	0.324	0.059	***	0.65
COMMU	<-->	ORGST	0.399	0.07	***	0.59
COMMU	<-->	PROCO	0.333	0.063	***	0.68
COMMU	<-->	SUCC	0.401	0.075	***	0.61
COMMU	<-->	TRUST	-0.158	0.055	0.004	-0.78
COMP	<-->	CONF	0.801	0.116	***	0.81
COMP	<-->	COOR	0.36	0.075	***	0.48
COMP	<-->	DESC	0.426	0.08	***	0.50
COMP	<-->	EXPE	0.399	0.072	***	0.65
COMP	<-->	ORGST	0.469	0.084	***	0.57
COMP	<-->	PROCO	0.395	0.075	***	0.66
COMP	<-->	SUCC	0.46	0.088	***	0.58
COMP	<-->	TRUST	-0.243	0.08	0.002	-0.99
CONF	<-->	COOR	0.472	0.082	***	0.64
CONF	<-->	DESC	0.563	0.087	***	0.68
CONF	<-->	EXPE	0.44	0.075	***	0.74
CONF	<-->	ORGST	0.566	0.09	***	0.70
CONF	<-->	PROCO	0.418	0.078	***	0.72
CONF	<-->	SUCC	0.434	0.086	***	0.56
CONF	<-->	TRUST	-0.179	0.063	0.005	-0.74
COOR	<-->	DESC	0.467	0.07	***	0.74

Factors			Covariance estimate	SE	Significance	Correlation estimate
COOR	<-->	EXPE	0.267	0.053	***	0.58
COOR	<-->	ORGST	0.53	0.077	***	0.86
COOR	<-->	PROCO	0.281	0.056	***	0.63
COOR	<-->	SUCC	0.405	0.073	***	0.68
COOR	<-->	TRUST	-0.064	0.032	0.049	-0.35
DESC	<-->	EXPE	0.364	0.06	***	0.71
DESC	<-->	ORGST	0.572	0.078	***	0.82
DESC	<-->	PROCO	0.302	0.058	***	0.60
DESC	<-->	SUCC	0.364	0.07	***	0.54
DESC	<-->	TRUST	-0.064	0.033	0.056	-0.31
EXPE	<-->	ORGST	0.363	0.062	***	0.72
EXPE	<-->	PROCO	0.236	0.049	***	0.65
EXPE	<-->	SUCC	0.264	0.057	***	0.54
EXPE	<-->	TRUST	-0.071	0.031	0.022	-0.47
ORGST	<-->	PROCO	0.321	0.062	***	0.65
ORGST	<-->	SUCC	0.367	0.072	***	0.56
ORGST	<-->	TRUST	-0.088	0.038	0.022	-0.43
PROCO	<-->	SUCC	0.288	0.061	***	0.61
PROCO	<-->	TRUST	-0.093	0.035	0.009	-0.63
SUCC	<-->	TRUST	-0.065	0.033	0.05	-0.33

A4.4 – Equivalent models

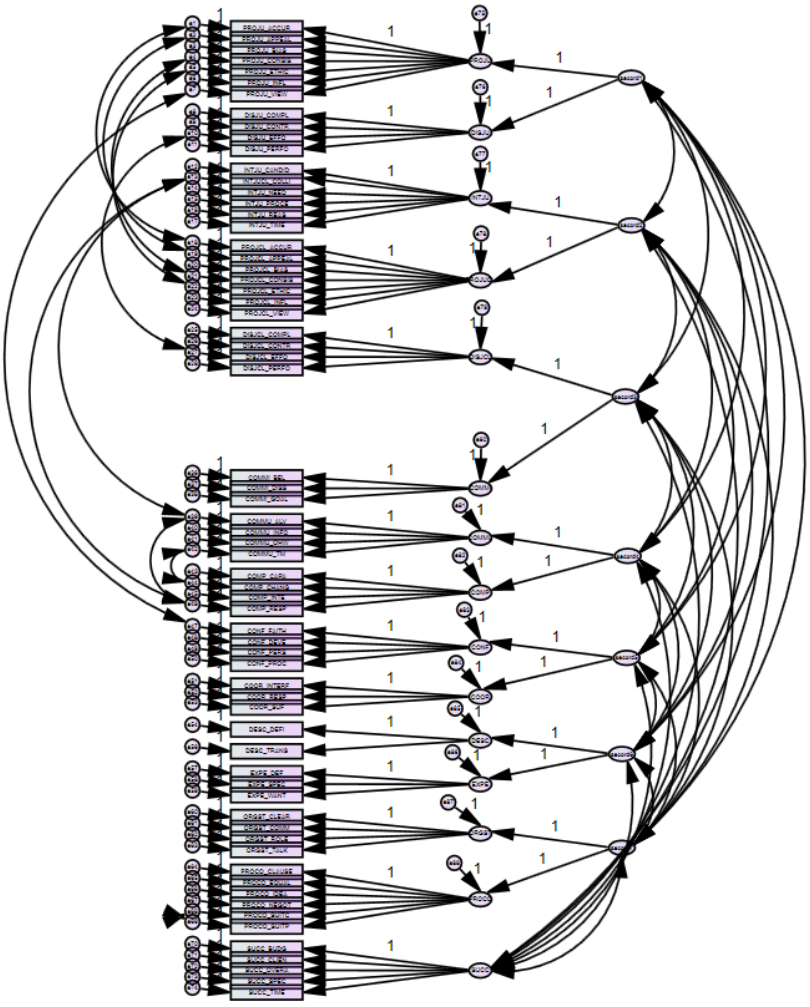
Six equivalent measurement models to the modified model (III) are presented in the following:

Equivalent model (I)



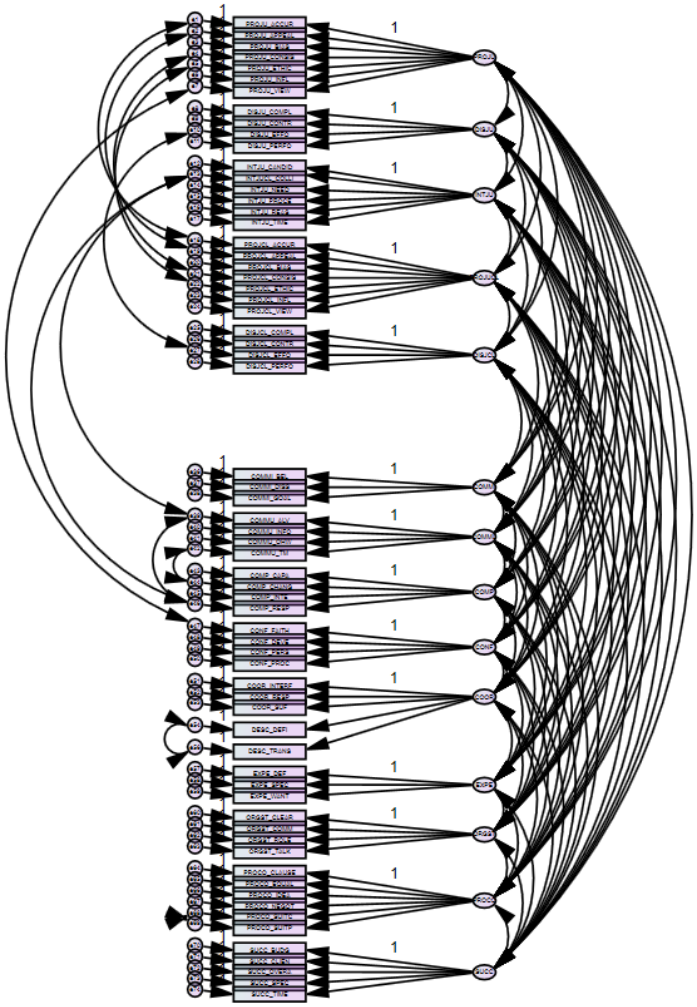
Fit statistic	Result
χ^2_M	3572.06
df_M	2048
p	0.00
χ^2_M / df_M	1.74
RMSEA (90% CI)	0.06 (0.06 – 0.07)
P close-fit H0	0.00
GFI	0.64
RMR	0.09
SRMR	0.08
CFI	0.84
NFI	0.69
TLI	0.83

Equivalent model (II)



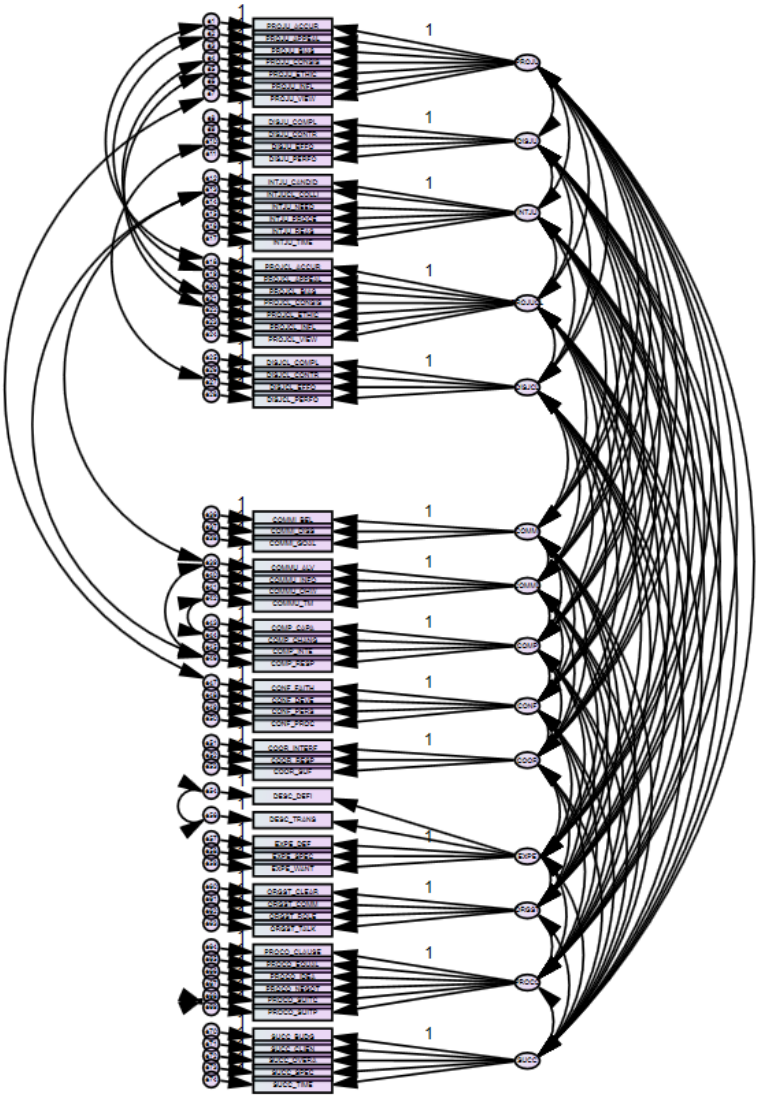
Fit statistic	Result
χ^2_M	3470.59
df_M	2033
p	0.00
χ^2_M / df_M	1.71
RMSEA (90% CI)	0.06 (0.06 – 0.06)
$P_{\text{close-fit H0}}$	0.00
GFI	0.67
RMR	0.09
SRMR	0.08
CFI	0.85
NFI	0.70
TLI	0.84

Equivalent model (III)



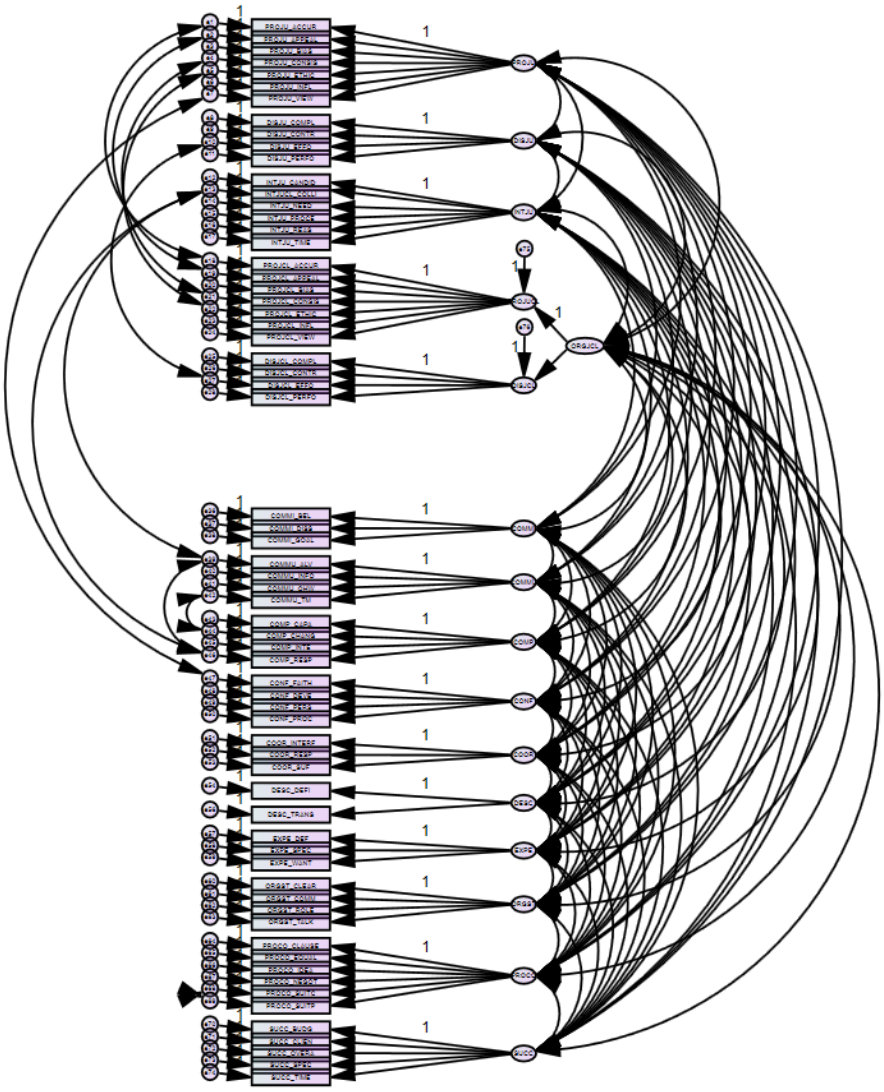
Fit statistic	Result
χ^2_M	3172.97
df_M	1976
p	0.00
χ^2_M / df_M	1.61
RMSEA (90% CI)	0.06 (0.05 – 0.06)
P close-fit H0	0.00
GFI	0.69
RMR	0.07
SRMR	0.06
CFI	0.87
NFI	0.73
TLI	0.86

Equivalent model (IV)



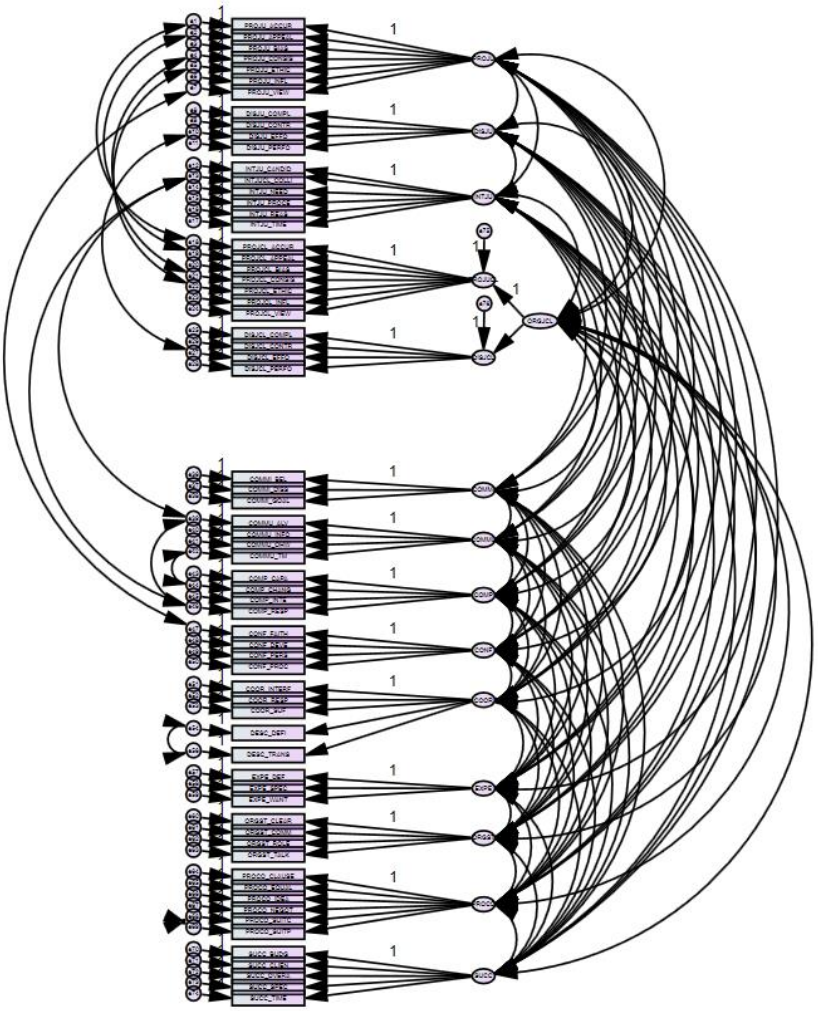
Fit statistic	Result
χ^2_M	3178.36
df_M	1976
p	0.00
χ^2_M / df_M	1.61
RMSEA (90% CI)	0.06 (0.05 – 0.06)
P close-fit H0	0.00
GFI	0.67
RMR	0.07
SRMR	0.06
CFI	0.87
NFI	0.73
TLI	0.86

Equivalent model (V)



Fit statistic	Result
χ^2_M	3222.35
df_M	1975
p	0.00
χ^2_M / df_M	1.63
RMSEA (90% CI)	0.06 (0.05 – 0.06)
P close-fit H0	0.00
GFI	0.68
RMR	0.07
SRMR	0.07
CFI	0.87
NFI	0.72
TLI	0.86

Equivalent model (VI)



Fit statistic	Result
χ^2_M	3252.05
df_M	1987
p	0.00
χ^2_M / df_M	1.64
RMSEA (90% CI)	0.06 (0.05 – 0.06)
P close-fit H0	0.00
GFI	0.68
RMR	0.07
SRMR	0.07
CFI	0.87
NFI	0.72
TLI	0.86

Appendix 5 – Structural model

A5.1 – Indirect effects

The indirect effects using the Sobel test are presented in the table below. The type of mediation is categorised based on Zhao et al. (2010) taking into consideration the direct effects with mediators from Table 5.21.

Variables					Sobel test statistic	Sign.	Type of mediation
SUCC_BUDG	<---	COMMI	<---	DISJU	-1.63	ns	Direct-only non-mediation
SUCC_CLIEN	<---	COMMI	<---	DISJU	0.12	ns	Direct-only non-mediation
SUCC_OVERA	<---	COMMI	<---	DISJU	-2.11	*	Complementary mediation
SUCC_SPEC	<---	COMMI	<---	DISJU	1.27	ns	No-effect non-mediation
SUCC_TIME	<---	COMMI	<---	DISJU	0.29	ns	Direct-only non-mediation
SUCC_BUDG	<---	COMMU	<---	DISJU	-0.86	ns	Direct-only non-mediation
SUCC_CLIEN	<---	COMMU	<---	DISJU	1.27	ns	Direct-only non-mediation
SUCC_OVERA	<---	COMMU	<---	DISJU	0.00	ns	Direct-only non-mediation
SUCC_SPEC	<---	COMMU	<---	DISJU	0.21	ns	No-effect non-mediation
SUCC_TIME	<---	COMMU	<---	DISJU	0.51	ns	Direct-only non-mediation
SUCC_BUDG	<---	COMP	<---	DISJU	2.95	**	Competitive mediation
SUCC_CLIEN	<---	COMP	<---	DISJU	1.92	ns	Direct-only non-mediation
SUCC_OVERA	<---	COMP	<---	DISJU	3.12	**	Competitive mediation
SUCC_SPEC	<---	COMP	<---	DISJU	1.15	ns	No-effect non-mediation
SUCC_TIME	<---	COMP	<---	DISJU	2.85	**	Competitive mediation
SUCC_BUDG	<---	CONF	<---	DISJU	1.33	ns	Direct-only non-mediation
SUCC_CLIEN	<---	CONF	<---	DISJU	1.39	ns	Direct-only non-mediation
SUCC_OVERA	<---	CONF	<---	DISJU	1.44	ns	Direct-only non-mediation
SUCC_SPEC	<---	CONF	<---	DISJU	1.19	ns	No-effect non-mediation
SUCC_TIME	<---	CONF	<---	DISJU	1.37	ns	Direct-only non-mediation
SUCC_BUDG	<---	COOR	<---	DISJU	3.05	**	Competitive mediation
SUCC_CLIEN	<---	COOR	<---	DISJU	2.62	**	Competitive mediation
SUCC_OVERA	<---	COOR	<---	DISJU	3.48	***	Competitive mediation
SUCC_SPEC	<---	COOR	<---	DISJU	1.09	ns	No-effect non-mediation
SUCC_TIME	<---	COOR	<---	DISJU	2.81	**	Competitive mediation
SUCC_BUDG	<---	DESC	<---	DISJU	0.39	ns	Direct-only non-mediation
SUCC_CLIEN	<---	DESC	<---	DISJU	0.39	ns	Direct-only non-mediation
SUCC_OVERA	<---	DESC	<---	DISJU	0.40	ns	Direct-only non-mediation
SUCC_SPEC	<---	DESC	<---	DISJU	0.37	ns	No-effect non-mediation
SUCC_TIME	<---	DESC	<---	DISJU	0.39	ns	Direct-only non-mediation
SUCC_BUDG	<---	EXPE	<---	DISJU	1.02	ns	Direct-only non-mediation
SUCC_CLIEN	<---	EXPE	<---	DISJU	1.08	ns	Direct-only non-mediation
SUCC_OVERA	<---	EXPE	<---	DISJU	1.14	ns	Direct-only non-mediation

Variables					Sobel test statistic	Sign.	Type of mediation
SUCC_SPEC	<---	EXPE	<---	DISJU	0.91	ns	No-effect non-mediation
SUCC_TIME	<---	EXPE	<---	DISJU	0.93	ns	Direct-only non-mediation
SUCC_BUDG	<---	ORGST	<---	DISJU	-0.33	ns	Direct-only non-mediation
SUCC_CLIEN	<---	ORGST	<---	DISJU	-0.33	ns	Direct-only non-mediation
SUCC_OVERA	<---	ORGST	<---	DISJU	-0.33	ns	Direct-only non-mediation
SUCC_SPEC	<---	ORGST	<---	DISJU	-0.31	ns	No-effect non-mediation
SUCC_TIME	<---	ORGST	<---	DISJU	-0.33	ns	Direct-only non-mediation
SUCC_BUDG	<---	PROCO	<---	DISJU	0.20	ns	Direct-only non-mediation
SUCC_CLIEN	<---	PROCO	<---	DISJU	0.19	ns	Direct-only non-mediation
SUCC_OVERA	<---	PROCO	<---	DISJU	0.20	ns	Direct-only non-mediation
SUCC_SPEC	<---	PROCO	<---	DISJU	0.19	ns	No-effect non-mediation
SUCC_TIME	<---	PROCO	<---	DISJU	0.19	ns	Direct-only non-mediation
SUCC_BUDG	<---	COMMI	<---	INTJU	-1.70	ns	Direct-only non-mediation
SUCC_CLIEN	<---	COMMI	<---	INTJU	0.12	ns	Direct-only non-mediation
SUCC_OVERA	<---	COMMI	<---	INTJU	-2.27	*	Complementary mediation
SUCC_SPEC	<---	COMMI	<---	INTJU	1.31	ns	No-effect non-mediation
SUCC_TIME	<---	COMMI	<---	INTJU	0.29	ns	Direct-only non-mediation
SUCC_BUDG	<---	COMMU	<---	INTJU	-0.89	ns	Direct-only non-mediation
SUCC_CLIEN	<---	COMMU	<---	INTJU	1.34	ns	Direct-only non-mediation
SUCC_OVERA	<---	COMMU	<---	INTJU	0.00	ns	Direct-only non-mediation
SUCC_SPEC	<---	COMMU	<---	INTJU	0.21	ns	No-effect non-mediation
SUCC_TIME	<---	COMMU	<---	INTJU	0.51	ns	Direct-only non-mediation
SUCC_BUDG	<---	COMP	<---	INTJU	4.42	***	Competitive mediation
SUCC_CLIEN	<---	COMP	<---	INTJU	2.20	*	Competitive mediation
SUCC_OVERA	<---	COMP	<---	INTJU	5.07	***	Competitive mediation
SUCC_SPEC	<---	COMP	<---	INTJU	1.20	ns	No-effect non-mediation
SUCC_TIME	<---	COMP	<---	INTJU	4.12	***	Competitive mediation
SUCC_BUDG	<---	CONF	<---	INTJU	-2.70	**	Complementary mediation
SUCC_CLIEN	<---	CONF	<---	INTJU	-3.43	*	Complementary mediation
SUCC_OVERA	<---	CONF	<---	INTJU	-4.29	***	Complementary mediation
SUCC_SPEC	<---	CONF	<---	INTJU	-1.89	ns	No-effect non-mediation
SUCC_TIME	<---	CONF	<---	INTJU	-3.11	**	Complementary mediation
SUCC_BUDG	<---	COOR	<---	INTJU	-0.37	ns	Direct-only non-mediation
SUCC_CLIEN	<---	COOR	<---	INTJU	-0.37	ns	Direct-only non-mediation
SUCC_OVERA	<---	COOR	<---	INTJU	-0.37	ns	Direct-only non-mediation
SUCC_SPEC	<---	COOR	<---	INTJU	-0.36	ns	No-effect non-mediation
SUCC_TIME	<---	COOR	<---	INTJU	-0.37	ns	Direct-only non-mediation
SUCC_BUDG	<---	DESC	<---	INTJU	0.40	ns	Direct-only non-mediation
SUCC_CLIEN	<---	DESC	<---	INTJU	0.41	ns	Direct-only non-mediation
SUCC_OVERA	<---	DESC	<---	INTJU	0.41	ns	Direct-only non-mediation

Variables					Sobel test statistic	Sign.	Type of mediation
SUCC_SPEC	<---	DESC	<---	INTJU	0.38	ns	No-effect non-mediation
SUCC_TIME	<---	DESC	<---	INTJU	0.41	ns	Direct-only non-mediation
SUCC_BUDG	<---	EXPE	<---	INTJU	1.86	ns	Direct-only non-mediation
SUCC_CLIEN	<---	EXPE	<---	INTJU	2.40	**	Competitive mediation
SUCC_OVERA	<---	EXPE	<---	INTJU	3.31	***	Competitive mediation
SUCC_SPEC	<---	EXPE	<---	INTJU	1.38	ns	No-effect non-mediation
SUCC_TIME	<---	EXPE	<---	INTJU	1.44	ns	Direct-only non-mediation
SUCC_BUDG	<---	ORGST	<---	INTJU	-0.78	ns	Direct-only non-mediation
SUCC_CLIEN	<---	ORGST	<---	INTJU	-0.78	ns	Direct-only non-mediation
SUCC_OVERA	<---	ORGST	<---	INTJU	-0.80	ns	Direct-only non-mediation
SUCC_SPEC	<---	ORGST	<---	INTJU	-0.61	ns	No-effect non-mediation
SUCC_TIME	<---	ORGST	<---	INTJU	-0.78	ns	Direct-only non-mediation
SUCC_BUDG	<---	PROCO	<---	INTJU	-0.95	ns	Direct-only non-mediation
SUCC_CLIEN	<---	PROCO	<---	INTJU	-0.86	ns	Direct-only non-mediation
SUCC_OVERA	<---	PROCO	<---	INTJU	-2.35	ns	Direct-only non-mediation
SUCC_SPEC	<---	PROCO	<---	INTJU	-0.65	ns	No-effect non-mediation
SUCC_TIME	<---	PROCO	<---	INTJU	-0.59	ns	Direct-only non-mediation
SUCC_BUDG	<---	COMMI	<---	PROJU	-1.50	ns	Direct-only non-mediation
SUCC_CLIEN	<---	COMMI	<---	PROJU	0.12	ns	Direct-only non-mediation
SUCC_OVERA	<---	COMMI	<---	PROJU	-1.84	ns	Direct-only non-mediation
SUCC_SPEC	<---	COMMI	<---	PROJU	1.21	ns	No-effect non-mediation
SUCC_TIME	<---	COMMI	<---	PROJU	0.29	ns	Direct-only non-mediation
SUCC_BUDG	<---	COMMU	<---	PROJU	0.31	ns	Direct-only non-mediation
SUCC_CLIEN	<---	COMMU	<---	PROJU	-0.32	ns	Direct-only non-mediation
SUCC_OVERA	<---	COMMU	<---	PROJU	0.00	ns	Direct-only non-mediation
SUCC_SPEC	<---	COMMU	<---	PROJU	-0.18	ns	No-effect non-mediation
SUCC_TIME	<---	COMMU	<---	PROJU	-0.28	ns	Direct-only non-mediation
SUCC_BUDG	<---	COMP	<---	PROJU	-1.13	ns	Direct-only non-mediation
SUCC_CLIEN	<---	COMP	<---	PROJU	-1.03	ns	Direct-only non-mediation
SUCC_OVERA	<---	COMP	<---	PROJU	-1.14	ns	Direct-only non-mediation
SUCC_SPEC	<---	COMP	<---	PROJU	-0.84	ns	No-effect non-mediation
SUCC_TIME	<---	COMP	<---	PROJU	-1.13	ns	Direct-only non-mediation
SUCC_BUDG	<---	CONF	<---	PROJU	-2.32	*	Competitive mediation
SUCC_CLIEN	<---	CONF	<---	PROJU	-2.73	**	Competitive mediation
SUCC_OVERA	<---	CONF	<---	PROJU	-3.11	**	Competitive mediation
SUCC_SPEC	<---	CONF	<---	PROJU	-1.74	ns	No-effect non-mediation
SUCC_TIME	<---	CONF	<---	PROJU	-2.56	*	Competitive mediation
SUCC_BUDG	<---	COOR	<---	PROJU	-1.67	ns	Direct-only non-mediation
SUCC_CLIEN	<---	COOR	<---	PROJU	-1.58	ns	Direct-only non-mediation
SUCC_OVERA	<---	COOR	<---	PROJU	-1.73	ns	Direct-only non-mediation

Variables					Sobel test statistic	Sign.	Type of mediation
SUCC_SPEC	<---	COOR	<---	PROJU	-0.95	ns	No-effect non-mediation
SUCC_TIME	<---	COOR	<---	PROJU	-1.62	ns	Direct-only non-mediation
SUCC_BUDG	<---	DESC	<---	PROJU	-0.56	ns	Direct-only non-mediation
SUCC_CLIEN	<---	DESC	<---	PROJU	-0.57	ns	Direct-only non-mediation
SUCC_OVERA	<---	DESC	<---	PROJU	-0.59	ns	Direct-only non-mediation
SUCC_SPEC	<---	DESC	<---	PROJU	-0.51	ns	No-effect non-mediation
SUCC_TIME	<---	DESC	<---	PROJU	-0.58	ns	Direct-only non-mediation
SUCC_BUDG		EXPE	<---	PROJU	0.31	ns	Direct-only non-mediation
SUCC_CLIEN	<---	EXPE	<---	PROJU	0.31	ns	Direct-only non-mediation
SUCC_OVERA	<---	EXPE	<---	PROJU	0.31	ns	Direct-only non-mediation
SUCC_SPEC	<---	EXPE	<---	PROJU	0.31	ns	No-effect non-mediation
SUCC_TIME	<---	EXPE	<---	PROJU	0.31	ns	Direct-only non-mediation
SUCC_BUDG	<---	ORGST	<---	PROJU	-1.18	ns	Direct-only non-mediation
SUCC_CLIEN	<---	ORGST	<---	PROJU	-1.17	ns	Direct-only non-mediation
SUCC_OVERA	<---	ORGST	<---	PROJU	-1.22	ns	Direct-only non-mediation
SUCC_SPEC	<---	ORGST	<---	PROJU	-0.76	ns	No-effect non-mediation
SUCC_TIME	<---	ORGST	<---	PROJU	-1.18	ns	Direct-only non-mediation
SUCC_BUDG	<---	PROCO	<---	PROJU	-0.94	ns	Direct-only non-mediation
SUCC_CLIEN	<---	PROCO	<---	PROJU	-0.85	ns	Direct-only non-mediation
SUCC_OVERA	<---	PROCO	<---	PROJU	-2.22	*	Competitive mediation
SUCC_SPEC	<---	PROCO	<---	PROJU	-0.65	ns	No-effect non-mediation
SUCC_TIME	<---	PROCO	<---	PROJU	-0.59	ns	Direct-only non-mediation
SUCC_BUDG	<---	COMMI	<---	DISJCL	1.60	ns	Direct-only non-mediation
SUCC_CLIEN	<---	COMMI	<---	DISJCL	-0.12	ns	Direct-only non-mediation
SUCC_OVERA	<---	COMMI	<---	DISJCL	2.04	*	Complementary mediation
SUCC_SPEC	<---	COMMI	<---	DISJCL	-1.26	ns	No-effect non-mediation
SUCC_TIME	<---	COMMI	<---	DISJCL	-0.29	ns	Direct-only non-mediation
SUCC_BUDG	<---	COMMU	<---	DISJCL	0.79	ns	Direct-only non-mediation
SUCC_CLIEN	<---	COMMU	<---	DISJCL	-1.07	ns	Direct-only non-mediation
SUCC_OVERA	<---	COMMU	<---	DISJCL	0.00	ns	Direct-only non-mediation
SUCC_SPEC	<---	COMMU	<---	DISJCL	-0.20	ns	No-effect non-mediation
SUCC_TIME	<---	COMMU	<---	DISJCL	-0.49	ns	Direct-only non-mediation
SUCC_BUDG	<---	COMP	<---	DISJCL	-2.25	*	Competitive mediation
SUCC_CLIEN	<---	COMP	<---	DISJCL	-1.68	ns	Direct-only non-mediation
SUCC_OVERA	<---	COMP	<---	DISJCL	-2.32	*	Competitive mediation
SUCC_SPEC	<---	COMP	<---	DISJCL	-1.09	ns	No-effect non-mediation
SUCC_TIME	<---	COMP	<---	DISJCL	-2.20	*	Competitive mediation
SUCC_BUDG	<---	CONF	<---	DISJCL	-0.56	ns	Direct-only non-mediation
SUCC_CLIEN	<---	CONF	<---	DISJCL	-0.56	ns	Direct-only non-mediation
SUCC_OVERA	<---	CONF	<---	DISJCL	-0.57	ns	Direct-only non-mediation

Variables					Sobel test statistic	Sign.	Type of mediation
SUCC_SPEC	<---	CONF	<---	DISJCL	-0.55	ns	No-effect non-mediation
SUCC_TIME	<---	CONF	<---	DISJCL	-0.56	ns	Direct-only non-mediation
SUCC_BUDG	<---	COOR	<---	DISJCL	-2.75	**	Competitive mediation
SUCC_CLIEN	<---	COOR	<---	DISJCL	-2.43	*	Competitive mediation
SUCC_OVERA	<---	COOR	<---	DISJCL	-3.05	**	Competitive mediation
SUCC_SPEC	<---	COOR	<---	DISJCL	-1.07	ns	No-effect non-mediation
SUCC_TIME	<---	COOR	<---	DISJCL	-2.57	**	Competitive mediation
SUCC_BUDG	<---	DESC	<---	DISJCL	-1.17	ns	Direct-only non-mediation
SUCC_CLIEN	<---	DESC	<---	DISJCL	-1.28	ns	Direct-only non-mediation
SUCC_OVERA	<---	DESC	<---	DISJCL	-1.52	ns	Direct-only non-mediation
SUCC_SPEC	<---	DESC	<---	DISJCL	-0.86	ns	No-effect non-mediation
SUCC_TIME	<---	DESC	<---	DISJCL	-1.40	ns	Direct-only non-mediation
SUCC_BUDG	<---	EXPE	<---	DISJCL	-1.21	ns	Direct-only non-mediation
SUCC_CLIEN	<---	EXPE	<---	DISJCL	-1.33	ns	Direct-only non-mediation
SUCC_OVERA	<---	EXPE	<---	DISJCL	-1.44	ns	Direct-only non-mediation
SUCC_SPEC	<---	EXPE	<---	DISJCL	-1.05	ns	No-effect non-mediation
SUCC_TIME	<---	EXPE	<---	DISJCL	-1.07	ns	Direct-only non-mediation
SUCC_BUDG	<---	ORGST	<---	DISJCL	1.45	ns	Direct-only non-mediation
SUCC_CLIEN	<---	ORGST	<---	DISJCL	1.42	ns	Direct-only non-mediation
SUCC_OVERA	<---	ORGST	<---	DISJCL	1.52	ns	Direct-only non-mediation
SUCC_SPEC	<---	ORGST	<---	DISJCL	0.82	ns	No-effect non-mediation
SUCC_TIME	<---	ORGST	<---	DISJCL	1.45	ns	Direct-only non-mediation
SUCC_BUDG	<---	PROCO	<---	DISJCL	-0.70	ns	Direct-only non-mediation
SUCC_CLIEN	<---	PROCO	<---	DISJCL	-0.66	ns	Direct-only non-mediation
SUCC_OVERA	<---	PROCO	<---	DISJCL	-0.94	ns	Direct-only non-mediation
SUCC_SPEC	<---	PROCO	<---	DISJCL	-0.55	ns	No-effect non-mediation
SUCC_TIME	<---	PROCO	<---	DISJCL	-0.51	ns	Direct-only non-mediation
SUCC_BUDG	<---	COMMI	<---	PROJCL	-0.33	ns	Direct-only non-mediation
SUCC_CLIEN	<---	COMMI	<---	PROJCL	0.11	ns	Direct-only non-mediation
SUCC_OVERA	<---	COMMI	<---	PROJCL	-0.33	ns	Direct-only non-mediation
SUCC_SPEC	<---	COMMI	<---	PROJCL	0.32	ns	No-effect non-mediation
SUCC_TIME	<---	COMMI	<---	PROJCL	0.22	ns	Direct-only non-mediation
SUCC_BUDG	<---	COMMU	<---	PROJCL	-0.80	ns	Direct-only non-mediation
SUCC_CLIEN	<---	COMMU	<---	PROJCL	1.09	ns	Direct-only non-mediation
SUCC_OVERA	<---	COMMU	<---	PROJCL	0.00	ns	Direct-only non-mediation
SUCC_SPEC	<---	COMMU	<---	PROJCL	0.20	ns	No-effect non-mediation
SUCC_TIME	<---	COMMU	<---	PROJCL	0.49	ns	Direct-only non-mediation
SUCC_BUDG	<---	COMP	<---	PROJCL	1.48	ns	Direct-only non-mediation
SUCC_CLIEN	<---	COMP	<---	PROJCL	1.28	ns	Direct-only non-mediation
SUCC_OVERA	<---	COMP	<---	PROJCL	1.50	ns	Direct-only non-mediation

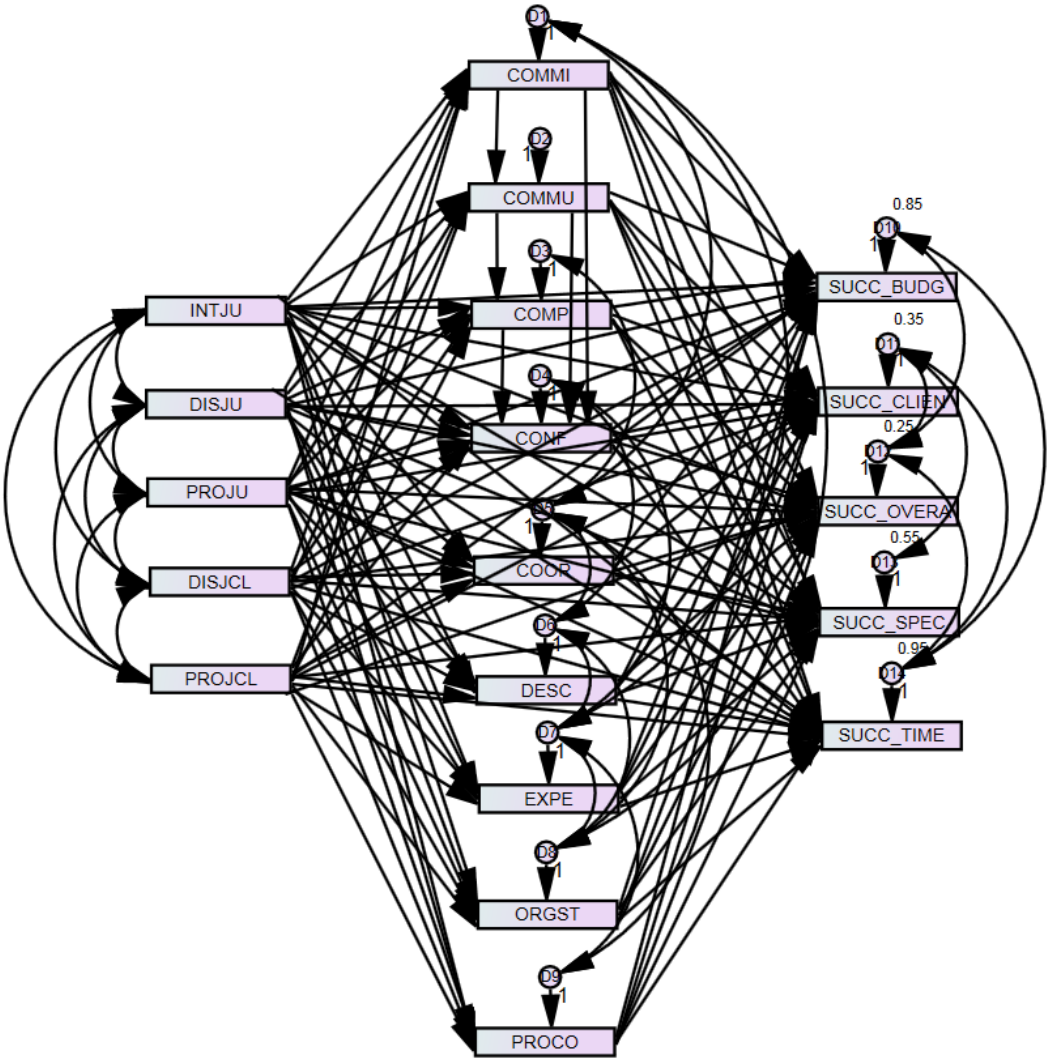
Variables					Sobel test statistic	Sign.	Type of mediation
SUCC_SPEC	<---	COMP	<---	PROJCL	0.95	ns	No-effect non-mediation
SUCC_TIME	<---	COMP	<---	PROJCL	1.47	ns	Direct-only non-mediation
SUCC_BUDG	<---	CONF	<---	PROJCL	-0.17	ns	Direct-only non-mediation
SUCC_CLIEN	<---	CONF	<---	PROJCL	-0.17	ns	Direct-only non-mediation
SUCC_OVERA	<---	CONF	<---	PROJCL	-0.17	ns	Direct-only non-mediation
SUCC_SPEC	<---	CONF	<---	PROJCL	-0.17	ns	No-effect non-mediation
SUCC_TIME	<---	CONF	<---	PROJCL	-0.17	ns	Direct-only non-mediation
SUCC_BUDG	<---	COOR	<---	PROJCL	3.94	***	Competitive mediation
SUCC_CLIEN	<---	COOR	<---	PROJCL	3.14	**	Competitive mediation
SUCC_OVERA	<---	COOR	<---	PROJCL	5.07	***	Competitive mediation
SUCC_SPEC	<---	COOR	<---	PROJCL	1.11	ns	No-effect non-mediation
SUCC_TIME	<---	COOR	<---	PROJCL	3.48	***	Competitive mediation
SUCC_BUDG	<---	DESC	<---	PROJCL	1.49	ns	Direct-only non-mediation
SUCC_CLIEN	<---	DESC	<---	PROJCL	1.73	ns	Direct-only non-mediation
SUCC_OVERA	<---	DESC	<---	PROJCL	2.55	*	Competitive mediation
SUCC_SPEC	<---	DESC	<---	PROJCL	0.97	ns	No-effect non-mediation
SUCC_TIME	<---	DESC	<---	PROJCL	2.07	*	Competitive mediation
SUCC_BUDG	<---	EXPE	<---	PROJCL	1.35	ns	Direct-only non-mediation
SUCC_CLIEN	<---	EXPE	<---	PROJCL	1.52	ns	Direct-only non-mediation
SUCC_OVERA	<---	EXPE	<---	PROJCL	1.69	ns	Direct-only non-mediation
SUCC_SPEC	<---	EXPE	<---	PROJCL	1.13	ns	No-effect non-mediation
SUCC_TIME	<---	EXPE	<---	PROJCL	1.16	ns	Direct-only non-mediation
SUCC_BUDG	<---	ORGST	<---	PROJCL	-2.40	*	Complementary mediation
SUCC_CLIEN	<---	ORGST	<---	PROJCL	-2.26	*	Complementary mediation
SUCC_OVERA	<---	ORGST	<---	PROJCL	-2.79	**	Complementary mediation
SUCC_SPEC	<---	ORGST	<---	PROJCL	-0.91	ns	No-effect non-mediation
SUCC_TIME	<---	ORGST	<---	PROJCL	-2.40	*	Complementary mediation
SUCC_BUDG	<---	PROCO	<---	PROJCL	-0.60	ns	Direct-only non-mediation
SUCC_CLIEN	<---	PROCO	<---	PROJCL	-0.58	ns	Direct-only non-mediation
SUCC_OVERA	<---	PROCO	<---	PROJCL	-0.74	ns	Direct-only non-mediation
SUCC_SPEC	<---	PROCO	<---	PROJCL	-0.50	ns	No-effect non-mediation
SUCC_TIME	<---	PROCO	<---	PROJCL	-0.47	ns	Direct-only non-mediation

*** = p<0.001, ** = p<0.01, * = p<0.05, ns = not significant

A5.2 – Equivalent models

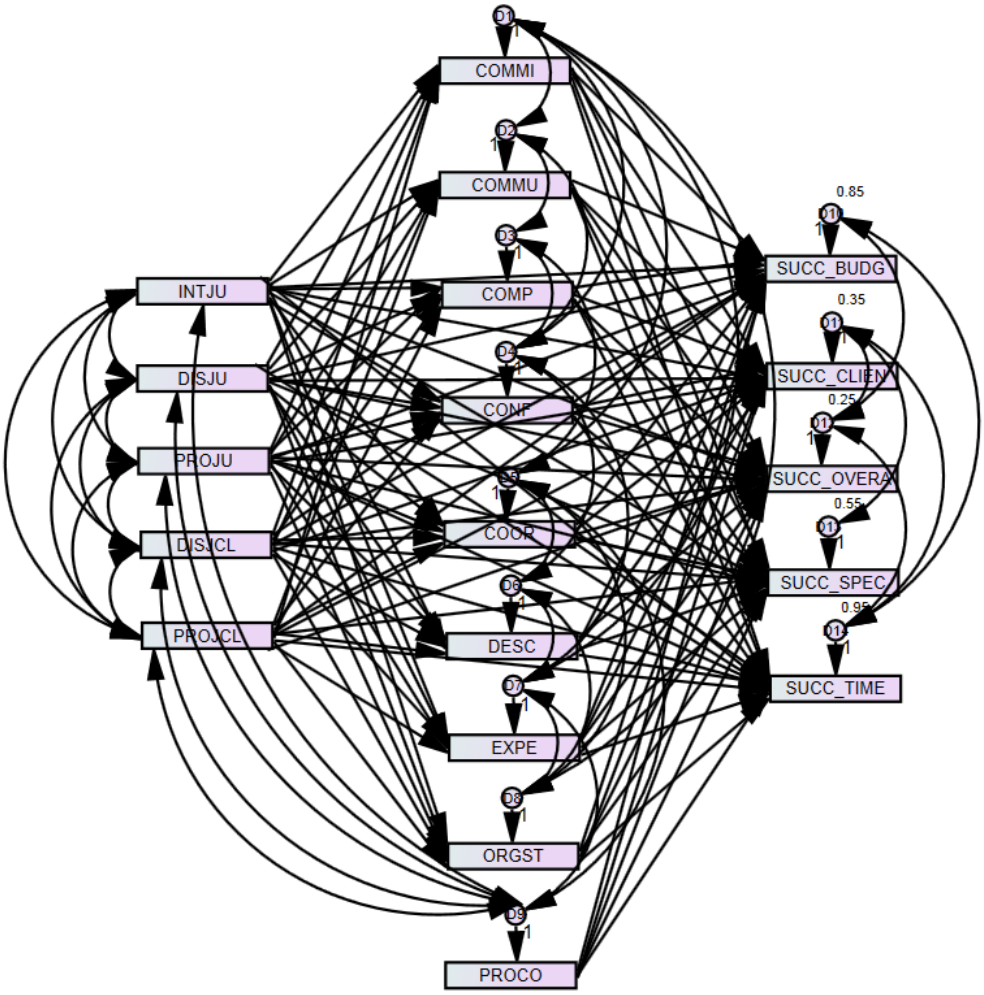
Six equivalent structural models to the modified model (I) are presented in the following:

Equivalent model (I)



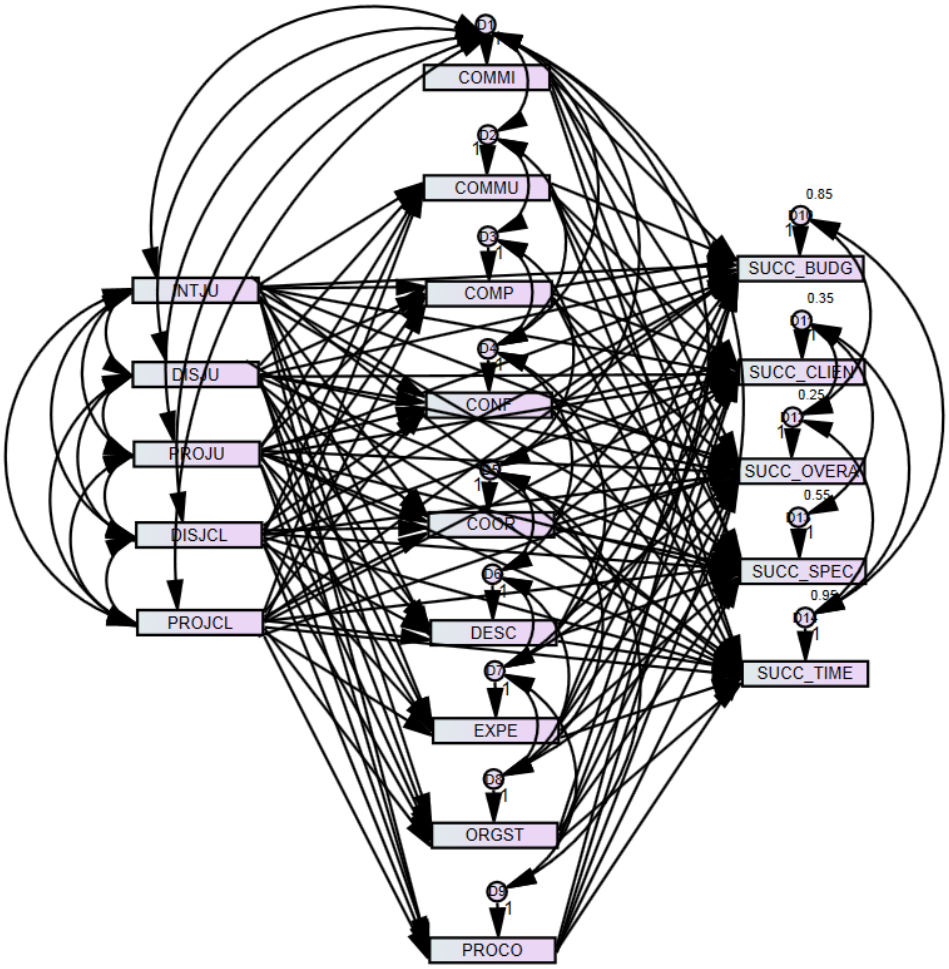
Fit statistic	Result
χ^2_M	185.52
df_M	27
p	0.00
χ^2_M / df_M	6.87
RMSEA (90% CI)	0.17 (0.15 – 0.20)
P close-fit H0	0.00
GFI	0.91
RMR	0.03
SRMR	0.03
CFI	0.97
NFI	0.96
TLI	0.79

Equivalent model (II)



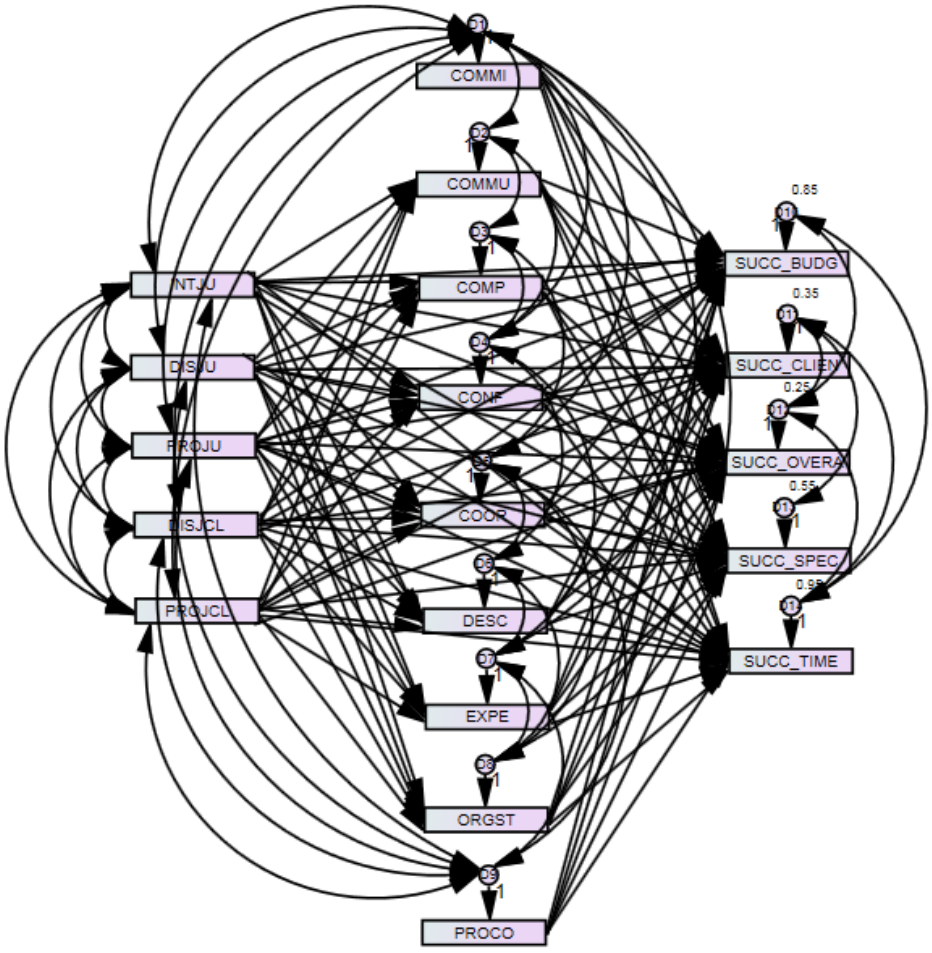
Fit statistic	Result
χ^2_M	161.97
df_M	27
p	0.00
χ^2_M / df_M	6.00
RMSEA (90% CI)	0.16 (0.14 – 0.19)
$P_{\text{close-fit H0}}$	0.00
GFI	0.92
RMR	0.03
SRMR	0.04
CFI	0.97
NFI	0.97
TLI	0.82

Equivalent model (III)



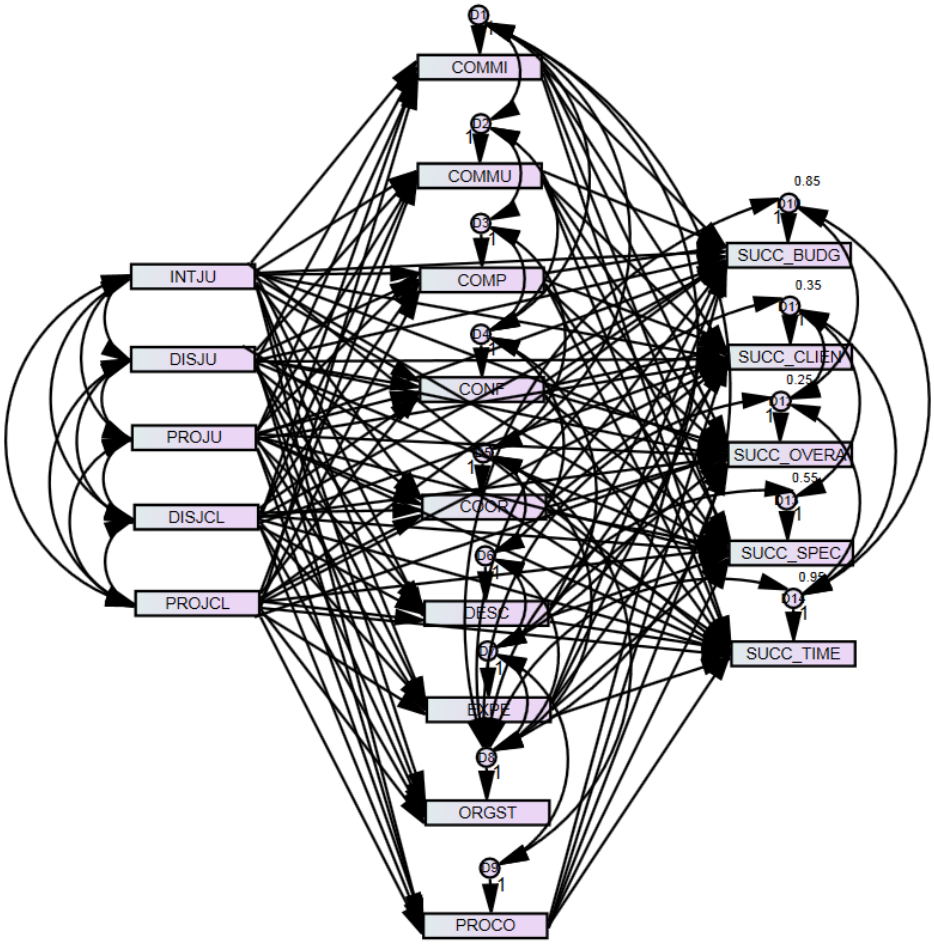
Fit statistic	Result
χ^2_M	161.97
df_M	27
p	0.00
χ^2_M / df_M	6.00
RMSEA (90% CI)	0.16 (0.14 – 0.19)
$P_{\text{close-fit H0}}$	0.00
GFI	0.92
RMR	0.03
SRMR	0.04
CFI	0.97
NFI	0.97
TLI	0.82

Equivalent model (IV)



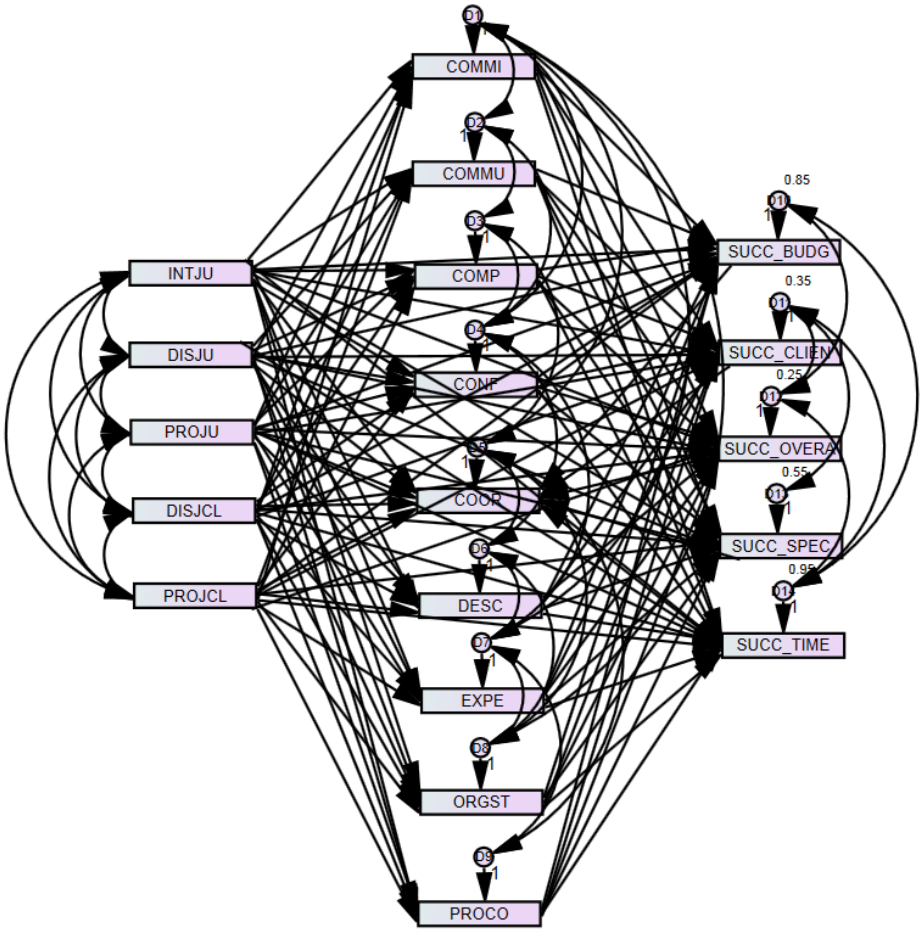
Fit statistic	Result
χ^2_M	290.35
df_M	27
p	0.00
χ^2_M / df_M	10.75
RMSEA (90% CI)	0.23 (0.20 – 0.25)
$P_{\text{close-fit H0}}$	0.00
GFI	0.88
RMR	0.13
SRMR	0.15
CFI	0.95
NFI	0.94
TLI	0.66

Equivalent model (V)



Fit statistic	Result
χ^2_M	182.01
df_M	27
p	0.00
χ^2_M / df_M	6.74
RMSEA (90% CI)	0.17 (0.15 – 0.20)
P close-fit H0	0.00
GFI	0.91
RMR	0.03
SRMR	0.04
CFI	0.97
NFI	0.96
TLI	0.80

Equivalent model (VI)



Fit statistic	Result
χ^2_M	203.52
df_M	27
p	0.00
χ^2_M / df_M	7.54
RMSEA (90% CI)	0.18 (0.16 – 0.21)
P close-fit H0	0.00
GFI	0.90
RMR	0.04
SRMR	0.03
CFI	0.96
NFI	0.96
TLI	0.77