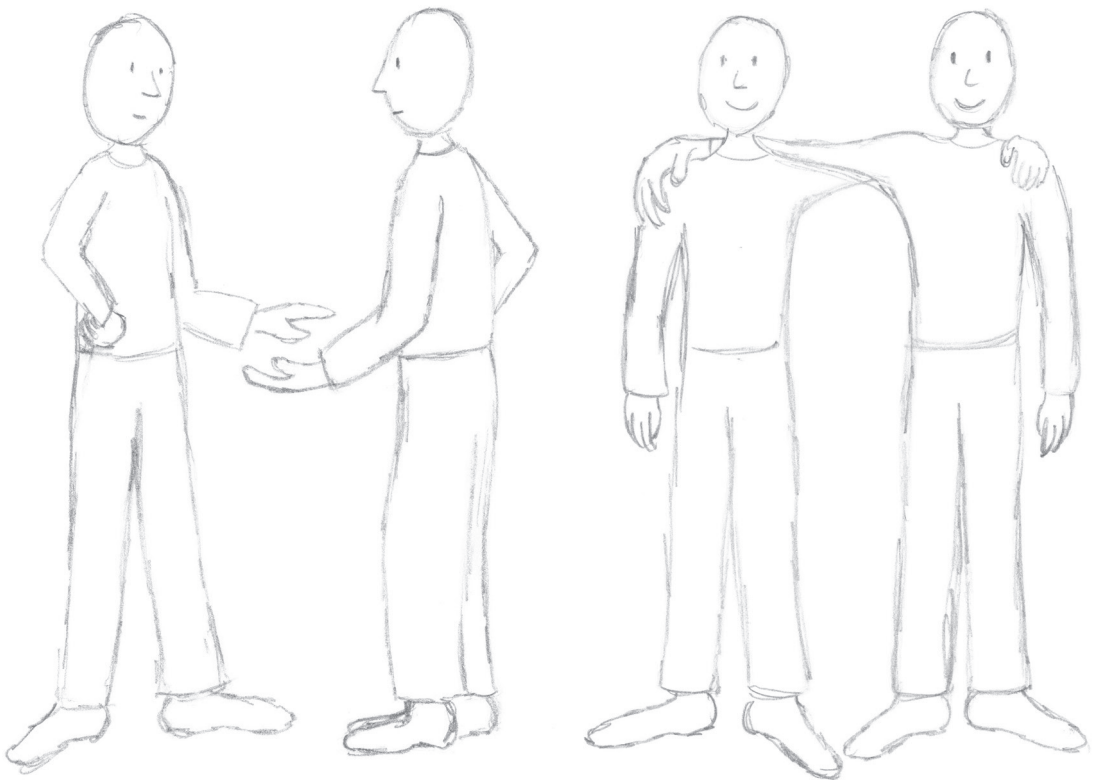


# Buyer-Supplier Relationship Management in the Construction Industry





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Jeroen Bemelmans

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BUYER-SUPPLIER RELATIONSHIP MANAGEMENT IN THE  
CONSTRUCTION INDUSTRY

DISSERTATION

to obtain  
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by

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Everyone has his or her own reason for beginning a PhD research project and striving to obtain the degree of doctor. During most of my study of Industrial Engineering and Management, with a focus on Civil Engineering, I had never even considered conducting PhD research. Nevertheless, in the final year, I became involved in a research project run by Bart Vos, Hans Voordijk and Jan Buter (in a *capita selecta* assignment) and after a couple of weeks it was Jan Buter who asked me to expand my role in this project and commence this PhD research. Had he not asked me and, together with Hans, convinced me, I would not have started this research. Jan, I want to thank you for your confidence in me and for all your help in the first year of my research.

My research was supervised by Bart Vos, Geert Dewulf and Hans Voordijk, each of whom had a specific role in the project. Hans was my daily supervisor (and assistant promotor) and therefore the one with whom I worked the closest. Hans, I will always remember your efforts in improving the papers and your valuable input into this process. I really enjoyed working together and also our social chats during the many car and train journeys. I also enjoyed our cooperative teaching tasks, not only supervising master students but especially “our” master course on Supply Chain Management & ICT. Bart had the task of being my lead promotor and guided me from, literally, a distance (being based in Tilburg). Bart, you succeeded absolutely in the role of providing guidance and valuable feedback. We have had many phone calls and, of course, also face-to-face meetings. Looking back on the whole period, you travelled more often to Enschede than I to Tilburg, and I really appreciate your efforts. I assume that our shared interest in FC Twente also made it worthwhile coming to Enschede, and I really enjoyed being able to combine work and pleasure with you in this way. Geert has been my second promotor. During the first years we discussed the research and progress on a general level, but the contact intensified during the final phase of the research. Geert, I want to thank you for your flexible way of working and the confidence you have demonstrated in this project. I especially appreciate your efforts and guidance in the final phase. Also I would like to thank, in advance, the other members of my promotion committee for their willingness to challenge me during the defence of my PhD thesis.

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In recent years I have naturally met many researchers working in the field of supply chain management and purchasing. First, I would like to thank the colleagues from UTIPS (University of Twente Initiative for Purchasing Studies) for our discussions and meetings. I have enjoyed sharing knowledge by means of this platform within our university. Second, I want to thank the participants of the annual WION (Workshop Inkoop Onderzoek Nederland) for their critical and constructive reviews of my research, your feedback has helped to improve the papers. I also would like to thank Giles Stacey for his editorial work, which has also helped improve the papers.

Naturally I want to mention my colleagues from the Department of Construction Management & Engineering in the Faculty of Engineering Technology and thank them for their collaboration. Members of the 'walking group', thank you for the interesting lunches. I enjoyed our work discussions, and certainly also our non-work-related conversations. I also want to thank all the colleagues who participated in activities such as the hexathlon, water-skiing and barbecuing at the Rutbeek, go-kart racing and many other activities. I really valued these moments of relaxation and social interaction. A special thank-you is for Maartje van Reedt Dortland who was willing to create the cover illustration. To all my fellow PhD researchers I would like to say that I enjoyed sharing Office HT300, and although it could be quite busy we managed to maintain both a productive working environment and have fun. Good luck with your own research, and I will pass on a tip I received from my predecessors: keep focussed on the end goal, make a plan and stick to it, and most of all enjoy your time as a PhD researcher as I did.

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scuba diving trips have helped to completely clear my mind, enjoy beautiful environments and relax. The members of my 'pub-quiz' team have 'forced' me to stay mentally sharp. But, most importantly, I have had fun with all of you and thank you for all the good times and wonderful memories.

I am very grateful for the support of my family. You have all been there for me when needed and showed confidence in me. Esther, thank you for all the sacrifices you have made so that it was possible for me to strive towards the degree of doctor. Over these years, we have bought a house together, got married and had many other precious moments: I am looking forward to the adventures ahead.

Jeroen Bemelmans,  
February 2012



# SUMMARY

The construction industry is a large, fragmented market in which construction firms operate in a decentralized network of suppliers and customers. Projects within this industry can be seen as temporary organizations among and within the organizations involved. The responsibility scope of prime contractors within construction projects is increasing, and client demands are shifting from a focus on just price to a focus on criteria like innovation, sustainability and speed. Another development is that contractors are increasingly depending upon their suppliers to realize the required performance in construction projects. This increasing dependence emphasizes the growing importance for contractors of collaborating with and managing suppliers.

In general, the more mature the purchasing function, which encompasses buyer-supplier relationship management, the greater its contribution to overall company performance. However, in the construction industry only limited research has been conducted on the maturity level of the purchasing function of prime contractors. The concept of supply chain management has, to an extent, been researched in the construction industry, but the focus has mainly been on the client-contractor relationship rather than the contractor-supplier one (Dainty *et al.*, 2001a). An important question still to be answered is how contractors can increase their competitive position in the industry through their relationships with their suppliers.

Given the growing importance for construction companies of the collaboration with and managing of suppliers, and the limited research conducted in the construction industry on supplier-contractor relationships, the aim of this research has been defined as follows:

*The aim of this research is to gain insight into ways in which contractors could improve the management of, and the collaboration with, suppliers in order to increase their competitiveness.*

To achieve this aim, four research phases have been conducted. In the first phase, the current status of supplier-contractor research in the construction industry was explored. In the second and third phases, tools were designed and then applied to assess the maturity levels of buyer-supplier relationship management and of the purchasing function of construction companies. In the fourth and final phase, the supplier's perspective was considered to gain further insight into ways in which contractors could improve the management of and the collaboration with suppliers.

*In the first phase*, the current status of supplier-contractor research in the construction industry was explored. Using a systematic approach to search for and eventually identify 50 articles, published in the 2000-2009 period, it was concluded that supplier-contractor research in the construction industry is still a relatively under-researched phenomenon. Of the sample of 50 articles, only 25 focus solely on supplier-contractor relationships.

The first group of major topics discussed in the identified articles covered aspects of partnering, such as conditions for partnering, characteristics of partnering, barriers/obstacles to partnering, or a combination thereof. In terms of conditions for successful partnering, one of the most interesting results concerns the role of communication and information sharing. Compared to trust and confidence, which are widely accepted as the most influential factors in partnering success, communication and information sharing actually seemed to be more influential. Meanwhile, the testing of organisational barriers to partnering, such as the external environment, organisational culture, organisational climate and organisational structure, had received only limited attention. One of the barriers found to partnering is the lack of belief in the benefits of partnering by practitioners. Nevertheless, many researchers assume partnering is beneficial. Other conditions which were found to lead to closer relationships include creating a learning culture and having institutional norms. The effect of learning experiences on developing relationships and the factors that affect vertical integration have also been addressed, but only to a limited extent.

The other group of major topics discussed involved (sub)contracting/procurement issues, such as the practices employed, selection criteria, performance, characteristics, or a combination of these. Practices of (sub)contracting/procurement issues discussed include approaches used in subcontracting, such as the rate of subcontracting, reasons behind this choice and business relationships with subcontractors, subcontractor and supply enquiries and e-business strategies. The most important selection criterion used by contractors in selecting subcontractors remains the price. Considering the general characteristics of subcontracting, Greenwood (2001) argues that the typical subcontractor-contractor relationship remains traditional and cost-driven, although contractors are becoming interested in having closer relationships (partnerships) with their subcontractors. Ross and Goulding (2007) support this view, that contractors are willing to develop closer relationships, but conclude that such relationships are still in the early stages of development.

*In the second phase*, obstacles to, and opportunities for, increasing the effectiveness of construction firms in managing buyer-supplier relationships were researched. More specifically, the focus was on assessing the maturity level of buyer-supplier relationship management by construction firms.

First, based on a literature review and discussions with industry experts, five constructs were defined and, based on these constructs, a measurement tool was developed. Following this, the maturity level in terms of the five constructs was assessed by applying the measurement tool in 19 Dutch construction firms. It was concluded that the vast majority of companies have maturity levels, in terms of buyer-supplier relationship management, which remain within the project-level classification (i.e. maturity levels no higher than 3 on a scale of 1 to 10). This finding emphasises the dominance of the more traditional, project-based way of working in construction supply chains. While there are major factors impeding, there are, at the same time, developments stimulating the effectiveness of managing buyer-supplier relationships.

The major impeding factors are the lack of formalization, documentation and communication (both internally and with suppliers) linked to the various policies, plans, processes and measurement systems that form part of the management of buyer-supplier relationships. These obstacles reinforce the natural tendency for temporary project work to result in a lack of continuous relationships between firms. On the positive side, many initiatives regarding the optimization of the supply base, the management of supplier relationships, the integration of suppliers into the operational and value creation processes and the development of suppliers have started. Contractors have opportunities to further develop these initiatives, for example by paying specific attention to involving suppliers. These positive developments and opportunities reinforce the improvement potential of buyer-supplier relationship management in the construction industry.

After this assessment, two of the participating case companies indicated that they wanted to make improvements in their buyer-supplier relationship management and purchasing maturity. Further, to monitor if these improvements actually led to a higher level of maturity, the contractors required a quick scan tool that could provide an indication of the current maturity and suggest further possibilities for improvement. Consequently, such a tool was developed in the next research phase.

Thus, *in the third phase*, a quick scan purchasing maturity tool was developed and tested. In developing this tool, design science was an important starting point. A typical product of design science is not a causal model but an act, a sequence of acts, a process, a system or a tool (Hevner *et al.*, 2004; Van Aken, 2004; Voordijk, 2009). In order to make a contribution to design research, the framework first presented by Hevner *et al.* (2004), and further elaborated in 2007 (Hevner, 2007), was applied to purchasing research.

In this case a construction company had the need for a quick scan tool that could assess their purchasing maturity. The tool developed is indeed able to quickly assess the purchasing maturity of a single business unit, and suggest improvements, while involving no more than

approximately two to three hours of work. Another advantage of the new quick scan tool is that it suggests priorities. This prioritization shows those characteristics where the company is lagging and consequently needs to develop further. In doing so, the purchasing function matures and increases its potential to contribute to the overall company performance. Moreover, by improving the management of supplier relationships, companies can obtain a competitive advantage. The collaboration between suppliers and the prime contractor determines the achieved success of a project. Differences in the maturity level of managing these relationships by prime contractors may also affect the relation between a supplier and the contractor.

*In the fourth and final phase, the supplier's perspective is considered to gain further insights into ways that contractors could improve the management of and the collaboration with suppliers: does a contractor's maturity level in managing supplier relationships affect the behaviour of the supplier? Recent research has shown that suppliers do not treat every customer the same (Steinle and Schiele, 2008). The differing treatments by suppliers are reflected in them having awarded, or not, preferred customer status to a contractor. If a supplier regards a buyer as a preferred customer, it will preferentially allocate resources to that buyer.*

Both the antecedents and the impact of a contractor having preferred customer status have been explored. In terms of antecedents, specific attention was paid to an, until now, unexplored factor: the contractor's maturity in supplier relationship management *as perceived by the supplier*. In terms of impact, the focus was on the link between obtaining preferred customer status from a specific supplier and the contractor's satisfaction with its collaboration with that supplier. Inductive qualitative case research was conducted with two cases being investigated. In each, representatives of three companies were interviewed: one supplier plus two of its customers (both prime contractors and one with preferred status). As such, a total of four dyadic matched-pair inter-organizational relationships were investigated.

It has been concluded that there are many antecedents (e.g. attractiveness and satisfaction, recent relationship developments, relationship specific investments, preferential resource allocation and treatment, and innovation / improvement suggestions) to obtaining preferred status, but that not all these antecedents have to be in place to obtain such a status. Conversely, even if all the antecedents are in place, preferred customer status is not guaranteed. The results also reveal the presence of an overlooked antecedent that enables contractors to obtain preferred customer status at their suppliers: namely, the contractor's maturity in managing buyer-supplier relationships. Moreover, if contractors are to obtain preferred customer status at their suppliers, it is important that they are perceived as mature in managing supplier relationships. This new antecedent adopts an overlooked

important aspect: the supplier's perspective. A conclusion that follows is that it is beneficial for a contractor to obtain preferred customer status at a supplier since this will have a positive impact on their satisfaction with the collaboration with that supplier. Finally, if a contractor is satisfied with a collaboration, it is more likely to behave in a more mature way towards the supplier concerned, and this will result in the supplier perceiving that contractor as having a higher maturity level.

Although contractors and suppliers often both want to increase their mutual business, there can be many factors that impede this. The framework presented in this final research phase can help companies to obtain greater insights into such relationships and this will help in overcoming these impediments. Although many variables that influence the relationship between a supplier and a contractor have been researched, to fully understand the various dynamics in relationship development it is recommended that future research adopts a longitudinal approach.





## SAMENVATTING (SUMMARY IN DUTCH)

De bouwsector is een grote, gefragmenteerde markt waarin bouwbedrijven opereren in een gedecentraliseerd netwerk van leveranciers en klanten. Projecten binnen deze industrie kunnen worden gezien als tijdelijke organisatievormen tussen en binnen betrokken partijen. De omvang van de verantwoordelijkheid van hoofdaannemers in bouwprojecten neemt toe en klanteisen verschuiven van een focus op alleen prijs naar een focus op criteria zoals innovatie, duurzaamheid en snelheid. Een andere ontwikkeling is dat aannemers steeds meer afhankelijk worden van hun leveranciers om het vereiste prestatieniveau in bouwprojecten te behalen. Deze toenemende afhankelijkheid benadrukt het als maar groter wordende belang voor aannemers van het samenwerken met en managen van leveranciers.

In het algemeen geldt dat hoe volwassener de inkoopfunctie (die ook het klant-leveranciers relatiemanagement omvat) hoe groter de bijdrage aan de algehele bedrijfsprestaties. Echter, er is in de bouwsector slechts beperkt onderzoek uitgevoerd naar het volwassenheidsniveau van de inkoopfunctie van hoofdaannemers. Tot op zekere hoogte is het concept van ketenmanagement onderzocht in de bouwsector maar hierbij was de focus vooral op de opdrachtgever-aannemer relatie in plaats van op de aannemer-leverancier relatie (Dainty *et al.*, 2001a). Een belangrijke onbeantwoorde vraag is hoe aannemers hun concurrentiepositie in de sector kunnen verhogen door middel van hun leveranciersrelaties.

Gegeven het als maar groter wordende belang voor aannemers van het samenwerken met en managen van leveranciers en de beperkte hoeveelheid onderzoek in de bouwsector naar leverancier-aannemer relaties is het doel van dit onderzoek als volgt geformuleerd:

*Het doel van dit onderzoek is om inzicht te verkrijgen in methoden waarop aannemers het managen van en de samenwerking met leveranciers kunnen verbeteren, om zo hun concurrerend vermogen te vergroten.*

Om dit doel te bereiken zijn vier onderzoeksfases doorlopen. In de eerste fase is de huidige status van leverancier-aannemer onderzoek in de bouwsector onderzocht. In de tweede en derde fase zijn hulpmiddelen ontworpen en vervolgens toegepast om volwassenheidsniveaus van klant-leverancier relatiemanagement en van de inkoopfunctie van bouwbedrijven te beoordelen. In de vierde en laatste fase is het leveranciersperspectief als uitgangspunt genomen om verdere inzichten te verkrijgen in methoden waarop aannemers het managen van en de samenwerking met leveranciers kunnen verbeteren.

*In de eerste fase* is de huidige status van leverancier-aannemer onderzoek in de bouwsector geanalyseerd. Gebruik makend van een systematische aanpak om te zoeken naar en een uiteindelijke identificatie van 50 artikelen, gepubliceerd in de periode 2000-2009, is geconcludeerd dat leverancier-aannemer onderzoek in de bouwsector nog steeds een relatief weinig onderzocht fenomeen is. Uit de verzameling van 50 artikelen richten er zich slechts 25 alleen op leveranciers-aannemer relaties.

De eerste groep van thema's die besproken wordt in de geïdentificeerde artikelen omvat aspecten van samenwerking, zoals voorwaarden voor samenwerking, kenmerken van samenwerking, barrières/belemmeringen voor samenwerking, of een combinatie daarvan. In termen van voorwaarden voor succesvolle samenwerking heeft één van de meest interessante resultaten betrekking op de rol van communicatie en informatie-uitwisseling. In vergelijking met vertrouwen, algemeen beschouwd als de meest invloedrijke factor bij succesvolle samenwerking, bleken communicatie en informatie-uitwisseling invloedrijker. Het testen van organisatorische barrières voor samenwerking, zoals de externe omgeving, de organisatiecultuur, de organisatiesfeer en organisatiestructuur, hebben slechts beperkt aandacht gekregen. Eén van de gevonden barrières voor samenwerking is het gebrek aan geloof in de voordelen van samenwerking door de praktijk. Toch gaan veel onderzoekers ervan uit dat samenwerking voordelig is. Andere gevonden voorwaarden die leiden tot nauwere relaties zijn het creëren van een leercultuur en de aanwezigheid van institutionele normen. Het effect van leerervaringen op het ontwikkelen van relaties en de factoren die verticale integratie beïnvloeden zijn in slechts beperkte mate onderzocht.

De andere groep van thema's die besproken wordt heeft betrekking op (onder)aanneming/inkoop vraagstukken, zoals gebezigde praktijken, selectiecriteria, prestaties, kenmerken, of een combinatie daarvan. Besproken praktijken van (onder)aanneming/inkoop zijn gebruikte benaderingen voor onderaanneming, zoals de verhouding tussen hoofd- en onderaanneming, de redenen achter deze keuze en zakelijke relaties met onderaannemers, onderaanneming- en leveringsaanvragen en e-business strategieën. Het belangrijkste selectie criterium voor het selecteren van onderaannemers blijft de prijs. Ten aanzien van de algemene kenmerken van onderaanneming beargumenteert Greenwood (2001) dat de typische onderaannemer-aannemer relatie traditioneel en kosten-gedreven blijft, maar dat de aannemers steeds meer geïnteresseerd zijn in het hebben van nauwere relaties (partnerships) met hun onderaannemers. Ross en Goulding (2007) ondersteunen deze visie dat aannemers bereid zijn om hechtere relaties te ontwikkelen maar concluderen dat dergelijke relaties zich nog in een vroeg stadium van ontwikkeling bevinden.

*In de tweede fase* zijn de belemmeringen voor en de mogelijkheden om de effectiviteit van bouwbedrijven in het managen van klant-leveranciersrelaties te verhogen onderzocht. Meer

specifiek lag de focus op het beoordelen van het volwassenheidsniveau van klant-leverancier relatiemanagement door bouwbedrijven.

Eerst zijn, op basis van een literatuuronderzoek en discussies met industrie experts, vijf constructen gedefinieerd en op basis daarvan een meetinstrument ontwikkeld. Hierna is het volwassenheidsniveau, in termen van de vijf constructen, beoordeeld door toepassing van het meetinstrument in 19 Nederlandse bouwbedrijven. Er is geconcludeerd dat de overgrote meerderheid van de bedrijven, in termen van klant-leverancier relatiemanagement, volwassenheidsniveaus hebben die niet verder gaan dan het project-niveau (dat wil zeggen volwassenheidsniveaus niet hoger dan 3 op een schaal van 1 tot 10). Deze bevinding benadrukt de dominantie van de meer traditionele, projectmatige wijze van werken in bouwketens. Hoewel er belangrijke belemmerende factoren zijn, zijn er tegelijkertijd ontwikkelingen die de effectiviteit van het managen van klant-leverancier relaties stimuleren.

De belangrijkste belemmerende factoren zijn het gebrek aan formalisering, documentatie en communicatie (zowel intern als met leveranciers) gerelateerd aan de verschillende beleidsterreinen, plannen, processen en meetsystemen die onderdeel zijn van klant-leverancier relatiemanagement. Deze belemmeringen versterken het tijdelijke en projectmatige karakter van relaties in projecten hetgeen leidt tot een gebrek aan continuïteit in relaties tussen bedrijven. Aan de positieve kant zijn veel initiatieven met betrekking tot de optimalisatie van het leveranciersbestand, het managen van leveranciersrelaties, de integratie van leveranciers in de operationele en waarde creatie processen en de ontwikkeling van leveranciers gestart. Aannemers hebben mogelijkheden om deze initiatieven verder te ontwikkelen, bijvoorbeeld door specifieke aandacht te schenken aan het betrekken van leveranciers. Deze positieve ontwikkelingen en kansen benadrukken het verbeterpotentieel van klant-leverancier relatiemanagement in de bouw.

Na deze beoordeling gaven twee van de deelnemende bedrijven aan dat zij hun klant-leverancier relatiemanagement en inkoopvolwassenheid wilden verbeteren. Om te controleren of deze verbeteringen daadwerkelijk leiden tot een hoger volwassenheidsniveau, hadden de aannemers behoefte aan een 'quick scan' meetinstrument dat in staat is om het huidige volwassenheidsniveau en verdere verbetermogelijkheden aan te geven. Derhalve is een dergelijk meetinstrument in de volgende onderzoeksfase ontwikkeld.

*In de derde fase* is dus een 'quick scan' inkoopvolwassenheidsmeetinstrument ontwikkeld en getest. Bij de ontwikkeling van dit instrument was de ontwerpende benadering (*design science*) een belangrijk uitgangspunt. Een typisch product van deze benadering is niet een causaal model, maar een handeling, een opeenvolging van handelingen, een proces, een

systeem of een instrument (Hevner *et al.*, 2004; Van Aken, 2004; Voordijk, 2009). Om een bijdrage te leveren aan de ontwerpende benadering is het kader van Hevner *et al.* (Hevner, 2007; Hevner *et al.*, 2004) toegepast op inkooponderzoek.

In de onderzochte casus had een bouwbedrijf de behoefte aan een 'quick scan' meetinstrument dat hun inkoopvolwassenheid kon beoordelen. Het ontwikkelde meetinstrument is in staat om snel (binnen twee tot drie uur) de inkoopvolwassenheid van een business unit te beoordelen en verbeteringen voor te stellen. Een ander voordeel van het nieuwe 'quick scan' meetinstrument is dat het prioriteiten aangeeft. Deze prioritering geeft die kenmerken aan waarop het bedrijf achterloopt en zich verder moet ontwikkelen. Door dit te doen wordt de inkoopfunctie volwassener en zo het potentieel om bij te dragen aan de algehele bedrijfsprestaties verhoogd. Door het verbeteren van het managen van de leveranciersrelaties kunnen bedrijven bovendien concurrentievoordeel verkrijgen. De samenwerking tussen leveranciers en de hoofdaannemer bepaalt het behaalde succes van een project. Verschillen in het volwassenheidsniveau bij het managen van deze relaties door hoofdaannemers kan ook invloed hebben op de relatie tussen een leverancier en de aannemer.

*In de vierde en laatste fase* is het leveranciersperspectief als uitgangspunt genomen om verdere inzichten te verkrijgen in methoden waarop aannemers het managen van en de samenwerking met leveranciers kunnen verbeteren: heeft het volwassenheidsniveau van een aannemer in het managen van leveranciersrelaties invloed op het gedrag van de leverancier? Recent onderzoek heeft aangetoond dat leveranciers niet iedere klant hetzelfde behandelen (Steinle and Schiele, 2008). Het verschil in behandeling door leveranciers wordt weerspiegeld in het wel of niet toekennen van een voorkeursstatus door de leverancier aan een aannemer (*preferred customer* status). Indien een leverancier een klant als een voorkeursklant beschouwd, zal het bij het toewijzen van de bedrijfsmiddelen voorkeur geven aan die klant.

Zowel de antecedenten als de impact van het hebben van een voorkeursklantstatus zijn onderzocht. In termen van antecedenten is specifiek aandacht besteed aan een, tot nu toe, niet verkende factor: de volwassenheid van de aannemer met betrekking tot leverancier relatiemanagement *zoals waargenomen door de leverancier*. In termen van impact lag de nadruk op het verband tussen het verkrijgen van voorkeursklantstatus van een specifieke leverancier en de tevredenheid van de aannemer over de samenwerking met die leverancier. Inductief kwalitatief casus onderzoek is uitgevoerd waarbij twee casussen zijn onderzocht. In elk van twee de casussen zijn vertegenwoordigers van drie bedrijven geïnterviewd: een leverancier en twee van zijn klanten (allebei hoofdaannemers en één met voorkeursklantstatus). Als zodanig werden in totaal vier dyadische relaties tussen bedrijven onderzocht.

De conclusie is dat er veel antecedenten (bijvoorbeeld aantrekkelijkheid en tevredenheid, recente ontwikkelingen in de relatie, relatie specifieke investeringen, preferentiële toewijzing van middelen en behandeling, en innovatie- / verbetersuggesties) zijn voor het verkrijgen van voorkeursstatus, maar dat niet al deze antecedenten aanwezig hoeven te zijn om een dergelijke status te verkrijgen. Omgekeerd, zelfs als alle antecedenten aanwezig zijn is een voorkeursklantstatus niet gegarandeerd. De resultaten tonen ook de aanwezigheid aan van een over het hoofd gezien antecedent dat aannemers in staat stelt om voorkeursklantstatus te verkrijgen bij hun leveranciers: de volwassenheid van de aannemer in het managen van klant-leverancier relaties. Bovendien, als aannemers een voorkeursklantstatus willen verkrijgen bij hun leveranciers, is het belangrijk dat ze worden waargenomen als volwassen in het managen van leveranciersrelaties. Dit nieuwe antecedent benadrukt het belang van het leveranciersperspectief, een perspectief dat lang over het hoofd is gezien. Een conclusie is dat het gunstig is voor een aannemer om een voorkeursklantstatus van een leverancier te verkrijgen, omdat dit een positieve invloed zal hebben op zijn tevredenheid over de samenwerking met die leverancier. Ten slotte, als een aannemer tevreden is over een samenwerking, dan is de kans groter dat hij zich op een meer volwassen manier naar de betreffende leverancier zal gedragen. Dit zal als resultaat hebben dat de leverancier het volwassenheidsniveau van de aannemer als hoger waarneemt.

Hoewel aannemers en leveranciers vaak streven naar wederzijdse groei, zijn er vele factoren die dit belemmeren. Het gepresenteerde kader in deze laatste onderzoeksfase kan bedrijven helpen om meer inzicht te verkrijgen in dit soort relaties en de belemmeringen te overkomen. Hoewel veel variabelen die de relatie tussen leverancier en aannemer beïnvloeden zijn onderzocht, is verder longitudinaal onderzoek nodig om ten volle de verschillende dynamieken in de ontwikkeling van een dergelijke relatie te begrijpen.



# TABLE OF CONTENTS

Acknowledgements.....	v
Summary.....	ix
Samenvatting (summary in Dutch).....	xv

## Chapter 1

### Introduction

1.1 Context of the construction industry.....	1
1.2 Theoretical context.....	4
1.3 Research project design.....	6
1.4 Structure of thesis.....	9

## Chapter 2

### Supplier-contractor collaboration in the construction industry

2.1 Introduction.....	13
2.2 Research method.....	14
2.2.1 Step 1: Journal selection.....	15
2.2.2 Step 2: Initial article selection.....	15
2.2.3 Step 3: Final article selection.....	17
2.3 Results.....	18
2.3.1 Journal source and publication year.....	18
2.3.2 Research methods employed.....	19
2.3.3 Longitudinal approach.....	20
2.3.4 Scope of data collection (the research perspective).....	20
2.3.5 Unit of analysis.....	21
2.3.6 Common research subjects, theoretical approaches and tools used.....	21

2.4	Discussion and conclusions .....	27
2.4.1	Current state of supplier-contractor research .....	27
2.4.2	Analysis of research into supplier-contractor relationships in the construction industry .....	27
2.4.3	Suggestions for future research .....	28
2.5	Closing remarks .....	30

## Chapter 3

### Assessing buyer-supplier relationship management

3.1	Introduction .....	34
3.2	Literature review .....	35
3.2.1	Optimize supply base .....	36
3.2.2	Manage supplier relationships .....	37
3.2.3	Integrate suppliers into the operational process .....	38
3.2.4	Integrate suppliers into the value creation process .....	38
3.2.5	Develop suppliers .....	39
3.2.6	Project-based working in the construction industry .....	40
3.3	Empirical research design .....	40
3.3.1	Measurement tool .....	41
3.3.2	Data collection at the case companies .....	43
3.4	Results .....	44
3.4.1	Optimize supply base .....	45
3.4.2	Manage supplier relationships .....	46
3.4.3	Integrate suppliers into the operational process .....	47
3.4.4	Integrate suppliers into the value creation process .....	48
3.4.5	Develop suppliers .....	49
3.5	Discussion .....	50
3.6	Conclusions and managerial implications .....	53



## Chapter 4

### Designing a tool for an effective assessment of purchasing maturity in construction

4.1	Introduction .....	56
4.2	Research method .....	57
4.3	Business need.....	59
4.4	Applicable knowledge .....	59
4.4.1	Purchasing maturity & models.....	60
4.4.2	The existing comprehensive industry auditing tool .....	62
4.4.3	The purchasing and supply development model of Van Weele.....	62
4.5	Develop/Build .....	64
4.6	Justify/Evaluate .....	67
4.6.1	Business Unit A.....	67
4.6.2	Business Unit B.....	70
4.7	Applications, additions and concluding remarks .....	72

## Chapter 5

### Why and how to become your suppliers' preferred customer

5.1	Introduction .....	77
5.2	Conceptual framework.....	79
5.2.1	Preferred customer status & collaboration satisfaction .....	79
5.2.2	Supplier relationship management.....	80
5.2.3	Relationships between concepts .....	81
5.3	Research method .....	82
5.4	Results.....	85
5.4.1	Case 1.....	85
5.4.2	Case 2.....	95
5.5	Discussion.....	107
5.5.1	Preferred customer status & collaboration satisfaction .....	107
5.5.2	Supplier relationship management.....	109
5.6	Conclusions and managerial implications .....	110

## Chapter 6

### Conclusions, managerial implications and recommendations

6.1	Conclusions .....	112
6.2	Managerial implications.....	115
6.3	Future research recommendations.....	116

## Appendices

Appendix A.....	119
Appendix B.....	125
Appendix C.....	130
Appendix D.....	132
Appendix E.....	136
References .....	139

# Chapter 1

## INTRODUCTION

In this thesis the results of a PhD research project on buyer-supplier relationships, executed in the Dutch construction industry, are presented. This chapter provides the context of the study subject. In Section 1.1, characteristics of and recent developments in the Dutch construction industry are presented. Then, in Section 1.2, the theoretical context is provided. Thirdly, the research project design is described in Section 1.3 and, finally, in Section 1.4, the structure of this thesis is explained.

### 1.1 CONTEXT OF THE CONSTRUCTION INDUSTRY

The construction industry is a major one: in most national economies it accounts for between 6% and 10% of the gross domestic product. The industry is fragmented and its culture is predominantly adversarial (Cox and Ireland, 2002). Most construction firms operate in a decentralized network of suppliers (subcontractors, material suppliers, service suppliers etc.) and customers, and draw on the production capacity of various external suppliers. These sources of external capacity are typically brought into action on a project basis. A construction project can be seen as a temporary set-up among and within the organizations involved (Hofman *et al.*, 2009).

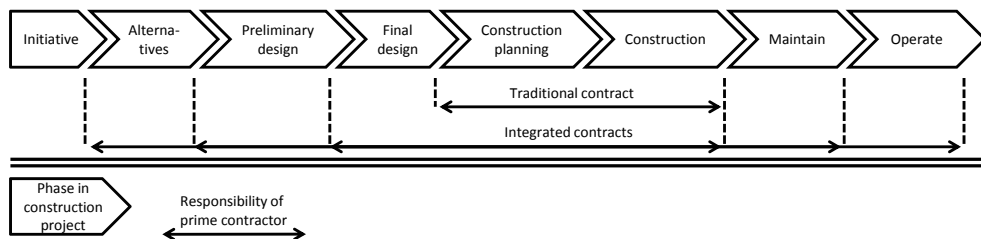
Recent developments in this industry have resulted in an increased importance for construction companies of managing the purchasing function, the collaboration with and managing of suppliers. These developments are presented in this section. First, the shift of responsibilities from client to prime contractor is elaborated upon. Second, the increased dependence of contractors on their suppliers is presented.

#### *Development 1 – Shift of responsibilities from client to prime contractor*

In recent years, clients have increasingly been tendering their construction projects by integrated contracts rather than traditional contracts. In a traditional construction project, the client chooses the contractor who offers the lowest price. Given the cost-driven nature

of the construction industry, the contractor who gets the project then tries to get the lowest prices from its suppliers. The contractor then executes the design, assisted by suppliers. This temporary coalition lasts only until the completion of the project. During the execution stage of the construction process, each firm involved allocates resources according to its contractual obligations (Voordijk, 2004). The established professional and organizational boundaries are rarely crossed. Many problems occur because firms differ in volume, market environment, culture, language and approach. The temporary character of relationships stimulates opportunistic behaviour because parties may try to benefit whenever possible from their contract (Williamson, 1998).

The increased use of integrated contacts by clients means that the scope of responsibilities is shifting: responsibility shifts from client to prime contractor (see Figure 1). In the traditionally tendered construction project, the coordinating role within the overall construction project is filled by the client. However, in integrated contracts the coordination role of prime contractors is expanded. Furthermore, client demands are shifting from a focus on simply price to a focus on criteria like innovation, sustainability and speed. As such, prime contractors are having to meet many more requirements alongside a competitive price. A consequence of this increased responsibility is that prime contractors require capabilities and knowledge which are not part of their own core competences and need to be purchased from suppliers. Consequently, prime contractors have to move from a price competition strategy to a differentiation and segmentation strategy in selecting suppliers. Suppliers have to be selected based on their distinguishing aspects. The importance of managing the purchasing function within construction firms has thus increased.



**FIGURE 1: EXPANDED RESPONSIBILITIES OF PRIME CONTRACTORS**

*Development 2 – Increased dependence on suppliers*

Another development related to the developments described above is that prime contractors increasingly depend upon their suppliers for realizing projects, and for achieving the required performance in these projects. Besides innovative forms of contract, other reasons for this growing dependence are the growing degrees of specialization (Dubois and Gadde, 2000) and industrialization (Vrijhoef and Koskela, 2000) seen in this sector. According

to Eccles (1981), the level of specialization within an industry is an important determinant of the level of subcontracting. Indeed, the construction industry greatly relies on subcontractors (Dubois and Gadde, 2000). Up to 90% of the project turnover can be spent by prime contractors on buying goods and services (Hinze and Tracey, 1994; Nobbs, 1993; Vrijhoef and Koskela, 2000). Nevertheless, prime contractors do not take full advantage of opportunities to make use of external resources through buyer-supplier cooperation (Dubois and Gadde, 2000).

The development and management of long-term buyer-supplier relationships at the cross-project level is difficult as project teams and product designs change from project to project. Many researchers view the temporary nature of these buyer-supplier relationships as unsatisfactory (Briscoe and Dainty, 2005; Egan, 1998; Voordijk *et al.*, 2000; Vrijhoef and Koskela, 2000). Furthermore, the industry continues to rely on price competition (Saad *et al.*, 2002), meaning that suppliers are primarily selected because they offer the lowest price (Greenwood, 2001; Hartmann *et al.*, 2009).

In Bensaou's terms, buyer-supplier relationships in this traditional construction setting can be characterized as a typical market-exchange relationship: "Information exchange between two firms takes place mainly during bidding and contract negotiations. Suppliers do not get involved in the design of the component and usually manufacture to the buyer's specifications" (Bensaou, 1999: p.41). The operational coordination of delivery as well as the monitoring of quality is executed using proven organizational routines. The lack of continuing long-term relationships between firms is seen as the main reason for the failure to increase efficiency and innovation in the construction industry (Dubois and Gadde, 2000). Increased efficiency and innovation could be realized if more permanent relationships between prime contractors and suppliers were allowed to develop. The increasing percentage of project turnover which is spent by prime contractors on buying goods and services provides opportunities for contractor-supplier cooperation and emphasizes the importance and significance of managing the purchasing function.

To summarize, the construction industry is a large, fragmented market in which construction firms operate in a decentralized network of suppliers and customers. Projects within this industry can be seen as temporary organizations among and within the organizations involved. The responsibility scope of prime contractors within construction projects is increasing, and client demands are shifting from a focus on just price to a focus on criteria like innovation, sustainability and speed. Another development related to this is that contractors are increasingly depending upon their suppliers to realize projects, and for achieving the required performance in these projects. Therefore, the importance of managing the purchasing function within construction companies is growing. This increasing

dependence emphasizes the growing importance for contractors of collaborating with and managing suppliers.

## 1.2 THEORETICAL CONTEXT

Given the developments described in the previous section it can be concluded that the importance within construction companies of managing the *purchasing function* is growing. The management of the purchasing function, or purchasing management, is defined as “all activities necessary to manage supplier relationships in such a way that their activities are aligned with the company’s overall business strategies and interests” (Van Weele, 2009: p.11). In manufacturing industries, the role of purchasing has evolved from a clerical buying function into a strategic business function, and the purchasing function now has an impact on the competitive position of a company (Carter and Narasimhan, 1996; Ellram and Carr, 1994). Moreover, by managing supplier relationships, companies can obtain a competitive advantage (Chen *et al.*, 2004; Leenders *et al.*, 2002). The more developed (i.e. mature or professional) the purchasing function, the greater its contribution to overall company performance (Schiele, 2007).

The *maturity level* of the purchasing function is reflected in whether the purchasing function is integrated in the strategic management decision-making process (Pearson and Gritzmacher, 1990) and thus can play a vital role. If the maturity level of the purchasing function is low, it will fulfil a clerical buying function, and this will impede purchasing professionals in providing critical supplier information when needed (Pearson and Gritzmacher, 1990). A purchasing function with a high level of maturity can provide such information and potentially solve problems before major crises occur (Pearson and Gritzmacher, 1990). A company with a well-developed purchasing function may well be applying world-class best practices whereas, with less-developed companies, this is much less likely (Ellram *et al.*, 2002).

However, in the construction industry only limited research has been conducted on the maturity level of the purchasing function of prime contractors. The supply chain management concept has received some attention in research on the construction industry although the focus has mainly been on the client-contractor relationship rather than the contractor-supplier one (Dainty *et al.*, 2001a; Eom *et al.*, 2008). Moreover, results from a study in the UK, that did include the contractor-supplier relationship, show that construction firms have a larger number of collaborative arrangements with clients than with suppliers, and that most relationships with suppliers are contractual in nature (Akintoye and Main, 2007). Also earlier research by Akintoye *et al.* (2000), involving forty construction companies, showed that only one-third of these firms valued relationships with suppliers

more than the relationship with the client, with the other two-thirds arguing the opposite. To improve the situation, Dainty *et al.* (2001b) and Kadefors *et al.* (2007) suggest designing tools that help companies to form and develop closer relationships.

In the last twenty years, business studies have shown that there has been a move away from arm's-length relationships towards longer-term collaborative strategic partnerships (Bensaou, 1999). Manufacturing industries (such as the automotive and electronics ones) can be characterized by the existence of longer-term buyer-supplier relationships (Håkansson and Persson, 2004). Several concepts and frameworks have been developed which have contributed significantly to our understanding of how different buyer-supplier relationships can be developed and managed. Kraljic (1983) described a product-orientated model that could segment the total purchasing portfolio in a systematic way, with each segment requiring a different approach to supplier management. As an alternative, Bensaou (1999) presented a portfolio model of buyer-supplier relationships. In this relationship-orientated model, a two-sided perspective is applied in which the position of one's own company in the supplier's client-portfolio is also taken into account.

The findings from studies of buyer-supplier relationships within manufacturing industries, where production takes place within controlled factory environments and where the supply of goods is merely a repeat process involving a production line, have been argued to be of limited use in the construction industry (Cox and Thompson, 1997). As mentioned earlier, most work within the construction industry is organized as projects. The normal systems of tender-based procurement, as well as the 'project-organization' of most construction work, naturally leads to arm's-length relationships, even if firms repeatedly encounter the same counterparts in various construction projects over time.

Opportunities to capitalize on economies of scale are lost when working on a series of individual projects. Various buyer-supplier and purchasing strategies for managing suppliers are recognised in manufacturing, but their applicability to the construction industry is less well understood (Barlow *et al.*, 2003; Barlow and Ozaki, 2003; Barlow and Ozaki, 2005). It has been argued, for certain products and services in the construction industry, that arm's-length transactions could be replaced by relationship and network-oriented approaches: approaches that stimulate adaptation and joint development between buyers and suppliers (Dubois and Gadde, 2002; Storer *et al.*, 2003). An important question for construction firms is how they could increase their competitive position in the industry through horizontal and vertical links (Inkpen, 1998). Using horizontal relationships, companies are able to achieve scale economies and/or strengthen their position in the market. As a result, they are able to pursue a cost leadership or a differentiation strategy. Through vertical links, a construction firm gains greater control over the sources of critical inputs and/or the distribution of outputs. Vertical links facilitate investments in efficiency-enhancing specialized assets. The

focus in this research is on such *vertical buyer-supplier relationships*. More specifically, the focus is on the relatively under-researched relationship between contractors and their suppliers. How specific characteristics of the construction industry can be taken into account when organizing supplier networks within the construction industry is analysed.

To summarize, the importance of managing the purchasing function within construction companies is growing (as became clear in Section 1.2). The more mature the purchasing function, the greater its contribution to overall company performance. However, in the construction industry only limited research has been conducted on the maturity level of the purchasing function of prime contractors. The concept of supply chain management has to an extent been researched in the construction industry but the focus has mainly been on the client-contractor relationship rather than the contractor-supplier one. It has been argued that experiences from studies into buyer-supplier relationships within manufacturing industries are of limited relevance to the construction industry. An important question for construction firms is how they can increase their competitive position in the industry through vertical links. The focus in this research is on one specific example of such links: relationships between prime contractors and their suppliers.

### 1.3 RESEARCH PROJECT DESIGN

Given the growing importance for construction companies of managing the purchasing function, the collaboration with and managing of suppliers, and the limited research conducted in the construction industry on supplier-contractor relationships, the aim of this research is defined as follows:

*The aim of this research is to gain insight into ways in which contractors could improve the management of, and the collaboration with, suppliers in order to increase their competitiveness.*

To achieve this aim, four research phases are conducted. In the first phase, the current status of supplier-contractor research in the construction industry is explored. In the second and third phases, tools are designed and then applied to assess the maturity levels of buyer-supplier relationship management and of the purchasing function of construction companies. In the fourth and final phase, the supplier's perspective is considered to gain further insight into ways in which contractors could improve the management of and the collaboration with suppliers. Here, in this subsection, these four phases are briefly described. The aim and the method used are presented for each research phase plus the link with the other research phases.



**Research Phase A:** Supplier-contractor collaboration in the construction industry: a taxonomic approach to the literature of the 2000-2009 decade.

This phase is the starting point of this thesis. In order to gain insights into ways that contractors could improve the management of and their collaboration with suppliers, a literature review is conducted. As discussed earlier, research in the construction industry has mainly focused on the client-contractor relationship (Dainty *et al.*, 2001a; Eom *et al.*, 2008). This literature review focuses on the less researched contractor-supplier relationship.

The aims of this research phase are threefold. Firstly, to verify the current state of supplier-contractor research in the construction industry through a taxonomic approach to the literature. Secondly, to gain insights into which topics on supplier-contractor relationships have been researched in the construction industry. Finally, to provide suggestions for future research based upon the research gaps identified.

The current state of supplier-contractor research in the construction industry is verified through a taxonomic approach to the literature on buyer-supplier research over the last decade (2000-2009). In other words, topics of articles in this field of research are divided into ordered groups or categories. The systematic method followed consists of the following three steps: journal selection, initial article selection and final article selection.

In the next phase the current status of buyer-supplier relationship management within the Dutch construction industry is assessed.

**Research Phase B:** Assessing buyer-supplier relationship management: a multiple case-study in the Dutch construction industry.

The aim of this research phase is to shed light on obstacles to, and opportunities for, increasing the effectiveness of construction firms in managing buyer-supplier relationships. More specifically, the focus is on assessing the maturity level of buyer-supplier relationship management by construction firms. So far, only very limited research has been conducted in the construction industry on managing buyer-supplier relationships by prime contractors.

First, based on a literature review and discussions with industry experts, five constructs are defined that reflect the maturity level of buyer-supplier relationship management and, based on these constructs, a measurement tool is developed. Following this, the maturity level, in terms of the five constructs, is assessed by applying the measurement tool in 19 Dutch construction firms.

Two of the participating case companies (two business units belonging to the same concern) want to make improvements, in terms of buyer-supplier relationship management and purchasing maturity, after this assessment. To monitor if their improvements actually lead to a higher level of maturity, the contractors require a quick scan tool that can provide an indication of the current maturity and suggest further improvement possibilities. Such a tool is developed in the next research phase.

**Research Phase C:** Designing a tool for an effective assessment of purchasing maturity in construction.

The aim of this research phase is to develop and test a quick scan purchasing maturity tool by applying a design science research method. Using the terms of Van de Ven (2007), this research is a 'design/policy evaluation research'. In this type of research, a profession's practical problem is resolved by examining questions related to the design and evaluation of policies, programmes or models. As such, design science (Romme, 2003; Simon, 1996) is an important starting point in this research. A typical product of design science is not a causal model, but an act, a sequence of acts, a process, a system or a tool (Hevner *et al.*, 2004; Van Aken, 2004; Voordijk, 2009).

In this research, the product is a maturity tool developed by applying Hevner's framework (Hevner, 2007; Hevner *et al.*, 2004) for design science research. In this framework, one builds on foundations drawn from the available knowledge base to develop a new tool. Scientific justification for this new tool and approval of its approach for construction practice is obtained through testing it in the specific context of a case company.

The developed tool provides a company with insight into its current level of purchasing maturity (and, as part of this, their supplier relationship management) and can provide them with possibilities for improving performance by increasing this level.

**Research Phase D:** Why and how to become your suppliers' preferred customer: linking contractor satisfaction, preferred customer status and maturity in managing supplier relationships in the Dutch construction industry.

In the previous research phases, the collaboration with and management of suppliers has mainly been researched from the contractors' perspective. In this final research phase, the lessons learnt from these previous phases are combined with the supplier's perspective.

The aim of this research phase is to explore both the antecedents and the impact of a contractor having preferred customer status. In terms of antecedents, we pay specific attention to an, until now, unexplored factor: the contractor's maturity in supplier relationship management as perceived by the supplier. In terms of impact, we focus on the link between obtaining preferred customer status from a specific supplier and the contractor's satisfaction with its collaboration with that supplier. Firstly, a conceptual framework on the relationships between these variables is developed. Secondly, in order to investigate the conceptual relationships of this framework, inductive qualitative case research is conducted.

Two cases are investigated and, in each case, representatives of three companies are interviewed: one supplier plus two of its customers (both prime contractors and one with preferred status). As such, a total of four dyadic matched-pair inter-organizational relationships are investigated.

#### 1.4 STRUCTURE OF THESIS

The following four chapters present the above described four research phases. Each research phase has been written up as an academic paper, the first three having been already submitted to scientific journals. For each chapter of this thesis, the content is presented in the form of the most recent revision submitted to the specific journal. For readability purposes, minor changes have been made for this thesis, such as the application of consecutive section numbering and presenting the appendices collectively after Chapter 6 rather than by chapter. Also, a consistent formatting style (including the formatting of the references) is applied. Further, one reference list containing all the references used in the four papers is presented at the end of this thesis rather than a reference list per chapter/paper. On the first page of each chapter, the current status of the paper is noted. The final chapter (Chapter 6) of this thesis presents the overall conclusions, managerial implications and recommendations for future research.



# Chapter 2

## SUPPLIER-CONTRACTOR COLLABORATION IN THE CONSTRUCTION INDUSTRY

### A taxonomic approach to the literature of the 2000-2009 decade

This chapter has been written together with Hans Voordijk and Bart Vos and is accepted for publication by the journal of Engineering, Construction and Architectural Management (ECAM). The chapter has not yet been scheduled for publication in the printed issue. Earlier versions of this chapter have been submitted to, accepted, and presented at WION (Workshop Inkoop Onderzoek Nederland) 2011 (Lunteren, the Netherlands) and IPSERA (International Purchasing and Supply Education and Research Association – International conference) 2011 (Maastricht, the Netherlands).

# SUPPLIER-CONTRACTOR COLLABORATION IN THE CONSTRUCTION INDUSTRY

## A taxonomic approach to the literature of the 2000-2009 decade

### **Abstract**

**Purpose** – Recent developments in the construction industry resulted in an increased importance of collaboration with and managing of suppliers by prime contractors. The focus of this study is on getting insights in existing knowledge on this topic and the gaps in this knowledge base. The goals of this study are threefold: To verify the current state of, to gain insights into, and to provide suggestions for supplier-contractor research.

**Design/methodology/approach** – The current state of supplier-contractor research in the construction industry is verified through a taxonomic approach to the literature on buyer-supplier research over the last decade (2000-2009). The method followed consists of the following three steps: journal selection, initial article selection and final article selection.

**Findings** – Supplier-contractor research in the construction industry is still a relatively under-researched phenomenon. The major topics discussed in the identified articles are aspects of partnering (conditions, characteristics and barriers/obstacles) and (sub)contracting/procurement issues (practices, selection criteria, performance and characteristics).

**Research limitations/implications** – This study concludes that future research should focus on longitudinal studies, testing organisational barriers to partnering, the benefits of partnering in practice, conditions under which the formation of collaborative relationships between suppliers and contractors takes place, and experiences with this formation process.

**Practical implications** – In practice, contractors do see a need to develop closer and more collaborative relationships with their suppliers. This study highlights the topics that need to be addressed to achieve these goals.

**Originality/value** – This study is a literature overview of relatively scarce research on collaborative relationships between suppliers and contractors in the construction industry.

## 2.1 INTRODUCTION

Recent developments in the construction industry resulted in an increased importance of collaboration with and managing of suppliers by prime contractors. A major development is the shift of responsibilities from client to prime contractor by the increased use of integrated contracts. In the traditionally tendered construction project the coordinating role within the whole construction project is fulfilled by the client. Alternatively, in integrated contracts the role of coordination for prime contractors is enlarged. Furthermore, client demands are shifting from a focus on just price to a focus on criteria like innovations, sustainability and speed. A consequence of the increased responsibility is that prime contractors require capabilities and knowledge which do not belong to their own core competences and need to be purchased from suppliers.

A related development in the construction industry is that prime contractors increasingly depend upon their suppliers, both for realising projects and for achieving the required performance in these projects. Several studies have shown that up to 90% of the project turnover of prime contractors is spent on buying goods or services (Hinze and Tracey, 1994; Nobbs, 1993; Vrijhoef and Koskela, 2000). The increasing percentage of project turnover which is spent on buying goods and services by prime contractors provides opportunities for contractor-supplier cooperation and emphasizes the importance and significance of managing suppliers.

Therefore, it is perhaps surprising then, as Dainty *et al.* (2001a) and Eom *et al.* (2008) noted, that the main focus in research on the construction industry has been on the contractor-client relationship rather than the supplier-contractor one (see, for example, Bresnen and Marshall, 2000; Eriksson and Laan, 2007; Kadefors *et al.*, 2007). The term supplier covers subcontractors, material suppliers, and service suppliers.

Li *et al.* (2000) summarised and presented a critique of the literature on partnering in the construction industry. Moreover, they provided a future research agenda and recommended that future research should focus on "...the identification of performance measures and critical success factors, development and test of partnering models and processes, and the formation and selection of partnering strategy" (p.76). In their research, no clear distinction between project partnering and subcontracting was made, with both terms being treated as features of collaborative relationships. In our research, subcontracting and partnering are discussed separately. According to Li *et al.* (2000), there are many definitions of partnering. As the most comprehensive definition, they refer to the Construction Industry Institute's (CII) definition of partnering: "A long-term commitment by two or more organizations for the purpose of achieving specific business objectives by maximising the effectiveness of each participant's resources. This requires changing traditional relationships to a shared culture

without regard to organizational boundaries. The relationship is based upon trust, dedication to common goals, and an understanding of each other's individual expectations and values. Expected benefits include improved efficiency and cost-effectiveness, increased opportunity for innovation, and the continuous improvement of quality products and services" (CIIA, 1996). Whereas for subcontracting, a supplier performs some aspect of the contractor's work on a project (often a specific specialised task) (Arditi and Chotibhongs, 2005).

Because the importance of co-operation and partnering between prime contractor and supplier is growing, the focus of this study is on getting insights in existing knowledge on this topic and the gaps in this knowledge base. The goals of this paper are threefold. Firstly, we aim to verify the current state of supplier-contractor research in the construction industry through a taxonomic approach to the literature on buyer-supplier research over the last decade (2000-2009). In other words, topics of articles in this field of research are divided into ordered groups or categories. Secondly, we want to gain insights into which topics on supplier-contractor relationships have been researched in the construction industry. Finally, we intend to provide suggestions for future research based upon the research gaps identified in our study. Related to our second and third goals, we will reflect on the research agenda put forward by Li *et al.* (2000).

In conducting a taxonomic approach to the literature we followed a similar systematic method to that introduced by Van de Vijver (2009). Further, where possible, we took into account the guidelines offered by Webster and Watson (2002) on writing a literature review. The method adopted, as described in the next section, consists of three steps: journal selection, initial article selection and final article selection. The final sample of 50 articles on supplier-contractor collaboration has been analysed in terms of the methods and approaches used, the research perspective adopted and the unit of analysis used in order to present a systematic overview in the third section of the paper. To gain insights into what has been researched on supplier-contractor relationships in the construction industry and to determine the dominant research themes, the common research subjects and the theoretical approaches and tools used are also presented in Section 2.3. In Section 2.4 a discussion of the results, the drawing of conclusions and suggestions for future research are provided. This paper ends with the closing remarks in Section 2.5.

## 2.2 RESEARCH METHOD

In order to identify relevant articles for our literature overview on collaborative supplier-contractor relationships, we conduct a taxonomic approach and follow a similar systematic



method to that introduced by Van de Vijver (2009: pp.21-24). This systematic research method consists of the following three steps:

### 2.2.1 STEP 1: JOURNAL SELECTION

In the first step, both construction journals as well as non-construction journals were selected. Webster and Watson (2002) argue that the major contributions are likely to be found in the leading journals and, to identify relevant articles, it is useful to scan a journal's table of contents. In terms of construction journals, we selected the following five journals for analysis of their table of contents: Building Research & Information (BRI), Construction Innovation (CI), Construction Management and Economics (CME), Engineering, Construction and Architectural Management (ECAM) and the Journal of Construction Engineering and Management (JCEM). These five journals were selected because they have a reputation for publishing influential papers on managerial issues in the construction industry.

In terms of non-construction journals, we selected the top five journals in Van de Vijver's research on buyer-supplier relationships, and then carried out a full scan of the tables of contents over a ten-year period, 2000-2009. These journals were: Industrial Marketing Management (IMM), Journal of Supply Chain Management (JSCM), Journal of Business and Industrial Marketing (JBIM), Journal of Operations Management (JOM) and Journal of Marketing (JM). Further, we decided to also scan the remaining journals used in the research of Van de Vijver (2009: p.21) for special issues about the construction industry published during the same period. In this period, we found two special issues about the construction industry; one in the California Management Review (CMR) and one in the Journal of Purchasing and Supply Management (JPSM)<sup>1</sup>. The tables of contents of these two special issues were also analysed (in Step 2).

### 2.2.2 STEP 2: INITIAL ARTICLE SELECTION

In Step 2, the lead author of the current paper (labelled Rater 1) assessed all the tables of contents selected in the first step, while the second and third authors (each labelled Rater 2) each assessed approximately half of the tables of contents. The exception to this pattern was for the tables of contents of the two special issues, which were discussed by all three authors in the final phase of this step). In this step, the raters task was to select articles worthy of further analysis, based solely on having titles that seemed to be referring to collaboration between organisations. We took a broad perspective in making this selection.

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<sup>1</sup> Formerly titled European Journal of Purchasing and Supply Management

Alongside the concept of collaboration, the following concepts were also used as search terms: buyer-supplier relation(ship) (management), partner(ship), co-operation, co-ordination, outsourcing, managing suppliers, supplier integration and supplier development. For the non-construction journals, the title also had to state or at least suggest that the research was conducted in the construction industry. We added two restrictions. First, the article had to at least focus on supplier-contractor relations and not only dwell on contractor-client relationships. Second, the article had to focus on vertical, rather than horizontal, collaboration.

Limiting ourselves to a title search would risk overlooking articles about the construction industry in the non-construction journals (since the specific industry setting is not always mentioned in the title). Therefore, Rater 1 also scanned the keywords and abstracts of all the articles in the identified non-construction journals (published over the ten-year period) for the term construction. In the final phase of Step 2, the lists of articles selected by the first rater and by the second rater were compared. This comparison led to the calculation of inter-rater reliability, defined and explained as "... the proportion of articles selected by both raters compared to the total number of articles selected by the raters. That is, should the first and second rater select ten titles that are the same, and each of them also select ten titles not chosen by the other, inter-rater reliability for this total set of 30 articles would be 33%" (Van de Vijver, 2009: p.22). The non-construction articles selected by the first author in the extra scan described above were not taken into account when calculating inter-rater reliability. The inter-rater reliability calculated for Step 2 was 33%. The 46 articles selected by both raters were automatically included in the sample for Step 3. The 94 articles selected by only one of the raters were discussed, along with the 19 articles found in the extra non-construction journal scan by Rater 1 and the articles in the two special issues of CMR and JPSM. The result of this discussion was that 60 articles were added to the sample for Step 3, making a total number of 106 articles selected: 91 from construction journals and 15 from non-construction journals. Table 1 includes additional details on the article selection and on the inter-rater reliability.

TABLE 1: DETAILS OF STEPS 2 AND 3

Journal	Step 2					Step 3			
	Total no. of selected articles	Selected by both raters	Inter-rater reliability	No. of articles found by extra scan	Final no. of articles	Selected by both raters	No. of articles discussed	Inter-rater reliability	Final no. of articles
<i>Construction</i>									
BRI	24	6	25%	n/a	9	3	2	78%	3
CI	22	4	18%	n/a	14	5	3	79%	6
CME	38	17	45%	n/a	36	10	13	64%	15
ECAM	27	10	37%	n/a	16	9	2	88%	10
JCEM	24	8	33%	n/a	16	7	3	81%	8
<i>Non-construction</i>									
IMM	2	0	0%	1	2	1	1	50%	1
JSCM	1	1	100%	0	1	1	0	100%	1
JBIM	2	0	0%	12	4	2	0	100%	2
JOM	0	0	100%	3	0	n/a	n/a	n/a	n/a
JM	0	0	100%	3	1	0	0	100%	0
CMR	n/a	n/a	n/a	n/a	1	0	1	0%	0
JPSM	n/a	n/a	n/a	n/a	6	4	1	83%	5
<b>Total</b>	<b>140</b>	<b>46</b>	<b>33%</b>	<b>19</b>	<b>106</b>	<b>42</b>	<b>26</b>	<b>75%</b>	<b>51</b>

### 2.2.3 STEP 3: FINAL ARTICLE SELECTION

In this final step, in a similar double rater system as applied in Step 2, the 106 articles were again assessed, this time based on title, abstract and keywords. Again, the first rater assessed all the articles, and this time the other two authors only looked at those articles they had not personally looked at in Step 2. In this way, all the titles reaching this step will have been assessed by all three authors. This scan resulted in 42 articles selected by both raters and 26 articles selected by only one rater. Again in this step, the inter-rater reliability was calculated, defined in this step as “the proportion of articles selected in [Step 2] upon which both raters agreed in [Step 3]” (Van de Vijver, 2009: p.24). Here, the inter-rater reliability was higher at 75%. The 26 articles selected by only one of the two raters were discussed by all three authors until consensus was reached. This resulted in nine extra articles, yielding a final sample of 51 articles. Further details about article selection and inter-rater reliability can again be found in Table 1. These articles were then analysed as presented in the next section.

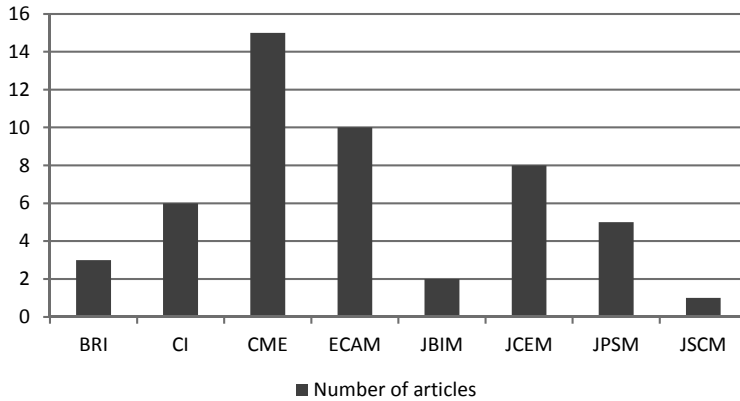
## 2.3 RESULTS

An in-depth analysis of what was researched on supplier-contractor relationships in these 51 articles delivered some interesting results. Regarding the relationship analysed, 25 articles focussed on both supplier-contractor and contractor-client relationships (of which the article by Mason (2007) also included the supplier-client relationship) and 25 articles solely on the supplier-contractor relationship. One article, by Crespín-Mazet and Ghauri (2007), appeared to focus only on the contractor-client relationship, although the title, abstract and keywords had suggested otherwise. This article was consequently deleted from the sample.

In the following parts of this section, a thorough analysis of which aspects of supplier-contractor relationships have been researched in the construction industry will be presented. To present a systematic overview, the articles are analysed in terms of methods and approaches used, the research perspective adopted and the unit of analysis used. To gain insights into what has been researched on supplier-contractor relationships in the construction industry and to determine the dominant research themes, the common research subjects, theoretical approaches and tools used are also presented. In Appendix A, a complete overview of all articles and their aspects is provided.

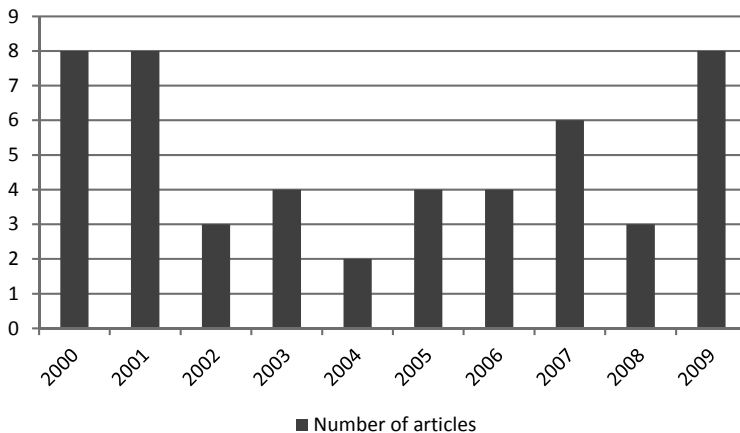
### 2.3.1 JOURNAL SOURCE AND PUBLICATION YEAR

Regarding the number of articles per journal, it is worth mentioning that none of the final sample of 50 articles came from the IMM, JOM, JM or CMR journals. The construction journals delivered 42 of the 50 articles, with the largest contributions coming from CME (15) and ECAM (10). The special issue of JPSM on the construction industry added five articles to our sample, the largest representation from the non-construction journals. For more details, see Figure 2.



**FIGURE 2: NUMBER OF ARTICLES PER JOURNAL**

Regarding the number of articles per year, it appears that there was less attention paid to collaboration between suppliers and contractors during the middle years of the decade, although the differences are too small to draw any real conclusions (see Figure 3).

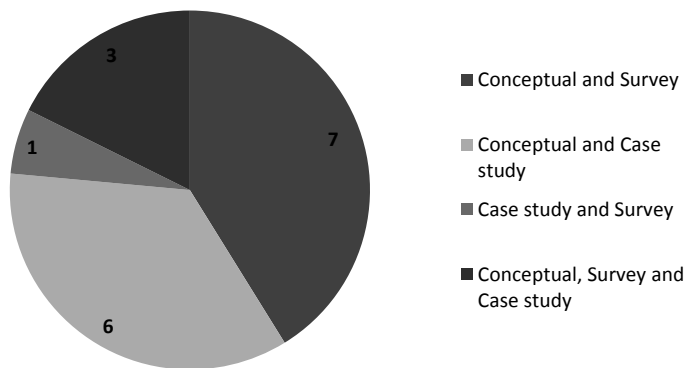


**FIGURE 3: NUMBER OF ARTICLES PER YEAR**

### 2.3.2 RESEARCH METHODS EMPLOYED

All articles have been analysed in terms of the research methods they adopted. For this analysis, we defined seven different types: case study, conceptual, literature review, simulation, survey, other, and mixed. Our sample of articles contains only one literature review, the article by Li *et al.* (2000) already mentioned in the introduction. Of the single-method approaches, a case study method was used in 15 articles, eight articles used a survey approach in their research, there were seven conceptual articles, none of the articles

used a simulation and two articles used other methods. Hartmann *et al.* (2009) used a choice experiment to determine which selection criteria (price, technical know-how, quality or cooperation) were the most important in the selection process for a subcontractor. Reeves (2002) described the contracting system used in the Japanese construction industry based mainly on industry reports and, as such, the article does not fit into any of our classifications. The largest group of articles (17) used a mixture of research methods as outlined in Figure 4.



**FIGURE 4: MIXED RESEARCH METHODS**

Of these 17 articles, 16 combined a conceptual method with either a survey (7), a case study (6) or both (3). Phua and Rowlinson (2004) used a survey to test the results of a case study.

### 2.3.3 LONGITUDINAL APPROACH

Of the 50 articles reviewed, only seven used a longitudinal approach. Interestingly, one of the articles, by Greenwood (2001), did not use a case study approach for the longitudinal research, as had the other six articles, but analysed a development over time by comparing two sets of survey data. The other six articles used data collected in periods ranging from six weeks to six years. Also worth a special mention is the study by Davidson (2009) who had the unique opportunity to present embedded research over a number of years.

### 2.3.4 SCOPE OF DATA COLLECTION (THE RESEARCH PERSPECTIVE)

The next aspect of the articles to be analysed was the research perspective adopted. The research perspective is defined by the firm/organisation or firms/organisations in the supply chain from which data are collected. For ten of the identified studies this is not applicable (including the conceptual articles and the literature review article). In one of these ten studies (by Love *et al.* (2002)), classification was not possible as the data were collected at a

consulting company and it was not mentioned for whom the consultant company was working. Consequently, we classified this article as not applicable. Fifteen studies adopted a single research perspective, in 12 the data were collected from the contractor, in three from the supplier and in no instances from the client. In the remaining 25 studies, the data were collected from multiple firms/organisations: in 14 studies from both the supplier and the contractor, in ten studies from all three parties, and in one study at the contractor and at the client (by Karim *et al.* (2006)).

### 2.3.5 UNIT OF ANALYSIS

The unit of analysis is defined as the level on which the relationship was researched: interpersonal, inter-organisational or both. Researching only on the inter-organisational level dominated in our sample of articles (used in 46 of the 50). In none of the articles were only interpersonal relationships considered. In only four articles was structural attention paid to both interpersonal and inter-organisational relationships. Fong and Lung (2007) used a survey to explore factors related to team orientation. In the other three articles, a case study method was used to respectively study knowledge sharing between individuals in the early design stages of architecture, engineering and construction products (Gil *et al.*, 2001), interpersonal versus inter-firm trust (Lau and Rowlinson, 2009) and the role of individuals in vertical cooperation (Welling and Kamann, 2001).

### 2.3.6 COMMON RESEARCH SUBJECTS, THEORETICAL APPROACHES AND TOOLS USED

In this subsection, the 50 sample articles are analysed to gain insights into what has been researched on supplier-contractor relationships in the construction industry and to determine the dominant research themes. Qualitative data analysis is used in analysing the titles and abstracts of the articles selected. Using a bottom-up approach, the commonly found research subjects, the theoretical approaches and the tools used were coded. In this way, the coding started without prior assumptions. The purpose of bottom-up coding is to classify a large number of textual data into a smaller number of homogeneous categories. For each article, the research subject was determined. From this analysis, three main categories could be distilled: partnering, (sub)contracting/procurement issues, and a miscellaneous other. Out of our sample of 50 articles, the research subject of 20 was related to partnering, of 22 to (sub)contracting/procurement issues, and eight articles were put in the third, other, classification. These three classifications are presented below in Subsections 2.3.6.1, 2.3.6.2 and 2.3.6.3. Following this, notable theoretical approaches and tools used will be presented in Subsection 2.3.6.4.

### 2.3.6.1 PARTNERING

Twenty articles deal with aspects of partnering, in some articles referred to as collaborative relationships. The aspects discussed are related to conditions for partnering, characteristics of partnering, barriers/obstacles to partnering, or a combination of these aspects. With some of the articles, it was not possible to identify these clear categories. For example, in some articles, conditions for partnering and characteristics of partnering are intertwined. Nine articles discuss only conditions for partnering, six only characteristics of partnering, three conditions for and characteristics of partnering, just one barriers/obstacles to partnering, and one conditions for and barriers/obstacles to partnering (see Figure 5).

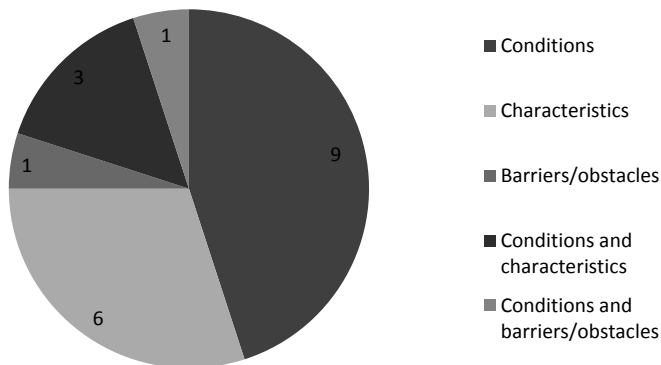


FIGURE 5: PARTNERING

Below, we will elaborate on the three categories of topics discussed in the partnering articles: conditions for, characteristics of and barriers to partnering.

Most articles discuss topics related to conditions for partnering. Cheng *et al.* (2004) suggest creating a learning culture to foster partnering. They present three models reflecting preconditions for a learning culture. By following these models, an organisation embeds a learning climate and is then able to ask how to learn from experience, how to sustain continuous improvement and how to establish a learning climate. Doloï (2009) argues that trust and confidence are not the only conditions for successful partnering, and that communication is the most influential condition for partnering success. This is in line with the results from Lau and Rowlinson (2009) who showed that partnering relationships do not necessarily exhibit more trust than non-partnering ones. Titus and Bröchner (2005) point to the important role of information sharing between partners in achieving project success, again in line with the findings of Doloï (2009). Fong and Lung (2007) researched the psychological aspects of working together. They argue that good relationships among team orientation (the individual's perceptions of working in a team), the cultural context (individualism and power distance) and employee attitudes (task interdependence and trust)



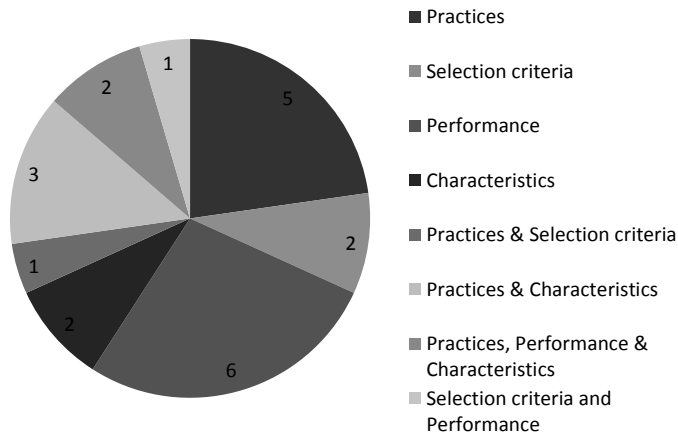
are essential for success. According to Phua (2006), partnering is less likely to occur without there being strong institutional partnering norms (i.e. regulations, policies and rules). To summarise, the articles dealing with conditions for partnering focus on aspects such as creating a learning culture (Cheng *et al.*, 2004), communication (Doloi, 2009), cultural and contextual factors and employee attitudes (Fong and Lung, 2007), trust (Lau and Rowlinson, 2009), institutional norms (Phua, 2006) and information sharing (Titus and Bröchner, 2005).

The second largest category of topics discussed relates to characteristics of partnering such as the commitment of resources by the partners, equity in the relationship, and clear and mutual objectives, as are discussed by Akintoye and Main (2007) and Tang *et al.* (2006). Various partnering types are formulated, from short-term (project) based partnerships to longer-term strategic alliances (Cheng and Li, 2001; Love *et al.*, 2002). Benefits found from partnering include a reduction in bias, increased cooperation and ultimately better (project) performance (Anvuur and Kumaraswamy, 2007).

A third category of often discussed topics deals with barriers and/or obstacles to partnering. These articles discuss aspects such as lack of top management commitment, poor understanding of the concept, an inappropriate organisational structure to cope with the concept (Akintoye *et al.*, 2000) and a lack of belief that there are mutual benefits (Dainty *et al.*, 2001b). To overcome these barriers, education and re-orientation of the industry is suggested (Akintoye *et al.*, 2000). Further, Dainty *et al.* (2001b) call for tools to facilitate the development of relationships.

#### 2.3.6.2 (SUB)CONTRACTING/PROCUREMENT ISSUES

Twenty-two articles deal with issues relating to (sub)contracting/procurement. Subdivisions are made in this category between articles discussing practices, selection criteria, performance or characteristics. Most of the articles discuss practices related to (sub)contracting/procurement issues (see Figure 6), either alone (5), or in combination with characteristics (3), or in combination with performance and with characteristics (2) or in combination with selection criteria (1). Six articles discuss performance issues related to (sub)contracting/procurement, two articles discuss selection criteria and one article considers selection criteria in combination with performance. Characteristics of (sub)contracting are discussed in two articles.



**FIGURE 6: (SUB)CONTRACTING/PROCUREMENT ISSUES**

Below, we will elaborate on the four major categories of topics discussed in the articles focusing on (sub)contracting/procurement: practices, selection criteria, performance and characteristics of (sub)contracting/procurement.

The articles in the first category discuss general practices in subcontracting. The research by Costantino *et al.* (2001) showed that, for the work categories included in their research, 95% of the contractors subcontracted that work at least 75% of the time they had to execute that specific work. Reducing liability exposure was the most important reason given for subcontracting. In order to reduce transaction costs, contractors conduct business with a restricted number of subcontractors. Laryea (2009) provides insights into the way contractors enquire and obtain prices from subcontractors, and provides recommendations for improvements. The labour involved and the volume of enquiry documents accounted for the largest percentage of costs. On this basis, an optimisation of the enquiry process and a reduction in the documents involved was recommended. Robeiro and Love (2003) demonstrated the use of an e-business strategy to create value throughout the supply chain. The e-business infrastructure can be used to support inter-organisational connectivity. To summarise, discussed practices include approaches used in subcontracting such as the rate of subcontracting, reasons behind this choice and business relationships with subcontractors (Costantino *et al.*, 2001), subcontractor and supply enquiries (Laryea, 2009) and e-business strategies (Robeiro and Love, 2003).

The second category of articles discusses selection criteria for subcontracting. The importance of different selection criteria such as price and quality are discussed, for example, by Hartmann *et al.* (2009). Their research showed that price remained the most important selection criterion for contractors, although price, technical expertise, quality and cooperation are all perceived to be important. Costantino *et al.* (2009) designed a tool to

assist in the selection process by focussing on the total costs of a purchase. Mbachu (2008) showed that quality is a very important selection criterion in pre-qualification, but price is the most influential award criterion. To summarise, the most important selection criterion used by contractors for the selection of subcontractors remains price (Greenwood, 2001; Hartmann *et al.*, 2009).

The third category of articles deals with a range of performance issues. In order to evaluate the performance of subcontractors and provide feedback to the management, Eom *et al.* (2008) developed a framework based on the balanced scorecard concept. To aid subcontractor management, Karim *et al.* (2006) focussed on defects in construction projects and developed a tool to analyse and present defects information. The framework developed by Mbachu (2008) does not only focus on assessing the performance of subcontractors, but also on their suitability. To improve process efficiency and product quality, Gil *et al.* (2001) identify the contributions of subcontractors in the early design stages of construction products. To summarise, the performance issues discussed cover for instance subcontractor evaluation and management (Eom *et al.*, 2008; Karim *et al.*, 2006; Mbachu, 2008) and early supplier involvement (Gil *et al.*, 2001).

The fourth category of articles identified deals with general characteristics of subcontracting. Greenwood (2001) argues that the typical subcontractor-contractor relationship remains traditional and cost-driven, although contractors are becoming interested in having closer relationships (partnerships) with their subcontractors. Ross and Goulding (2007) support this view that contractors are willing to develop closer relationships, but conclude that such relationships are still in the early stages of development.

#### 2.3.6.3 OTHER

The final classification we used was 'other', covering the remaining eight articles that couldn't be classified as either a partnering or a (sub)contracting/procurement issue. All eight articles used unique approaches in discussing a collaboration subject.

Arbulu *et al.* (2003) found inefficiencies at the interfaces between processes, disciplines and organisations in a construction supply chain. Cox and Ireland (2002) identified circumstances under which an integrated supply chain approach could be successfully implemented in a supplier-contractor relationship. Davidson (2009) argues for an upfront organisational design (alongside a technical design) for contemporary manufacturing innovators in the construction industry. Dubois and Gadde (2000) explore the occurrence of network effects in the construction industry. They state that characteristics of the construction industry (specifically project focus and competitive tendering) hinder efficiency and innovation.

Hofman *et al.* (2009) consider what type of relationship between contractors and suppliers is needed in order to develop and produce an industrialised modular housing system. Nicolini *et al.* (2001) use an organisational approach to supply chain integration which they claim would lead to the elimination of inefficiencies, the reduction of costs and an improved value. By using a grounded empirical approach, Phua and Rowlinson (2004) identify unique determinants of project success. Finally, Proverbs and Holt (2000) develop a model to minimise construction labour costs. In this, the suppliers of contractors should be targeted to reduce costs.

#### 2.3.6.4 NOTABLE THEORETICAL APPROACHES AND TOOLS

Economic approaches are frequently used in our sample of articles, with transaction costs economics (TCE) the most common. This approach was used by Costantino *et al.* (2001), Lai (2000), Lee *et al.* (2009), Ross and Goulding (2007) and Voordijk *et al.* (2000). Other economic approaches used are the principal-agent theory by Davidson (2009) and game theory by Welling and Kamann (2001).

A second group of approaches comes from the social sciences. A learning perspective is used by Cheng *et al.* (2004) and Love *et al.* (2002), a power dependency approach by Cox and Ireland (2002), the industrial marketing and purchasing (IMP) approach by Dubois and Gadde (2000), behavioural theory by Liu and Fellows (2001) and work clusters by Nicolini *et al.* (2001).

Two theoretical approaches used could not be grouped as either belonging to the economic or social science groupings: a modularity approach used by Hofman *et al.* (2009) and an information management approach used by Titus and Bröchner (2005). The following articles did not really have a theoretical starting point: Arditi and Chotibhongs (2005), Dainty *et al.* (2001b), Greenwood (2001), Jin and Ling (2005), Laryea (2009), Reeves (2002) and Vrijhoef and Koskela (2000).

In various articles, different tools are used: value stream mapping by Arbulu *et al.* (2003), a decision support system with a Monte Carlo approach by Costantino *et al.* (2009), the balanced scorecard by Eom *et al.* (2008), a decision support tool by Karim *et al.* (2006), utility modelling by Nicholas and Edwards (2003) and labour cost minimisation by Proverbs and Holt (2000).

## 2.4 DISCUSSION AND CONCLUSIONS

In this study, our first aim was to verify the current state of supplier-contractor research in the construction industry through a taxonomic approach to the literature on buyer-supplier research over the last decade (2000-2009). Secondly, we wanted to gain insights into which topics on supplier-contractor relationships have been researched in the construction industry. Finally, we intended to provide suggestions for future research based upon the research gaps identified in our study. In this section, the results are discussed and conclusions are drawn for each of these three objectives.

### 2.4.1 CURRENT STATE OF SUPPLIER-CONTRACTOR RESEARCH

As stated in the introduction, prime contractors depend upon their suppliers, both for realising projects and for their quality. This suggests that the supplier-contractor relationship is an important aspect to consider, not only for practitioners but also for researchers (who have traditionally tended to focus mainly on the contractor-client relationship). In this paper, we explain how a systematic approach was used to search for and eventually identify 50 articles, published in the 2000-2009 period, on supplier-contractor collaboration in the construction industry. Based on this limited number of findings, we conclude that supplier-contractor research in the construction industry remains relatively under-researched. Of the sample 50 articles, only 25 focus solely on supplier-contractor relationships. An incidental finding from our research supports the statement that research has mainly focussed on the contractor-client relationship. This is based on the fact that, during the selection process for articles to include in our sample, a large number of articles were rejected because they focused solely on the contractor-client relationship.

We do not anticipate this conclusion to change if the limitations of our research method were overcome. For example, other researchers might have chosen different journals based on their experiences. However, because the selection of construction journals was based on our knowledge that these five journals have a reputation of publishing influential papers on managerial issues in the construction industry, we do not consider this an area of weakness. Next, a different method could have resulted in different outcomes, yet we choose to follow a similar systematic method to that used successfully by Van de Vijver (2009).

### 2.4.2 ANALYSIS OF RESEARCH INTO SUPPLIER-CONTRACTOR RELATIONSHIPS IN THE CONSTRUCTION INDUSTRY

In the previous section, a thorough analysis of what has been researched in terms of supplier-contractor relationships in the construction industry was presented. In presenting a

systematic overview, the sample articles were analysed in terms of the methods and approaches used, the research perspective adopted and the unit of analysis used. To gain insights into what has been researched on supplier-contractor relationships in the construction industry, and to determine the dominant research themes, the common research subjects, the theoretical approaches and the tools used are also presented.

Most of the results of this analysis were as we had anticipated. Construction journals (as against non-construction journals) delivered 42 of the 50 articles analysed. In the selected articles, a combination of research methods was most frequently employed. Overall, the case study approach has been the dominant method employed in supplier-contractor research in the construction industry. Out of the 50 articles, only seven used a longitudinal approach. In a significant majority of the articles, the relationship was researched on the inter-organisational level, and none of the articles were limited to only interpersonal relationships. Naturally, one would like to see large scale, longitudinal, inter-organisational and interpersonal research reported, but practical limitations make this hard to realise. What we had not anticipated was that half of the publications would report data collected from more than one firm/organisation in a relationship: on fifteen occasions data were collected from two sources (dyadic), and in ten pieces of research from three sources (triadic).

In our sample of fifty articles, twenty focused on aspects of partnering, such as conditions for partnering, characteristics of partnering, barriers/obstacles to partnering, or a combination thereof. Twenty-two articles focused on (sub)contracting/procurement issues, such as practices, selection criteria, performance, characteristics, or a combination of these. As one might expect, the theoretical approach most frequently used is the economic one of transaction costs economics.

#### 2.4.3 SUGGESTIONS FOR FUTURE RESEARCH

Based on the results of our literature review of supplier-contractor relationships in the construction industry, we now reflect on gaps in the research and provide new directions for future research.

Since supplier-contractor (empirical) research in the construction industry is still relatively scarce, it can be concluded that more research on collaborative relationships between suppliers and contractors in the construction industry is needed. It is an understandable challenge, but one that needs to be met, for the research community to adopt a longitudinal approach in researching supplier-contractor collaboration. Furthermore, if possible, adopting a supplier's perspective and paying structural attention to interpersonal relationships would enhance future research. Comparing what has been researched over the

past decade with the research agenda set by Li *et al.* (2000) at its start, provides a list of topics still requiring research.

The first set of recommendations of Li *et al.* (2000) was related to performance measures and critical success factors in partnering. Indeed, conditions for and success factors in partnering have received research attention over the last decade. One of the most interesting results concerns the role of communication / information sharing. Compared to trust and confidence, which are widely accepted as the most influential factors in partnering success, communication / information sharing actually seem to be more influential (Doloi, 2009; Titus and Bröchner, 2005). The validity of other factors, such as cost and quality, has also been researched in the past decade, but the call for more longitudinal studies, to test the effect of the variable 'time' in relation to project success predictors, has been neglected. The recommendation by Li *et al.* (2000) to test for organisational barriers to partnering, such as the external environment, organisational culture, organisational climate and organisational structure, has received only limited attention and could benefit from further exploration. Considering the first set of recommendations by Li *et al.* (2000), one could conclude that there is a need for longitudinal studies and the testing of organisational barriers to partnering.

The second set of recommendations by Li *et al.* (2000) was related to the development and testing of partnering models and processes. Many of these recommendations have been responded to in the past ten years. Quantitative research to test hypotheses and propositions has been executed, although the call of Li *et al.* (2000) to consider team members' perceptions of the benefits and goals of partnering in such research has been neglected. One of the found barriers to partnering is the lack of belief in these benefits of partnering by practitioners (Dainty *et al.*, 2001b). Nevertheless, many researchers assume partnering is beneficial. Therefore, based on the second set of recommendations by Li *et al.* (2000), we would urge more empirical research on the benefits of partnering since we believe this could help practitioners.

The third set of recommendations by Li *et al.* (2000) was related to the formation and selection of partnering strategies. Conditions under which closer relationships are formed have been researched but only to a very limited degree. Conditions studied include creating a learning culture (Cheng *et al.*, 2004) and having institutional norms (Phua, 2006). The recommendations by Li *et al.* (2000) to research the effect of learning experiences on developing relationships and the factors that affect vertical integration have also been addressed to only a limited extent. A next step in this research would be to design tools that help companies/organisations form and develop closer relationships (Dainty *et al.*, 2001b). In designing such tools it will be important to take into account the conditions mentioned earlier as influencing partnering success and the factors that determine the success of a

partnership, such as commitment of resources, equity of relationship, clear and mutual objectives, and trust (Akintoye and Main, 2007; Tang *et al.*, 2006). Considering the third set of recommendations by Li *et al.* (2000) it can be concluded that the conditions under which closer relationships are formed, and experiences with this formation, should certainly be further researched.

## 2.5 CLOSING REMARKS

Background of this study are recent developments in the construction industry resulting in an increased importance of collaboration with and managing of suppliers by prime contractors. As mentioned before, responsibilities shift from client to prime contractor by the increased use of integrated contacts and client demands shift from a focus on just price to a focus on criteria like innovations, sustainability and speed. As a consequence, prime contractors require capabilities and knowledge which do not belong to their own core competences and need to be purchased from suppliers. Prime contractors increasingly depend upon their suppliers, both for realising projects and for achieving the required (financial) performance in these projects. This increasing dependence of prime contractors provides opportunities for contractor-supplier cooperation and emphasizes the importance and significance of managing suppliers.

Because of the growing importance of co-operation and partnering between prime contractor and supplier, the focus of this study is on getting insights in existing knowledge on this topic and the gaps in this knowledge base. From our research it is clear that relationships with suppliers become increasingly important for contractors, but remain largely traditional and cost driven: in most cases suppliers are selected based on offering the lowest price (Greenwood, 2001; Hartmann *et al.*, 2009). Therefore, it is hardly surprising that a large proportion of sampled articles focus on (sub)contracting/procurement issues in fairly traditional relationships. These articles found deal with the turnover percentage of subcontractors (Costantino *et al.*, 2001), consider performance issues (Eom *et al.*, 2008; Gil *et al.*, 2001; Karim *et al.*, 2006; Mbachu, 2008), and stress the importance of supplier management for contractors. Contractors do see a need to develop closer and more collaborative relationships with their suppliers, but require support in doing so.

In general, it can be concluded that, in the last decade, progress has been made in researching collaborative relationships between suppliers and contractors in the construction industry. In order to deal with opportunities for contractor-supplier cooperation and the management of suppliers by contractors in a more effective way, further research requires insights into the conditions under which collaborative relationships



between suppliers and contractors can be formed, and the critical success factors, barriers, benefits and goals of collaborative relationships between suppliers and contractors.



# Chapter 3

## ASSESSING BUYER-SUPPLIER RELATIONSHIP MANAGEMENT

### A multiple case-study in the Dutch construction industry

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# ASSESSING BUYER-SUPPLIER RELATIONSHIP MANAGEMENT

## A multiple case-study in the Dutch construction industry

### **Abstract**

The objective of this paper is to shed light on obstacles to, and opportunities for, increasing the effectiveness of construction firms in managing buyer-supplier relationships. More specifically, the focus is on assessing the maturity level of buyer-supplier relationship management by construction firms. First, based on a literature review and discussions with industry experts, five constructs were defined and, based on these constructs, a measurement tool was developed. Following this, the maturity level in terms of the five constructs was assessed by applying the measurement tool in 19 Dutch construction firms. The results demonstrate a large potential for improved management of buyer-supplier relationships. While there are major factors impeding, there are, at the same time, developments stimulating the effectiveness of managing buyer-supplier relationships. A useful next research step would be to determine the optimum portfolio of relationship types between contractors and suppliers in the construction industry.

### 3.1 INTRODUCTION

Most construction companies operate in a *decentralised network* of suppliers and customers in which they acquire production capacity from external suppliers. Construction projects can be viewed as temporary organisations *among* firms. The development and management of long-term buyer-supplier relationships at the cross-project level is therefore difficult as project teams and product designs change from project to project. Many researchers have expressed dissatisfaction with the temporary nature of these buyer-supplier relationships (Briscoe and Dainty, 2005; Egan, 1998; Voordijk *et al.*, 2000; Vrijhoef and Koskela, 2000). Although contractors spent up to 90% of the project turnover on buying goods or services (Hinze and Tracey, 1994; Nobbs, 1993; Vrijhoef and Koskela, 2000), they do not take full advantage of opportunities to make use of external resources through buyer-supplier cooperation (Dubois and Gadde, 2000).

Various types of buyer-supplier strategies are recognised in manufacturing, but their applicability in the construction industry is less well understood (Barlow *et al.*, 2003; Barlow and Ozaki, 2003; Barlow and Ozaki, 2005). Furthermore, as Dainty *et al.* (2001a) noted, the focus in the construction industry has been on the client-contractor relationship rather than

the contractor-supplier one (see, for example, Bresnen and Marshall (2000), Eriksson and Laan (2007) and Kadefors *et al.* (2007)). An exception to this trend are the studies by Kamann *et al.* (2006) and Eom *et al.* (2008) which did focus on the contractor-subcontractor relationship. Kamann *et al.* (2006) focussed on problems in buyer-supplier relationships and the effects of having a shared past or future. Eom *et al.* (2008) presented a framework for subcontractor evaluation and management in order to develop closer relationships with subcontractors. The research reported here similarly focuses on the relatively less researched relationship between contractors and their suppliers.

The objective of this paper is to shed light on obstacles to, and opportunities for, increasing the effectiveness of construction firms in managing buyer-supplier relationships. More specifically, the focus is on assessing the maturity level of buyer-supplier relationship management by construction firms. Following Rozemeijer *et al.* (2003) and Schiele (2007), here maturity is defined as the level of professionalism. The next section contains a literature review discussing conditions to improve the management of buyer-supplier relationships. Second, a methodological justification and an empirical research design are provided in Section 3.3. Third, the management of buyer-supplier relationships in the construction industry is assessed in 19 in-depth case studies of Dutch construction firms (Section 3.4). The results of the case studies are discussed in Section 3.5. The paper ends with conclusions and managerial implications.

## 3.2 LITERATURE REVIEW

The issue of managing buyer-supplier relationships has attracted a growing body of academic research in recent decades (Terpend *et al.*, 2008). This increased attention reflects the growing awareness of the link between the effective management of such relationships and firm performance. Various aspects are important in determining the effectiveness of buyer-supplier relationship management. Firstly, it is crucial for a buying company to optimize its supply base in terms of both the number and the quality of its suppliers. Secondly, attention should be given to activities related to managing a buying company's portfolio of suppliers. Thirdly, buying companies need to decide to what extent suppliers have to be integrated into their own processes. This integration aspect can be split into two distinct parts: operational processes and value creation. Finally, effective buyer-supplier relationship management requires attention to be given to developing suppliers, based on an ongoing monitoring of their performance.

In this section, a literature review on these five aspects of managing buyer-supplier relationships is presented and for each a construct is defined. Following this, attention is

paid to the impact of a distinctive feature of the construction industry - project-based working - on the management of buyer-supplier relationships.

### 3.2.1 OPTIMIZE SUPPLY BASE

Effective and efficient management of buyer-supplier relationships starts with determining the number and most suitable suppliers for the company, i.e. the optimization of the supply base. Monczka *et al.* (1993) discuss several strategies to improve the supply base, such as setting higher performance expectations and direct supplier development. As a prerequisite to pursue supply base improvements the results of the existing purchasing processes and strategies have to be measured. According to Cousins (1999), extensive supply base reduction strategies have been witnessed in a wide range of firms in various sectors. Many of these companies have claimed they had to reduce the size of their supplier bases in order to become more competitive and flexible, and to reduce costs. Companies need a systematic approach to realize these goals, and several frameworks have contributed significantly to an effective and efficient optimization of the supply base, for example the portfolio models presented by Kraljic (1983), Krapfel *et al.* (1991) and Bensaou (1999). The Kraljic model is a product-orientated model, whereas the models of Krapfel *et al.* and Bensaou are relationship-orientated. With the Kraljic model purchased items can be classified into four different categories, namely strategic, bottleneck, leverage and non-critical items. Each of these categories require a different purchasing strategy. Gelderman and Semeijn (2006) argue that the Kraljic model is not only useful for developing effective purchasing strategies, but also for managing a supply base. In using this product-orientated model the company applies a one-sided buyer perspective for the development of the purchasing strategies and managing the supply base. The relationship-orientated models apply a two-sided perspective in which also the position of the own company in the client-portfolio of the supplier is taken into account.

In this study 'Optimize supply base' is defined as a process to determine the correct number and most suitable suppliers for a company. This includes ensuring that the supply base is kept up-to-date. Ideally, the optimization of the supply base would be driven by product group strategies. Besides paying attention to the number of suppliers, it is important to focus on the policy of the company regarding the supply base. For instance, a company can have a policy to use only regional suppliers, or can demand certain certifications from suppliers.

### 3.2.2 MANAGE SUPPLIER RELATIONSHIPS

Zolkiewski and Turnbull (2002) concluded that adopting a portfolio approach may be a key factor in successful relationship management. A portfolio approach provides a framework for relationship management at both the strategic and the tactical levels. Based on a portfolio approach, relationships with strategic suppliers can be developed, managed and optimized. The portfolio approach enables managers to invest their resources in the most efficient and effective way, by focussing on a customer-orientation rather than a product-orientation (Zolkiewski and Turnbull, 2002). In the context of the project environment found in the construction industry, buyer-supplier relationships are often characterized as a typical market-exchange relationship. Bensaou (1999: p. 41) defines such relationships as ones in which "information exchange between two firms takes place mainly during bidding and contract negotiations". The normal systems of tender-based procurement, as well as the 'project-organization' of most construction work, naturally leads to arms-length relationships, even if the firms repeatedly encounter their counterparts in various construction projects over time. Price remains the most important selection criterion for contractors (Hartmann *et al.*, 2009). For certain construction products and services, however, arms-length transactions could be replaced by more collaborative relationships. A first development for a supplier to a more collaborative relationship is becoming a preferred supplier of the buyer. In this relationship type annual agreements are formed and the supplier becomes more involved in the quality control process (Van Weele, 2009). The most collaborative relationship is a partnership. Li *et al.* (2000) presented a literature review on partnering in the construction industry and refer to the Construction Industry Institute's (CII) definition of partnering as the most comprehensive one: "A long-term commitment by two or more organizations for the purpose of achieving specific business objectives by maximising the effectiveness of each participant's resources. This requires changing traditional relationships to a shared culture without regard to organizational boundaries. The relationship is based upon trust, dedication to common goals, and an understanding of each other's individual expectations and values. Expected benefits include improved efficiency and cost-effectiveness, increased opportunity for innovation, and the continuous improvement of quality products and services" (CIIA, 1996). Storey *et al.* (2005) argue there are several organizational factors that impede the development of such collaborative relationships: a lack of commitment, diverging corporate strategies and priorities, and differences in levels of trust and commitment at the operational and strategic levels in the organization. Barratt (2004) also mentions lack of trust as one of the key inhibitors of collaborative planning in supply chains. Furthermore, Lee *et al.* (2009) argue that forming and sustaining long-term and close relationships can be time-consuming and cost-intensive. When realized, collaborative relationships like partnering can lead to improved risk management and total quality management (Tang *et al.*, 2006). Collaborative relationships

often start by integrating suppliers into one's own operational processes, later to be followed by their integration into the value creation process.

In this study 'Manage supplier relationships' is defined as the process of managing and optimizing the relationship with strategic suppliers. It is necessary to classify suppliers into various categories (e.g. supplier, preferred supplier, co-maker or partner) in order to focus attention on the most important suppliers, to set the correct priorities and to manage all suppliers according to their importance to the business. Successful relationships with strategic suppliers require very high levels of coordination, trust, information sharing, creativity and senior management support to fully exploit joint opportunities.

### 3.2.3 INTEGRATE SUPPLIERS INTO THE OPERATIONAL PROCESS

The integration of suppliers into the operational process involves strategies and activities which help simplify, standardize and synchronize the operational processes of the company. Evans and Jukes (2000) suggest that synchronization can be achieved through the following four key steps: process standardization, knowledge sharing, alignment of existing practices and continuous elimination of waste within joint development cycles. They highlight the importance of joint team-working and multi-company involvement within the alignment process. To achieve effective planning and delivery of a project, the expertise and knowledge of suppliers should be integrated. The case studies described by Khalfan *et al.* (2008) demonstrate that such integration efforts can yield both cost savings and enhanced relationship-building opportunities.

In this study 'Integrate suppliers into the operational process' is defined as the set of strategies and activities directed at simplification, standardization and synchronisation with the operational processes of the company. The goals include increasing speed, support, service and client satisfaction, reducing logistical costs, and improving asset utilization / cash flow, the speed of cash flows and cross-enterprise relationships, decision-making and communication.

### 3.2.4 INTEGRATE SUPPLIERS INTO THE VALUE CREATION PROCESS

Involving suppliers in the value creation process of a buying firm can be a profitable option, but one that is difficult to achieve in practice. Vonderembse and Tracey (1999) found a positive correlation between the dimensions of both supplier involvement and supplier performance and manufacturing performance. Further, they concluded that involving suppliers has a positive impact on the buyer's performance. Similarly, McGinnis and Vallopra (1999) argued that purchasing and supplier involvement can contribute to process



development/improvement, especially in manufacturing industries. Earlier research by Clark (1989) showed that, in the engineering phase of a development project, intensive supplier involvement creates advantages in terms of lead times and costs. Utilization of suppliers' knowledge can be maximised in developing new products, processes or services. However, a problem with this in the construction industry is that suppliers tend not to get involved in component design and usually manufacture to a buyer's specifications (Bensaou, 1999). Dubois and Gadde (2000) argued that the lack of ongoing relationships between firms is the main reason for the construction industry's failure to increase efficiency and innovation. It has been argued that, for certain products and services in the construction industry, arms-length transactions could be replaced by relationship and network-oriented approaches: approaches that stimulate adaptation and joint development between buyers and suppliers (Dubois and Gadde, 2002; Storer *et al.*, 2003). According to Eriksson *et al.* (2007), actors in construction projects should adopt a long-term perspective and actively work to establish an innovation-friendly climate in order to increase subcontractor contributions to innovation and value creation. These observations point towards the importance of supplier development, another important aspect of buyer-supplier relationship management.

In this study 'Integrate suppliers into the value creation process' is defined as using the knowledge of suppliers to develop new products, process or services that are aimed at maximizing the performance of one's own company (in terms of costs, time, quality etc.). Integration of suppliers into the Value Creation Process (VCP) is probably the most profitable process in the long term, but also difficult to achieve in practice. If suppliers are repetitively integrated in various of these development projects, learning effects occur which smooth the value creation process.

### 3.2.5 DEVELOP SUPPLIERS

Supplier development focuses on identifying opportunities for improvement and then facilitating performance improvements at suppliers. Monczka *et al.* (1993) argue that there are significant opportunities to accelerate the development of supplier capabilities and performance. Krause and Ellram (1997: p.21) offered the following definition of supplier development: "supplier development is defined as any effort of a buying firm with its supplier to increase the performance and/or capabilities of the supplier and meet the buying firm's supply needs". In their research, they see the following elements as critical to the success of supplier development: effective communication, top management involvement, cross-functional buying firm teams, price versus the total cost of ownership, long-term perspective, large percentage of supplier's annual sales, supplier evaluation and supplier recognition. Modi and Mabert (2007) also note the importance of inter-organizational communication. Their research on the development of suppliers showed that evaluation and

certification efforts are the most important prerequisites before undertaking operational knowledge transfer activities such as site visits and supplier training.

In this study 'Develop suppliers' is defined as identifying possibilities for ongoing performance improvements. In particular, attention is paid to facilitating performance improvements at suppliers.

### 3.2.6 PROJECT-BASED WORKING IN THE CONSTRUCTION INDUSTRY

Cox and Thompson (1997) have argued that models developed for manufacturing industries (such as automotive and electronics) where production takes place within controlled factory environments are often of limited use in the construction industry. In manufacturing industries the supply of goods is merely a repeat process in the form of a production line, whereas in construction most work is organized as projects. A project can be viewed as a temporary network of parties that disperses after finishing a project. However, to a firm, these fixed-term projects are part of a more-or-less permanent network of firms that provide people, equipment and other resources to each other (Dubois and Gadde, 2000). Each construction firm can be modelled as a layered structure made up of project, regional, business unit and corporate levels. When attempting to measure different aspects of the maturity of construction firms in managing the buyer-supplier relationships, a tool is needed that recognizes the relevance of this layered structure as a contextual factor.

## 3.3 EMPIRICAL RESEARCH DESIGN

For this paper, empirical research on current buyer-supplier relationship management practices has been conducted in the Dutch construction industry. This exploratory empirical research consists of a multiple case study of 19 Dutch construction firms active in civil and utility building or in infrastructure. The empirical research design involved two stages. In the first stage, maturity levels were defined for each construct presented in the previous section and, based on these constructs and maturity levels, a measurement tool was developed. In the second stage, the maturity level in 19 Dutch construction firms, in terms of these five constructs, was assessed by applying the measurement tool.

The first stage of the research was carried out by a team consisting of the researchers of this study and industry experts (a consultant and two Chief Purchasing Officers (CPOs) of large Dutch construction firms). Basis for the discussions within the team was the MSU Model (Axelsson *et al.*, 2005; Faber *et al.*, 2007; Hoffmann *et al.*, 2008), an existing industry auditing tool (in which 10 levels of maturity are distinguished) often used by the Dutch Purchasing

Association. In interactive sessions, the various subjects and criteria of the auditing tool and other aspects raised in the literature were assessed for their suitability for the project-based construction industry. The end product of the team's work was a measurement tool based on the five constructs described in the literature section above. For each of these five constructs, maturity levels were described and assessment criteria developed by the team (a detailed description of the ten maturity levels for each construct can be found in Appendix B). These maturity levels and assessment criteria served as a basis in the development of a measurement tool. In the interactive sessions the researchers presented the constructs and corresponding subjects of the auditing tool to the industry experts. After an open discussion, the industry experts individually provided their comments to the researchers. The researchers analyzed all comments and drafted the maturity levels and assessment criteria per construct. In the next session these were presented to the experts and the whole process of discussing, commenting, revising was repeated until consensus was reached. As a further check, the five constructs (and defined maturity levels) and the measurement tool were evaluated by a new group of industry experts consisting of 15 CPOs of Dutch construction companies. Based on this evaluation, refinements were made to the constructs and the tool. By involving industry experts, specific characteristics of the construction industry were included. The main characteristic to take into account was the project based, temporary network nature of the construction industry as described in the previous section.

In the Subsection 3.3.1 the measurement tool is described. In Subsection 3.3.2, the data collection and the characteristics of the 19 case companies are presented.

### 3.3.1 MEASUREMENT TOOL

Based on the defined constructs and associated maturity levels (see Appendix B), a measurement tool has been developed to assess the maturity level of a contractors' current management of buyer-supplier relationships. For each construct a result matrix was created to assess all the criteria and to present the results in a clear way. The horizontal axis of this matrix shows the maturity levels; the vertical axis, the general aspects of the maturity levels. These general aspects are distilled from the constructs and associated maturity levels. For example in Table 5, the subject of 'supplier selection' is part of maturity levels 1,2,4 and 8 of the 'Optimize supply base' construct.

In the construction industry, much work is done on a project basis, and so many processes and procedures in a company are adjusted to this project-based way of working. As such, many activities take place on different levels as discussed before. To capture this specific contextual factor, stratification is applied in attributing maturity levels to the five constructs as follows:

- Project level: maturity levels 1,2 and 3 (see Table B1);
- Regional level: maturity levels 4, 5 and 6 (see Table B2);
- Business unit (division) level: maturity levels 7 and 8 (see Table B3);
- Corporate level: maturity levels 9 and 10 (see Table B4).

Some exceptions had to be made when the construct ‘demanded’ certain criteria on lower levels of maturity (e.g. maturity level 5) to contain corporate criteria. The following example helps to explain this stratification. On the three lowest levels the purchasing is carried out by a project purchaser and decisions are based on project strategies. On levels 4 to 6, multiple project purchasers in a region cooperate and for instance jointly purchase certain product groups. Decisions are based on regional strategies and there are regional systems for knowledge sharing. On levels 7 and 8, purchasing is also carried out at the divisional level with multiple regions working together. Divisional policies are leading in the decision making process and systems are in place to share knowledge on a divisional level. On the highest levels, purchasing is arranged for the whole corporation. This does not mean that all product groups have to be centrally purchased, but that a corporate purchasing policy is in place to provide a framework for purchasing activities and decision making at all levels. Furthermore, corporate systems are in place to facilitate knowledge sharing. For smaller construction companies there is less stratification, but the requirements for each level still have to be satisfied.

The measurement tool uses the ‘strict step’ principal when determining the maturity level for each construct, i.e. all criteria for a certain level have to be satisfied before the criteria of the next maturity level are considered. A company scores a maturity level of 3 for a construct when not all aspects of level 4 are met (whereas all the aspects of the first three levels are met), even if all the criteria at levels 5 and 6 were also met. However, if, in this situation, the company took the required actions to satisfy the criteria of level 4, it would automatically rise to level 6 for that construct. This strict step principle means that a company will be given a maturity level of 0 if one or more of the level 1 maturity criteria are not met.

The working of the result matrix is illustrated with Table 5. In the matrix, a cell in which now a percentage is presented means that, related to the aspect being considered on that maturity level, a specific criterion has to be met. A hatched cell means that there is no criterion at that maturity level. If the criterion for an aspect of a maturity level is met, then the cell is coloured black, if not it becomes white. Hence, following an assessment, all the non-hatched cells have turned either black or white and the resulting matrix shows which

maturity level has been reached. Moreover, the white cells indicate room for potential improvement at the assessed company.

### 3.3.2 DATA COLLECTION AT THE CASE COMPANIES

In the second stage of the research, maturity levels for the five constructs were assessed by applying the measurement tool in 19 Dutch construction firms. This *multiple* case approach was chosen for two main reasons. The first being the importance of studying the management of buyer-supplier relationships in the real-life context, and using multiple sources of evidence (Yin, 2009). The second reason is based on the structure of the Dutch construction industry. There is a great diversity of companies active in this industry, and companies with different sizes and business focus were selected, although their accessibility and willingness to cooperate also played a major part in the selection process. The Dutch construction industry has two main subsectors, the civil and utility building subsector and the infrastructure subsector, and companies from both subsectors were included. The selected companies also differed in size, with both SMEs and large companies involved. In Table 2 an overview of the case companies based on these characteristics is provided. A company is regarded as a SME if a maximum of 100 or less FTE are working for the company. This number was also used by Dutch Purchasing Association in their research in different industries in the Netherlands. The work portfolio of companies active in the civil and utility building subsector consist mainly of residential housing and office building projects. Companies active in the infrastructure subsector mainly focus on road construction projects. Suppliers of the case companies are subcontractors, material suppliers, service suppliers etc.

**TABLE 2: OVERVIEW CASE COMPANIES**

<i>Case companies</i>	Infrastructure	Civil and utility building	Total
Large companies	6	5	11
Small and medium size companies	2	6	8
Total	8	11	19

Each assessment took place as follows. First, the case company would provide documentation for the researchers to review that offered insights into their daily routines and strategies (related to the identified constructs). The documentation included internal reports such as minutes of meetings and memos, company policies, annual reports and internal process descriptions. Having read all this documentation, one or more researchers would visit the company and interview four or five representatives using the developed measurement tool as a reference. The following functions within the company were targeted in identifying representatives:

- Responsibility for purchasing (manager of the purchasing department / CPO),
- Their superior (usually a board member),
- Controller (person who oversees all relevant company procedures),
- Internal customer of purchasing (usually project managers).

These functions were chosen to enable assessment of the maturity levels using multiple sources. In the interviews, recorded for future reference, the interviewer essentially followed the questions derived from the measurement tool. To assess the maturity level of the different constructs related to the purchasing function, the interview format was partly open-ended, allowing the interviewer to explore areas that came to light during the course of the discussion. When required, the researchers would ask the interviewees to provide additional documentation to support the given answers. Following the set of interviews, data analysis was performed in three steps. First, after the visit, the researcher prepared a case report on the company. Second, to achieve construct validity, these draft reports were submitted to the respondents for verification. After the verification and integration of comments, the final case report was written. Finally, when all 19 assessments were completed, the overall results were analyzed. These results are presented in the next section.

### 3.4 RESULTS

In this section, the results of the multiple case study are presented. Table 3 summarizes the lowest, highest and average maturity levels for each construct obtained from the 19 case companies. The data from the 19 assessments show that there is a large potential for improvement in the Dutch construction industry. The average maturity level for the various constructs varies between 0.8 and 3.6 on a scale of 0 to 10. Moreover, looking at the spread between the lowest and highest maturity levels, it can be concluded that there are plenty of possibilities for benchmarking within the Dutch construction industry.

**TABLE 3: OVERALL RESULTS**

<i>Overall results</i>	Lowest maturity level	Average maturity level	Highest maturity level
Optimize supply base	1.0	3.6	8.0
Manage supplier relationships	0.0	1.2	5.0
Integrate suppliers into the operational process	1.0	2.8	5.0
Integrate suppliers into the value creation process	0.0	0.8	8.0
Develop suppliers	1.0	2.5	5.0

The percentages of companies achieving each maturity level for each construct are presented in Table 4. These results clearly show that the vast majority of companies have maturity levels which fit within the project level classification (i.e. maturity levels 1 - 3). Some companies have reached maturity levels which belong to the regional classification (maturity levels 4 and 5) but only one company obtained, and then only for two constructs, a maturity level belonging to the business unit classification (maturity levels 7 and 8). None of the companies achieved corporate level classifications (maturity levels 9 and 10). The detailed results for each construct are presented in next subsections (3.4.1 until 3.4.5), including an overall result matrix (as described in the previous section) per construct. These result matrices show per construct the percentages of companies that have met a specific criterion (see Tables 5 until 9). Table 4 presents the percentage of construction companies that have reached a certain maturity level per construct, these percentages are explained by analyzing the detailed results per construct presented in Tables 5 until 9.

**TABLE 4: OBTAINED MATURITY LEVELS FOR THE FIVE CONSTRUCTS**

<i>Obtained maturity levels</i>	<b>Maturity level</b>									
<b>Construct</b>	<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>	<b>6</b>	<b>7</b>	<b>8</b>	<b>9</b>	<b>10</b>
Optimize supply base	100%	95%	89%	37%	21%	11%	5%	5%	0%	0%
Manage supplier relationships	42%	42%	26%	5%	5%	0%	0%	0%	0%	0%
Integrate suppliers into the operational process	100%	84%	53%	26%	21%	0%	0%	0%	0%	0%
Integrate suppliers into the value creation process	42%	5%	5%	5%	5%	5%	5%	5%	0%	0%
Develop suppliers	100%	53%	53%	32%	11%	0%	0%	0%	0%	0%

**3.4.1 OPTIMIZE SUPPLY BASE**

Our analysis reveals that 89% of the case companies reached maturity level 3 (see Table 4, *Optimize supply base*) in terms of this construct. At this level, companies use a basic supplier rating system and, for this rating system, they measure at least the quality and the delivery performance of key suppliers. Further, there is multidisciplinary cooperation within a project over the selection and contracting of suppliers. Only about 37% of the case companies had reached maturity level 4 (see Table 4, *Optimize supply base*). One reason for this sharp decline from 89% at level 3 to 37% at level 4 in Table 4 is that only 58% of the case companies have a formal and documented supplier selection process in place that is focussed on the current needs and capabilities of the company (see Table 5, *Supplier selection* – level 4). A second reason is that only 42% of the case companies have a supply base optimization plan based on the supplier rating system (see Table 5, *Optimizing supplier base* – level 4).

The communication aspect provided a remarkable result. Although 79% of the case companies communicated internally about suppliers and their performance, only 11% of the companies communicated regularly with suppliers in meetings to discuss improvements (see Table 5, *Communication* – level 6 and 7 respectively). Looking at the results on the documentation aspect, 58% of the companies have documented evidence of analyses of their supplier base using purchasing models, but only 21% of the companies have documented evidence of adopting differentiated strategies towards the suppliers based on these analyses (see Table 5, *Documentation* – level 5 and 6 respectively).

As shown in Table 4, there are a few notable exceptions where construction companies did reach a more mature level. A closer analysis shows that these high performers have an optimization plan and also structurally pay attention to supply market research. These companies also carry out regular assessments at their key suppliers in order to clearly understand and communicate current and future capabilities of their suppliers.

TABLE 5: RESULT MATRIX 'OPTIMIZE SUPPLY BASE'

<i>Optimize supply base</i>	Maturity level									
Aspects	1	2	3	4	5	6	7	8	9	10
Supplier selection	100%	100%		58%				11%		
Supplier rating system	100%		95%	79%	53%	26%		37%		11%
Team arrangement			100%			63%				
Needs of the company								74%	42%	
Supplier market research		100%				37%			0%	
Supplier differentiation	100%				84%	53%	32%			16%
Optimizing supplier base	100%	95%		42%		37%	16%	16%		
Differentiated policy		100%				42%				
Documentation		100%			58%	21%	21%		0%	
Communication			89%			79%	11%			

3.4.2 MANAGE SUPPLIER RELATIONSHIPS

For this construct, the majority of the companies do not meet all the criteria set for maturity level 1 and thus obtain a level 0 ranking. Only 42% met all the criteria for the first maturity level, and all these companies also satisfied the level 2 criteria (see Table 4, *Manage supplier relationships*). Level 1 first requires a company to have a formal process in place to identify the criteria and objectives of relationships within a project, and for these to be in line with the project purchasing plan. Secondly, a company should have a documented and structured process in place to identify, assess and select potential partners on the project level. Finally, reaching level 1 means that the companies have a formal definition in their purchasing policy explaining with which category of suppliers they want to establish a partnership (see Table 6



– level 1). Maturity level 2 requires companies to have evidence of a formal communication framework and shared goals with their suppliers that go beyond the specific project.

A closer look at the ‘cooperation with suppliers’ aspect reveals that almost 74% of the companies do have strategic partnership agreements with one or more suppliers, and that, at 68% of the companies in such relationships, the executive managements at both companies (contractor and supplier) are involved in leading and managing the relationship (see Table 6, *Cooperation with suppliers* – level 4 and 5 respectively). Nevertheless, only 16% of the companies (see Table 6, *Cooperation with suppliers* – level 8) jointly analyze processes and integral costs (by sharing their own cost structures and cost calculations).

The highest maturity level found on *Manage supplier relationships* was level 5, and only one company had achieved this (see Table 4, *Manage supplier relationships*). This company had a formal process in place to identify its criteria and objectives for each relationship, and these were in line with a purchasing plan that went beyond the project and also in line with its business objectives.

**TABLE 6: RESULT MATRIX 'MANAGE SUPPLIER RELATIONSHIPS'**

<i>Manage supplier relationships</i>	Maturity level									
Aspects	1	2	3	4	5	6	7	8	9	10
Purchasing policy	42%									
Assessment process	100%			32%				16%	11%	
Documentation	95%		42%	21%					11%	
Cooperation with supplier		74%		74%	68%	26%	16%	16%	16%	0%
Improvement programs						47%		16%	0%	
Communication		95%		68%						0%

**3.4.3 INTEGRATE SUPPLIERS INTO THE OPERATIONAL PROCESS**

The results for this construct revealed that 84% of the companies had reached maturity level 2 (see Table 4, *Integrate suppliers into the operational process*). These companies could show evidence that they had started to integrate suppliers into their own operational processes. On a project level, they had a planning and scheduling process that satisfied limited requirements (such as including a supplier’s delivery times in the planning). A barrier to many companies obtaining maturity level 3 was the associated requirement to formalise, document and communicate an improvement plan for the operational process (see Table 7, *Communication, Documentation and Improvement plan* – level 3). In this improvement plan, targets (such as for a reduction in lead times and throughput times) have to be formalised and internally communicated.

The results shown in Table 7 do reveal some positive developments in terms of operations integration in construction supply chains. First, about 74% of the case companies have an active process to reduce the number of logistical steps, the number of invoices, the amount of stock, etc. (see Table 7, *Improvement plan* – level 5). Approaches included setting up web shops with suppliers, forming analysis teams (a few even involving suppliers), and producing monthly status reports. In working on such improvements, 84% of the companies indicated this involved an internal multidisciplinary team (see Table 7, *Multidisciplinary cooperation* – level 4). Second, suppliers were increasingly being asked to contribute to internal process improvements (some even had this included in their contracts). The weakest area related to this construct was the lack of documentation on such improvement actions and the associated results (see Table 7, *Documentation*).

The companies reaching maturity level 5 (21%, see Table 4, *Integrate suppliers into the operational process*) showed evidence of an active integration and optimization process resulting in fewer process steps, fewer invoices and lower inventory levels. Moreover, there was an internal optimization of the requirement planning and scheduling process on a regional level.

TABLE 7: RESULT MATRIX 'INTEGRATE SUPPLIERS INTO THE OPERATIONAL PROCESS'

<i>Integrate suppliers into the operational process</i>	Maturity level									
	1	2	3	4	5	6	7	8	9	10
Supplier integration	100%	84%		53%						
Multidisciplinary cooperation				84%		26%		11%	5%	
Communication			63%	47%			37%	16%		0%
Documentation			53%				16%	37%	0%	
Planning process	100%	100%	95%		47%		5%	16%		
Improvement plan			58%		74%	16%			5%	0%
Evaluation process						47%				0%

3.4.4 INTEGRATE SUPPLIERS INTO THE VALUE CREATION PROCESS

In terms of supplier integration into the value creation process, the participating construction companies were, with one notable exception, truly underdeveloped (see Table 4, *Integrate suppliers into the value creation process*).

As with the 'manage supplier relationships' construct, only 42% of the companies were able to satisfy the maturity level 1 criteria for this construct. Unlike the majority, these companies had taken the first steps in creating a value creation process policy/procedure. To satisfy the criterion, the policy/procedure had to describe the role of purchasing and define the tasks and responsibilities for both purchasing and suppliers at every milestone along the way. A positive finding was that almost half of the companies (47%, see Table 8, *Communication* –

level 8) indicated that if they did create a policy/procedure for the value creation process, they would include an open door policy on sharing information (including technology roadmaps, costs calculations and customer information) with their suppliers.

The notable exception, that achieved maturity level 8 (see Table 4, *Integrate suppliers into the value creation process*), was the only company that had a formal decision-making process to determine which *external* technologies and capacities were needed to develop new products, processes or services. Using this formal decision-making process the company could maximize its use of suppliers' knowledge.

TABLE 8: RESULT MATRIX 'INTEGRATE SUPPLIERS INTO THE VALUE CREATION PROCESS'

<i>Integrate suppliers into the value creation process</i>	Maturity level									
	1	2	3	4	5	6	7	8	9	10
<b>Aspects</b>										
VCP-policy	100%	5%						42%		
Involvement of purchasing	42%	58%								
Supplier selection			58%							5%
Assessment of supplier processes			53%							
Evaluation of supplier performance							16%		5%	
Corrective actions							58%		11%	
Decision making process				11%						
Targets and objectives				58%	11%	11%	16%			
Cooperation with suppliers	100%			47%	16%			26%		5%
Communication						21%		47%	11%	
Multidisciplinary						26%				
Usage of IT systems									16%	
Documentation	100%	47%		53%	26%		16%	21%		

### 3.4.5 DEVELOP SUPPLIERS

Turning to our final construct, all companies had reached maturity level 1 (see Table 4, *Develop suppliers*). This means that all companies carry out ad hoc supplier improvement actions, but not necessarily with any structured follow up activity. To a limited extent, they did examine suppliers on legally required aspects before contracting. The main reason companies did not qualify for maturity level 2 was that only 58% of them had a formal system in place to measure supplier performance (see Table 9, *Existence of supplier improvement programs* – level 2). The case companies have a predominantly reactive response to their suppliers, they identify bad performances (100%, see Table 9, *Evaluation of supplier performance* – level 3), communicate internal complaints to suppliers (95%, see Table 9, *Communication* – level 4) and have a working system to check whether agreed corrective actions are executed (89%, see Table 9, *Evaluation of supplier performance* and *Identification of corrective actions* – level 4). A closer analysis of the 'evaluation of supplier

performance’ and ‘communication’ aspects reveals a large drop in the numbers satisfying the level 5 criteria compared with the lower levels (see Table 9). Only 16% of the participating companies conducted formal audits at the suppliers and only 37% visited them in order to evaluate the supplier and communicate business strategy and purchasing objectives.

The analysis of data on the supplier development construct also yields some positive signs. First, 53% of the case companies were busy developing formal supplier improvement programmes (see Table 9, *Follow-up improvement programs* – level 3). Second, pre-contract auditing of suppliers has become quite common in our sample of construction companies, mostly on certification (e.g. ISO) and quality demands as can be seen in Table 9 under the ‘certifying suppliers’ aspect.

The few companies that did reach maturity level 5 (11%, see Table 4, *Develop suppliers*) do satisfy the above criteria in terms of conducting formal audits at the suppliers and visiting them to communicate business strategy and purchasing objectives. Furthermore, they review their strategic suppliers before entering into contracts, not only where legally necessary but also on other aspects they see as relevant (quality certificates, environmental certificates, etc.).

TABLE 9: RESULT MATRIX ‘DEVELOP SUPPLIERS’

<i>Develop suppliers</i>	Maturity level									
Aspects	1	2	3	4	5	6	7	8	9	10
Existence of supplier improvement programs	100%	58%							0%	
Follow-up improvement programs	100%		53%					16%		0%
Certifying suppliers	100%	84%	89%	63%	42%					
Evaluation of supplier performance		89%	100%	89%	16%	11%	26%	37%	21%	16%
Identification of corrective actions		95%		89%			63%	79%	5%	5%
Communication		95%	95%	95%	37%	26%			0%	
Complaint procedure				89%			79%			
Documentation	100%	95%		53%		47%	47%		16%	

### 3.5 DISCUSSION

The results from the Dutch case studies illustrate that there is a large potential for improvements in the management of buyer-supplier relationships in the construction industry. Based on the case studies, it is concluded that the vast majority of companies have maturity levels which remain within the project-level classification (maturity levels 1 - 3). This finding emphasises the dominance of the project-based way of working in construction supply chains. An important implication is that construction companies do not maximize the

use of the knowledge and competences of their suppliers when buying in goods and services. Most construction firms operate in a *decentralised network* of suppliers and customers, and draw on the production capacity of various external suppliers. A construction project can be seen as a temporary organisation *among* and *within* the organisations involved (Hofman *et al.*, 2009). In such business environments, strategic partnerships are costly to develop and to maintain, and bring risks associated with the specialized investments they require (Bensaou, 1999).

The case study results are in line with recent research on the UK construction industry by Akintoye and Main (2007). Their research showed that 68% of construction companies have strategic collaborations with clients, and 24% with other contractors. Moreover UK construction firms have a larger number of arrangements with clients than with suppliers, and a higher proportion of the relationships with suppliers are contractual. The most important reason, as identified by the UK contractors studied, for collaborative relationships is the requirement to 'respond to customers needs' (Akintoye and Main, 2007). Earlier research by Akintoye *et al.* (2000), involving 40 construction companies, showed that only one-third of these firms value relationships with suppliers more than the relationship with the client, with the other two-thirds arguing the opposite. We expect that this perception of the contractors will change given the recent requirements for sustainability. Because of these developments contractors are not only judged on their own sustainability performance, but also on the sustainability performance of their suppliers.

In more detail the case results from our study yield the following factors as impeding the effective management of buyer-supplier relationships in the Dutch construction industry:

- Lacking a formal and documented supplier selection process that is focussed on the current needs and capabilities of the company.
- Not having a supply base optimization plan based on a supplier rating system.
- Lacking a formal definition in the purchasing policy of which category of suppliers should be targeted in establishing partnerships.
- Not having a formal, documented and communicated improvement plan (with targets including for the reduction of lead times and throughput times) for their own operational processes.
- Not having taken the first steps to create a policy/procedure for the value creation process, in which the purchasing role is described and the tasks and responsibilities, at each milestone, for both purchasing and suppliers are explained.
- Lacking a formal system to provide a basic measurement of supplier performance.

- Not having a proactive mindset towards suppliers (visiting and auditing suppliers, evaluating suppliers, communicating business strategy and purchasing objectives etc.) to develop suppliers in the desirable direction.

These obstacles reinforce the natural tendency for temporary project work to result in a lack of continuous relationships between firms (see also Dubois and Gadde (2000)). The difficulties in achieving continuous relationships is especially illustrated by the relatively low maturity levels found for the 'manage supplier relationships' construct. Cox (2004) argued that strategic collaboration with suppliers is not always feasible or desirable for construction companies because (1) in some situations potential relationship benefits are exceeded by investment costs and (2) any investment competes with other opportunities. Despite this, companies should at least investigate with which suppliers it would make sense to establish more collaborative relationships.

The case results also highlight some positive developments and opportunities in the Dutch construction industry. A substantial minority of construction firms do already invest in improving relationship management. In more detail, the cases yield the following positive developments and corresponding opportunities for improving the management of the buyer-supplier relationship in the Dutch construction industry:

- Nearly all the case companies did communicate about suppliers and their performances internally, but not with the suppliers.
- A majority of the companies analysed their supply base with the help of purchasing models. They could go on to use these analyses to develop differentiated strategies towards their suppliers.
- Strategic partnership agreements with suppliers do exist, but only a few companies jointly analyze processes and integral costs with their suppliers.
- Three-quarters of the case companies have an active process to reduce the number of logistical steps, the number of invoices, stocks etc.
- The majority of companies indicated that they are improving their internal operational processes with an internal multidisciplinary team. Involving suppliers is a genuine opportunity.
- Almost half of the companies do have an open-door policy in sharing information with suppliers in the value creation process, but they lack a policy/procedure for their value creation process in which this could be explicitly stated.

- Half of the case companies are developing formal supplier-improvement programmes, but two-way communications with suppliers is not yet common practice.

These positive developments and opportunities reinforce the improvement potential of buyer-supplier relationship management in the construction industry.

### 3.6 CONCLUSIONS AND MANAGERIAL IMPLICATIONS

The objective of this paper was to shed light on obstacles to, and opportunities for, increasing the effectiveness of construction firms in managing buyer-supplier relationships. More specifically, the focus was on assessing the maturity level of buyer-supplier relationship management by construction firms. This assessment demonstrated a large potential to improve the management of buyer-supplier relationships in the Dutch construction industry.

It can be concluded that there are, at the same time, both major factors impeding, and positive developments and opportunities stimulating, improved management of buyer-supplier relationships in Dutch construction firms. The impeding factors can be summarized as the lack of formalization, documentation and communication (both internally and with suppliers) linked to the various policies, plans, processes and measurement systems that form part of the management of buyer-supplier relationships. On the positive side, it can be seen that many initiatives regarding the optimization of the supply base, the management of supplier relationships, the integration of suppliers into the operational and value creation processes and the development of suppliers have been started. The opportunity exists for these companies to further develop these initiatives, by paying specific attention to involving suppliers.

A strong recommendation is that construction companies should not only react towards suppliers when something goes wrong, but communicate proactively with suppliers in order to develop closer and trusting relationships. Construction firms and their suppliers should jointly analyze processes and integral cost in order to reduce costs linked to failures and improve the quality of the final product. Here, we saw that a minority of construction firms do already invest in formal supplier improvement programmes, do analyze processes and costs jointly with suppliers and do ask suppliers to contribute to process improvements. By involving suppliers in value creation projects, construction companies can maximize their use of the knowledge of suppliers in developing new products, processes or services. To further optimize the supply base, companies should develop an optimization plan (and document this) and structurally pay attention to research on the supply market. Furthermore, based on

their analyses with purchasing models of the supply base, they should develop differentiated strategies towards their suppliers.

Taking the large potential for improvements in the management of the buyer-supplier relationship by Dutch construction firms as a starting point for further research, the optimum relationship types, between contractors and suppliers in the construction industry, should be determined through further research. The portfolio approach by Bensaou (1999) could be an interesting starting point in that it argues that the various product, market and supplier conditions require a portfolio of relationship management approaches. Cox (2004) builds further on the principle of a portfolio of relationships by differentiating strategies for managing these relationships. If a portfolio of relationships is developed, based on the appropriate management styles, the competitive advantage of construction firms will increase (Bensaou, 1999). More specifically, further research could focus on determining under which conditions a supplier is able to provide structural added value for a contractor.



# Chapter 4

## DESIGNING A TOOL FOR AN EFFECTIVE ASSESSMENT OF PURCHASING MATURITY IN CONSTRUCTION

This chapter has been written together with Hans Voordijk and Bart Vos and is accepted for publication by *Benchmarking: an International Journal (BIJ)*. The chapter has not yet been scheduled for publication in the printed issue. Earlier versions of this chapter have been submitted to, accepted, and presented at WION 2010 (Lunteren, the Netherlands), IPSERA 2010 (Lappeenranta, Finland) and IFPSM Summer school 2010 (Salzburg, Austria).

# DESIGNING A TOOL FOR AN EFFECTIVE ASSESSMENT OF PURCHASING MATURITY IN CONSTRUCTION

## **Abstract**

Purpose - Prime contractors spend up to 90% of a construction project's turnover on buying goods and services, and thus suppliers have a large impact on project performance. Therefore, the purchasing function management of the prime contractor has a large influence on the overall performance: the more developed (i.e. mature or professional) this function is, the greater its positive contribution. The goal of this research is to develop and test a quick scan purchasing maturity tool by applying a design science research method.

Design/methodology/approach - The maturity tool is developed by applying Hevner's framework for design science research. In this framework, foundations drawn from the available knowledge base are used to develop the new tool. Scientific justification of this new tool and approval of its approach for construction practice is obtained through testing it in the specific context of a case company.

Findings - The tool provides a company with insight into its current level of purchasing maturity and possibilities for improving performance by increasing this level.

Originality/value - The conciseness and the limited time required to use the tool are major advantages over existing alternatives for construction practice.

## 4.1 INTRODUCTION

A lot of research has been done on benchmarking the performance of construction projects (Haponava and Al-Jibouri, 2010; Zwikael and Globerson, 2006). In realizing these construction projects, and for achieving the required performance, prime contractors increasingly depend upon their suppliers. The term supplier covers subcontractors, material suppliers, service suppliers etc. Up to 90% of the project turnover of prime contractors may be spent on buying goods and services (Hinze and Tracey, 1994; Nobbs, 1993; Vrijhoef and Koskela, 2000). Nevertheless, the main focus in research in the construction industry is on the contractor-client relationship and its management (Dainty *et al.*, 2001a; Eom *et al.*, 2008). Since suppliers have such a large impact on project performance, the management of the prime contractor's purchasing function has a large influence on the overall performance of that prime contractor. The management of the purchasing function, or purchasing

management, has been defined as “all activities necessary to manage supplier relationships in such a way that their activities are aligned with the company’s overall business strategies and interests” (Van Weele, 2009: p.11). A company with a well-developed purchasing function may well be applying world-class best practices whereas less-developed companies are unlikely to be applying these best practices (Ellram *et al.*, 2002). The more developed (i.e. mature or professional) the purchasing function is, the greater its contribution to the overall company performance (Schiele, 2007). The level of purchasing maturity reflects the extent to which the purchasing function is integrated into the strategic management decision-making process (Pearson and Gritzmacher, 1990). To date, several models have been developed to measure the level of purchasing maturity. All these models have in common that they describe several stages a company has to go through to reach a high level of maturity, and these stages are all auditable (Schiele, 2007). By applying these tools, a company not only obtains insights into its current level of purchasing maturity, it is also provided with possibilities to improve its purchasing maturity.

The starting point for this research is the need of construction firms for a quick scan tool that can give an indication of the purchasing maturity of a single business unit and provide improvement possibilities. Further, it should be possible to compare the outcomes of this new concise tool with the results of previous more-extensive audits. Therefore, the goal of this research is *to develop and test a quick scan purchasing maturity tool by applying a design science research method*. By designing such a tool, and so providing a solution to a contractor’s problem, the *relevance* of the research is assured. Within a short period of time the tool provides options to improve the purchasing maturity of a company, hence enlarging the purchasing function’s potential to improve the overall company performance. To achieve *rigour*, the framework for design science research proposed by Hevner *et al.* (2004) will be applied to purchasing. In other words, design science (Romme, 2003; Simon, 1996) is an important starting point of this research. A typical product of design science is not a causal model but an act, a sequence of acts, a process, a system or a tool (Hevner *et al.*, 2004; Van Aken, 2004; Voordijk, 2009). Justification of this new tool and its approval by construction practice is obtained through testing the developed tool in the specific context of a case company.

In Section 4.2 the research method will be described. Next, the article follows the approach of the research framework proposed by Hevner *et al.* (2004).

## 4.2 RESEARCH METHOD

This study is, using the terms of Van de Ven (2007), a ‘design/policy evaluation research’. In this type of research, a profession’s practical problem (in this case a construction company’s

need for a quick scan tool to assess purchasing maturity) is resolved by examining questions related to the design and evaluation of policies, programmes or models. The researchers' role can be categorized as that of a detached outsider. In making our contribution to design research, we apply the design science research framework presented by Hevner *et al.* (2004), and further elaborated in 2007 (Hevner, 2007), see Figure 7.

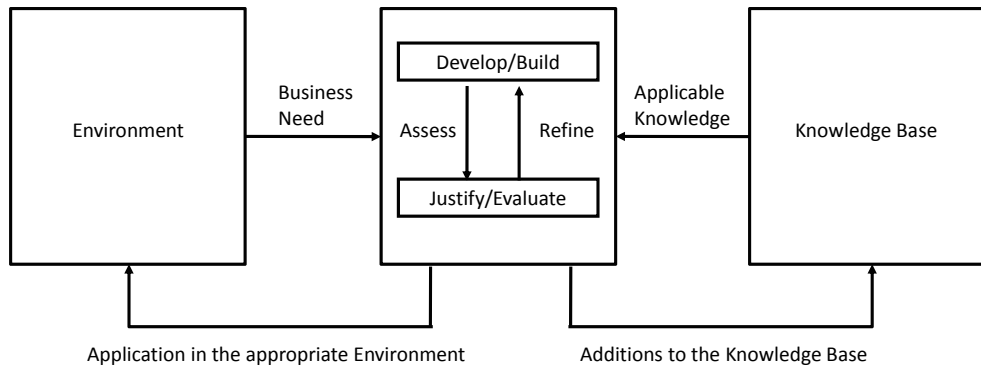


FIGURE 7: RESEARCH FRAMEWORK (AFTER HEVNER ET AL., 2004; HEVNER, 2007)

In Figure 7, the environment defines the business need or ‘problem’ as perceived by the researcher. This need is assessed and evaluated within the context of the organizational strategies, structure, culture, and existing business processes. By addressing this business need in the research, research *relevance* is assured. The knowledge base provides the raw materials from and through which research is accomplished. It consists of foundations (theories, frameworks, instruments, constructs, models, methods and instantiations) and methodologies (data analysis techniques, formalisms, measures and validation criteria) that are available to the researcher. By applying the foundations and methodologies available from the knowledge base, *rigour* is achieved in the research (Hevner *et al.*, 2004). The research itself is conducted in two complementary phases. First, foundations from the knowledge base are used in the develop/build phase of the research where a solution is designed. Solutions can be defined in terms of constructs, models and methods (March and Smith, 1995). Second, in the justify/evaluate phase, the methodologies available in the knowledge base are used to assess the proposed solution from the develop/build phase. This assessment can result in the identification of weaknesses in the solution. Conclusions from this assessment might be to refine and reassess the product from the develop/build phase (typically described in the form of future research directions). The final steps of the research process are to apply the results to the identified business need in an appropriate environment and then to add these results to the content of the knowledge base for further research and practice (Hevner, 2007; Hevner *et al.*, 2004).

Our research is presented in terms of the framework shown in Figure 7. First, in the next section, the 'business need' will be described. In Section 4.4 the 'applicable knowledge' will be discussed. Subsequently, the 'develop/build' and the 'justify/evaluate' phases of the framework are presented in respectively Sections 4.5 and 4.6. In the final section, the applications for use in the case company and for the construction industry, and the additions made to the knowledge base, are discussed.

### 4.3 BUSINESS NEED

Following the research framework presented in Figure 7, the environment defines the business need or 'problem' perceived by the researcher. In our study, the business need is defined by one of the top five construction companies in the Netherlands (based on turnover). Almost half of its turnover is realized within the Netherlands. The company is active in the utility sector, the infrastructure sector, the residential building sector, the real estate sector and some other sectors.

Within two business units of the case company, an existing comprehensive industry auditing tool has been used to execute a purchasing maturity scan. The contractor in this case believes in the benefits of having a more mature purchasing function, and views the audits undertaken as a starting point from which to make improvements in the coming years. Each of the earlier audits took roughly four working days to carry out. To monitor if any improvements made actually lead to a higher level of purchasing maturity, the contractor is now looking for a tool to use in follow-up audits that could provide an indication of the purchasing maturity of a single business unit and suggest improvement possibilities within two to three hours. Furthermore, it should be possible to compare the outcomes of this new quick scan tool with the results of the earlier extended audits. The problem is thus that the existing industry auditing tool is regarded as too comprehensive and therefore not suitable, and a new concise tool to measure purchasing maturity needs to be developed.

### 4.4 APPLICABLE KNOWLEDGE

In this section foundations (theories, frameworks, instruments, constructs, models, methods and instantiations) of the knowledge base, which could be used to satisfy the business need of the case company, are presented. In essence, this section will deliver the 'components' of the new quick scan purchasing maturity tool. First, tools and models that are available for determining the level of purchasing maturity are described in Subsection 4.4.1. Second, the existing comprehensive industry auditing tool is discussed in Subsection 4.4.2. Third, the purchasing maturity model that has been identified as having the most appropriate fit with

the existing comprehensive industry auditing tool is presented in Subsection 4.4.3. Together with the existing tool, this selected purchasing maturity tool will then become the foundation for the develop/build phase described in Section 4.5.

#### 4.4.1 PURCHASING MATURITY & MODELS

It is assumed that a higher level of purchasing maturity is associated with a better overall performance of the company (Schiele, 2007). The level of purchasing maturity reflects the extent to which the purchasing function is integrated into the strategic management decision-making process. If a company has a high level of purchasing maturity, it will have an integrated information system that enables the purchasing professionals to work on the tactical and strategic levels. Conversely, a low level of purchasing maturity means that the purchasing professionals remain on the operational level (Pearson and Gritzmacher, 1990). If a firm's purchasing function fulfils a 'supply chain management' role instead of a traditional ordering role, this is an indication of a higher purchasing maturity (Rozemeijer *et al.*, 2003). Another indication of developing the purchasing maturity of a firm is the stimulation to share purchasing information and best practices across their own business units. Examples of this stimulating behaviour are: the appointment of a corporate purchasing officer, corporate lead buyers, or cross functional commodity teams (Matthyssens and Faes, 1997; Rozemeijer *et al.*, 2003).

Several models have been developed to measure the level of purchasing maturity more accurately. Schiele (2007) presented an overview containing the models of Reck and Long (1988), Bhote (1989), Freeman and Cavinato (1990), Cammish and Keough (1991), Keough (1993), Burt and Doyle (1994), Chadwick and Rajagopal (1995), Barry *et al.* (1996), Paulraj *et al.* (2006) and Cousins *et al.* (2006). More recently, Van Weele (2009) has presented an adapted model based on Keough (1993). All these models have in common that they describe several stages a company has to go through to reach higher levels of maturity, and that these stages are all auditable (Schiele, 2007). Further, the stages describe a progression from clerical towards strategic purchasing (Ramsay and Croom, 2008). The various purchasing maturity models differ mainly in how they delimit the stages and in the assessment dimensions (Schiele, 2007). Table 10 provides an overview of the main characteristics of existing purchasing maturity models.

**TABLE 10: MATURITY MODELS (BASED ON SCHIELE (2007))**

	Reck and Long (1988)	Bhote (1989)	Freeman and Cavinato (1990)	Cammish and Keough (1991)	Keough (1993)	Burt and Doyle (1994)	Chadwick and Rajagopal (1995)	Barry <i>et al.</i> (1996)	Paulraj <i>et al.</i> (2006)	Cousins <i>et al.</i> (2006)	Michigan State University framework*
No. of stages	4	4	4	4	5	4	4	3	3	4	10
No. of items assessed	11	24	9	8	8	33	9	20	42	24	14
<i>Topics addressed:</i>											
Planning	√	√	√	√	√	√	√	√			√
Structural organization		√		√	√	√	√				√
Process organization		√		√	√		√	√			√
Human resources	√		√	√	√	√	√			√	√
Controlling	√	√	√			√	√	√	√	√	√
Collaborative supply relation	√	√				√	√		√	√	√

\* The Michigan State University model contains 14 processes, each contains 10 stages of maturity.

In Table 10, it is shown that most maturity models include some planning of procurement activities, such as the specification of materials and an environment scan. A second dimension of maturity is an established organizational structure. Formulating sourcing strategies and a long-range sourcing plan on performance is an important part of developing a process organization. Human resource management focuses on the importance of skills in purchasing. Purchasing controlling focuses on performance measurement and methods and tools to support control. Finally, the dimension of collaborative supplier relations assesses whether firms formulated a collaborative sourcing strategy.

Analysing the development of these models, they can be divided in two groups; those primarily deducted from dominant theory and those primarily based on observation (see Table 11). Several models are a combination of both: models with a more deductive character may also include observations and the models based on observations can be influenced by a dominant theory (Schiele, 2007). The existing comprehensive industry auditing tool, as used by the case company, is based on a framework developed at Michigan State University (Axelsson *et al.*, 2005). Therefore, this framework is a major input for the new quick scan purchasing maturity tool and will be further presented in the following subsection. Another major input for this tool to be developed in this study is Van Weele (2009), based on Keough (1993), and is presented in Subsection 4.4.3.

**TABLE 11: DEVELOPMENT OF MODELS (BASED ON SCHIELE (2007))**

Primarily deduced from dominant theory, ex ante assembling of stages	Bhote (1989), Freeman and Cavinato (1990), Chadwick and Rajagopal (1995)
Primarily observation based, ex post assembling of stages	Reck and Long (1988), Cammish and Keough (1991), Keough (1993), Burt and Doyle (1994), Barry <i>et al.</i> (1996), Cousins <i>et al.</i> (2006), Paulraj <i>et al.</i> (2006), Michigan State University framework (Axelsson <i>et al.</i> (2005))

#### 4.4.2 THE EXISTING COMPREHENSIVE INDUSTRY AUDITING TOOL

In the Michigan State University study (Axelsson *et al.*, 2005), 150 (mainly US) multinationals were invited to participate in benchmarking ‘best practices’ for purchasing and supplier management. The resulting framework consists of processes found in strategic purchasing management and in buyer-supplier relationships, and is focused on the creation of those conditions and resources that are required to professionally carry out these processes. Using the framework it is possible to determine the level of purchasing maturity and, based on this assessment, one can determine which steps should be taken to further professionalize the purchasing function. The topics related to purchasing management that are covered in the existing comprehensive industry auditing tool are: in- and outsourcing decisions, product (commodity) group strategies, optimization of the supply base, managing supplier relationships, integrating suppliers into the operational process, integrating suppliers into the value creation process, developing suppliers, strategic costs management, forming and aligning purchasing policies and plans, alignment of the purchasing organization, utilizing market possibilities, using performance indicators, using information technology and, finally, human resource management. A summary of these topics is included in Appendix C.

#### 4.4.3 THE PURCHASING AND SUPPLY DEVELOPMENT MODEL OF VAN WEELE

To determine which of the various purchasing maturity models has an appropriate fit with the existing comprehensive industry auditing tool (see Appendix C), documentation about existing purchasing maturity models has been analysed. During this analysis, the topics handled by the various purchasing maturity models are compared with the existing comprehensive industry auditing tool. This content analysis was first conducted on a general level and then in greater detail. Based on this analysis the ‘purchasing and supply development model’ of Van Weele (2009) had the most appropriate fit with the existing comprehensive industry auditing tool.

As already noted, Van Weele used the evolutionary stage model described by Keough (1993) as a basis for his own model. Keough’s model has five development phases and assumes a



link between the industry in which a company operates and the level of purchasing professionalism. As purchasing professionalism increases, the contribution of the purchasing department to the organization grows in the sense of realizing purchasing savings. The model of Van Weele (2009) is based on the same principles but arrives at six development stages for purchasing maturity by integrating and combining valuable insights from other contributors. The following six stages describe the developments from a transaction-orientated organization to an organization focussed on value chain integration (Van Weele, 2009: pp.68-72).

Stage 1 'Transactional orientation' – In this first stage, the primary task of purchasing is to find appropriate suppliers and ensure that the company's operational processes do not run out of raw materials and components. There is no explicit purchasing strategy in place. The organizational structure can be characterized as a decentralized sub-department at the business unit level. The purchasing function is strongly orientated towards operational and administrative activities. The culture is 'reactive'. Information systems, if in place, are also very much administratively oriented. The purchasing staff usually consists of operational and administrative buyers, with very limited professional education on how to do the job.

Stage 2 'Commercial orientation' – At this stage, a proactive purchasing manager is to be found, someone who can negotiate credibly with suppliers for lower prices. The purchasing strategy is characterized by its sharp focus on low prices. Buyers concentrate on negotiating and contracting 'good deals'. Management monitors low prices and savings. Performance measurement is focused primarily on price (variance), cost savings and the delivery performance of the suppliers.

Stage 3 'Purchasing coordination' – At this stage, some form of strategy formulation first appears, aimed at capturing the benefits of internal coordination, collaboration and synergy among business units. Apart from price and costs, the purchasing function is now seen as having an important influence on the quality of purchased products. Formalization of the purchasing process and procedures is a priority. The focus is on improving communication between the central purchasing unit and the decentralized business units.

Stage 4 'Internal integration' – At this stage, the emphasis turns to cross-functional problem solving with the objective of reducing total lifecycle costs and not just the unit cost of purchased components. These cross-functional efforts often involve key suppliers as joint problem solvers, which implies a move from confrontational to a more partnership form of sourcing. Operational buying disappears in the line. The culture is characterized by many cross-functional buying teams. Improvement actions are aimed at integrating and harmonizing the purchasing processes across the various business units. Information systems are integrated with those of other departments/functions and divisions, but not as

yet with those of the most important suppliers. Skills looked for at this stage are strong team-building abilities and strong communication skills.

Stage 5 'External integration' – Having reached this stage, suppliers are actively involved in new product development, process improvement and preproduction planning, and often have a base within the company. Users themselves order goods, against corporate contracts, through advanced, web-enabled catalogue systems. Companies invest heavily to truly involve supply partners in a range of business processes, rather than simply buying goods and services from them as efficiently and as effectively as possible. Responsibility for initial purchasing resides with cross-functional teams. An important skill is seen as the ability to build detailed cost models. Information systems are integrated not only internally, but also with those of the partner suppliers.

Stage 6 'Value chain integration' – In this stage, to satisfy the needs of the end-customer markets, subcontractors seek support from among their suppliers. Suppliers are consistently challenged to support the company's product/market strategies and to actively participate in product development. The goal is to design the most efficient and effective value chain possible so as to serve the end-customer. The orientation is both upstream and downstream. The culture is entrepreneurial. Information systems are integrated as much as possible.

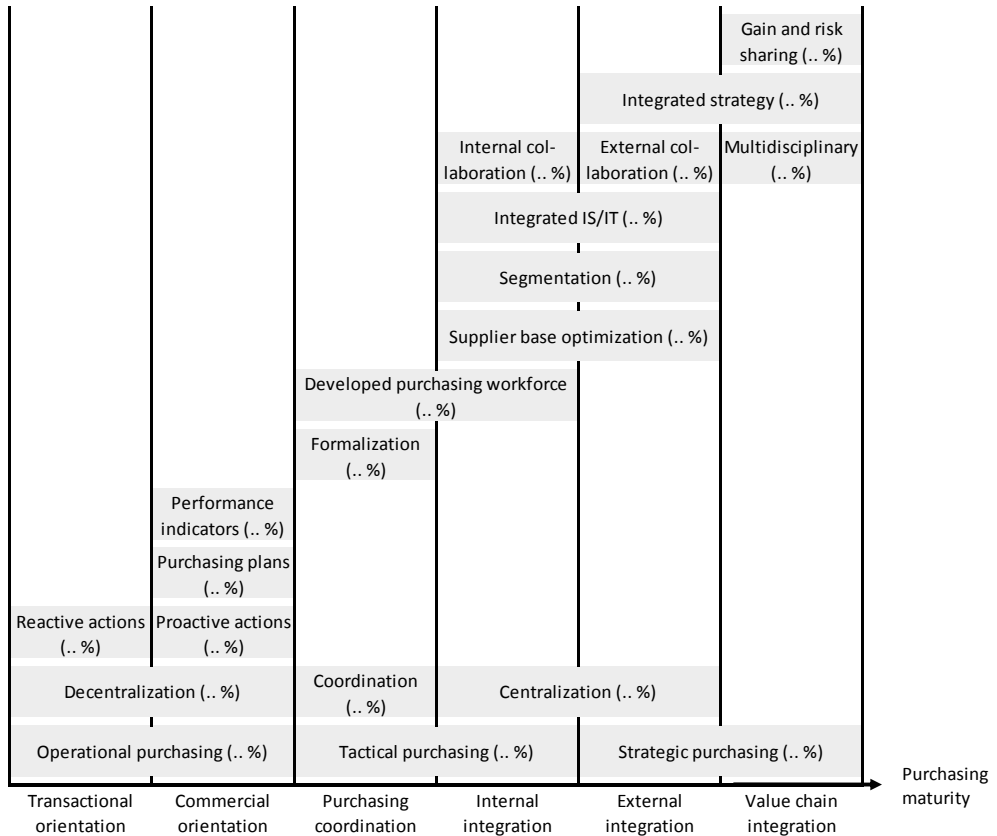
#### 4.5 DEVELOP/BUILD

Following the research framework presented in Figure 7, in this section the foundations of the knowledge base are used to develop a new quick scan purchasing maturity tool. As input for the develop phase, the 'purchasing and supply development model' of Van Weele (2009) and the existing comprehensive industry auditing tool are used. The purpose of the new tool is to determine purchasing maturity in a less comprehensive way as with the existing industry auditing tool. In describing the level of purchasing maturity in the new tool, we use the six stages of development in Van Weele's (2009) 'purchasing and supply development model' (from here on referred to as the PSD model).

In the first design step, for each of the six stages of the PSD model, the key topics are identified. In the following step, the key topics found in the existing comprehensive industry auditing tool, as described in Appendix C, are compared with these key topics of the PSD model. This comparison results in the definition of 20 characteristics (see Appendix D) that form the basis of the new concise purchasing maturity tool. These characteristics are linked to at least one of the developmental stages of the new tool and the underlying connections between the characteristics are identified (see Figure 8). Some of the characteristics overlap

stages while others do not. Characteristics that share an underlying connection are displayed at the same vertical position. The vertical displacements are used only to make a graphical presentation possible. In the next step, for each of the characteristics, a set of requirements is defined. These requirements (demands that have to be met and can be assessed) originate in both the PSD model and the existing comprehensive industry auditing tool. The more of these requirements a company meets, the more mature its purchasing function is. In the final step, the defined characteristics are compared with both the PSD model and the existing comprehensive industry auditing tool in order to assure that all the essential aspects of both models are included in the new quick scan purchasing maturity tool.

In the graphical presentation of the output of the new quick scan purchasing maturity tool, as shown in Figure 8, the percentage of the requirements met for each characteristic is shown. This overview provides a convenient indication of the level of purchasing maturity achieved. The detailed results are available to the company in the form of a list of all the requirements (per characteristic) that are and are not satisfied. This list indicates to the company what actions need to be taken to improve the level of purchasing maturity. The company has to satisfy all the requirements of a certain stage (and of the 'lower' stages) to have reached that specific maturity level. As a further benefit, the concise purchasing maturity tool shows the percentages of requirements for higher maturity levels already met. The detailed results give the company a clear indication of what requirements they need to work on if they are to evolve to the next level of purchasing maturity. If this concise tool is re-applied after some time has elapsed, the detailed results will show progress over time for each requirement.



**FIGURE 8: GRAPHICAL REPRESENTATION OF THE END RESULT OF THE DEVELOPED CONCISE PURCHASING MATURITY TOOL**

This new quick scan purchasing maturity tool is applied through interviewing the person responsible for purchasing within a company/business unit. During this interview, all the 20 characteristics need to be discussed in a semi-structured way, with the list of requirements serving as an interview guide. Based on the answers given, and additional documentation provided, the interviewer (i.e. the auditor) has to determine whether each requirement is met or not and enters this in a database. This results in an overview as shown in Figure 8, with percentages inserted, plus lists of detailed results for each characteristic.

In the following section, the new quick scan purchasing maturity tool is evaluated at two business units of the case company.

## 4.6 JUSTIFY/EVALUATE

In following the research framework presented in Figure 7, in this section we assess the quick scan purchasing maturity tool described in the previous section. The case company had two demands for the new tool. First, the company wanted the new tool, within approximately two to three hours, to provide an indication of the purchasing maturity of one of its business units and indicate improvement opportunities. Second, the company wanted to be able to compare the outcomes of this new tool with the results of the audits previously carried out with the existing comprehensive industry auditing tool. To assess whether our new concise tool satisfied these demands, it was applied in two business units. These were selected on the basis that, one year earlier, the comprehensive industry auditing tool had been applied to evaluate their level of purchasing maturity. All data from these two earlier audits were made available to the researchers, including all documentation and recorded interviews, and this made it also possible to 'retrospectively' apply the new concise tool to the situation at the two business units one year previously as a zero measurement ( $t=0$ ). Alongside this, the new tool was applied to the current situation in both business units ( $t=1$ ). With this double application of the new concise tool at the two business units, it became possible to reflect on how well the two demands of the company had been satisfied. For both business units, the results of the  $t=0$  scan were compared with the recommendations contained in the report that resulted from the earlier application of the existing comprehensive industry auditing tool to see how well they correspond. As a further evaluation, the  $t=1$  scan was compared with the  $t=0$  scan to see if the purchasing maturity had apparently changed during that interval, the changes indicated were then discussed with the business units to see if they matched their own observations. In Subsections 4.6.1 and 4.6.2 the application and evaluation of the new tool at the two business units is presented.

### 4.6.1 BUSINESS UNIT A

The information from the existing comprehensive industry auditing tool was entered into the new concise purchasing maturity tool. The results (at  $t=0$ ) are presented graphically in Figure 9 (the first of the percentages shown in each case). This shows that all requirements have only been met for the first, transactional orientation, stage. It is interesting to note that although the business unit fails to meet all the requirements of the second, commercial orientation, stage, it still manages to meet a majority of the requirements of the third stage.

The business unit already had a good basis in terms of purchasing objectives, policies and plans, but it made little use of performance indicators to improve the purchasing function. These performance indicators could also be used to manage and develop suppliers and their

performance. This failure to adequately use performance indicators was the main reason why the business unit's purchasing maturity failed to reach the commercial orientation stage. The concise scan also indicated that other changes to improve the maturity would be to have a more proactive mentality and to formalize and standardize decisions on supplier selection, supplier involvement and internal and external collaborations for value creation (development of new products or processes). These changes would enable the business unit to move from the first stage to the third stage, and be working towards the fourth stage. It would be fair to conclude that the business unit's purchasing maturity was reasonable, although not all requirements of the earlier stages have been met. Certainly, at least on the policy development side, a solid foundation was available on which to develop the purchasing function over the coming years.

The first author has also compared these findings in greater detail with the conclusions and recommendations presented in the report based on the existing comprehensive industry auditing tool. The overall conclusion is that the general outcomes and recommendations of both tools correspond well with each other.

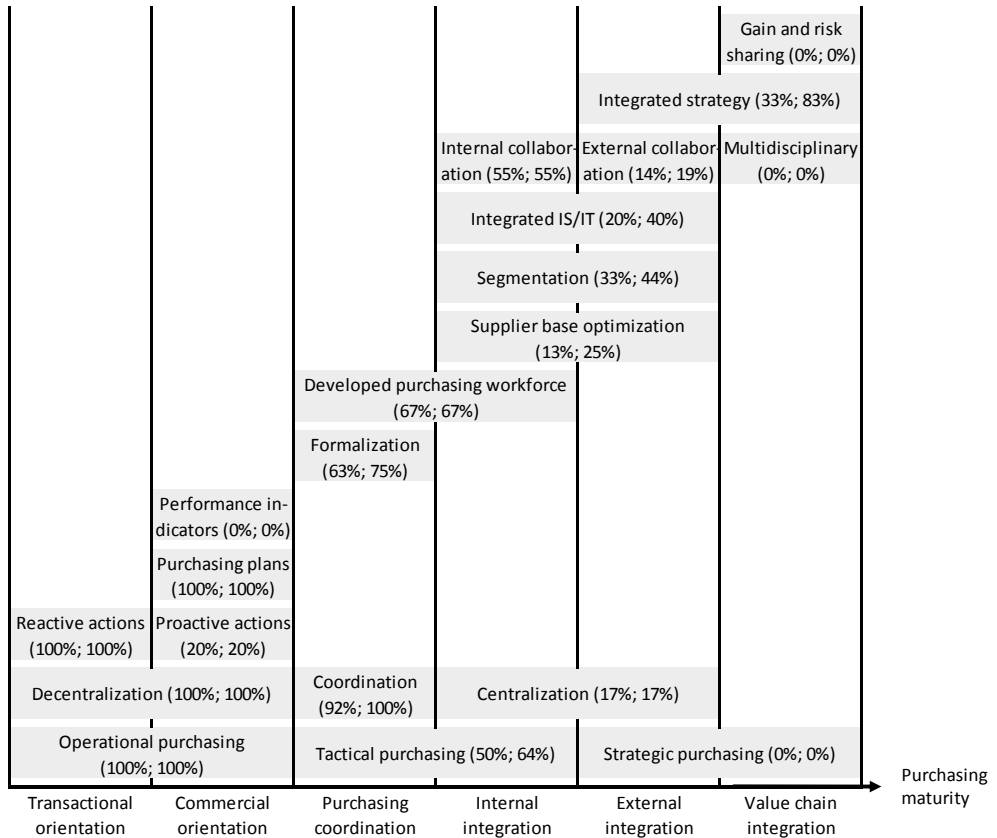


FIGURE 9: BUSINESS UNIT A (T=0; T=1)

In applying the new quick scan tool to the current situation (t=1), the manager of the purchasing department was interviewed (he had also participated in the earlier audit using the comprehensive industry auditing tool). During the interview, all 20 characteristics were discussed and one and a half hours proved sufficient to cover all the issues. Furthermore, the manager provided documentary 'evidence' where applicable. Processing and inputting the given answers and the documentation into the tool took approximately one hour. Thus, the application of the tool was completed within the three-hour target. The results of the t=1 application are presented graphically in Figure 9 (the second of the percentages stated for each characteristic).

Comparing the results of the t=0 and t=1 applications of the new concise tool (see Figure 9), it can be concluded that the business unit has met more of the requirements relating to eight of the characteristics. The characteristics where improvements have been made are coordination, external collaboration, tactical purchasing, formalization, integrated IS/IT, supplier base optimization, segmentation and integrated strategy. Nevertheless, the

business unit still fails to meet all the requirements of the commercial orientation stage because there were no improvements related to the proactive actions and purchasing performance characteristics. For this reason, the major recommendations that were highlighted following the t=0 application of the new tool still stand. The main improvements are in terms of a stronger focus on the performance of suppliers providing the most important product groups and in a better alignment of the purchasing organization with the company's policy, objectives and structure. Although the greater focus on supplier performance is an important development, the recommendation to use supplier performance indicators remains. Based on this second assessment, it can be concluded that the business unit has made some important steps in their efforts to improve their purchasing function. The recognition that it needed to improve supplier performance is a good start that can now be followed by the measurement of their performance, which would result in a more mature purchasing function.

The detailed results and the improvements found over the one year period have been presented to, and discussed with, the manager of the purchasing department. These discussions did not provide any reasons for changing the scoring for the characteristics.

#### 4.6.2 BUSINESS UNIT B

In the same way as with Business Unit A, the earlier findings and data from using the comprehensive industry auditing tool were entered into the new quick scan purchasing maturity tool. The earlier results (at t=0) using the new concise tool are presented graphically in Figure 10. All the requirements but one have been met for the first, transactional orientation, stage. In terms of the second, commercial orientation, stage, the business unit does not meet all the requirements.

As with the other business unit, the new concise tool was also applied to the current situation (i.e. t=1). This was carried out in a similar manner as described earlier for Business Unit A, and again the total application took less than three hours. The results were unchanged from those at the t=0 application, hence, one has to conclude that the business unit has made no progress at all regarding improving its purchasing maturity. Again, the detailed results were presented to and discussed with the manager of the purchasing department of this business unit. This did not produce new evidence to change our assessment.

The purchasing maturity of this business unit is generally somewhere between the first two stages: transactional and commercial orientations. In order to improve its purchasing maturity, the business unit should focus on four characteristics: decentralization, proactive actions, performance indicators and purchasing plans. It is recommended that they start by



implementing a formal, structured and documented process for the development of product group strategies. Further, the business unit should develop a thorough understanding of the structure of, and developments in, the national supplier market. Their measurement of their suppliers' performances should be further developed. This information could then be used to improve supplier performance and in the development of the purchasing function. Supplier improvement programmes could be defined based on the gathered performance information. Implementing these recommendations will enhance the purchasing maturity and lift it towards the third, purchasing coordination, stage. It is fair to conclude that the purchasing maturity of the business unit could reach the second, commercial orientation, stage relatively quickly, and from there advance to higher stages.

As with Business Unit A, the findings from the concise audit were compared with the conclusions and recommendations presented in an earlier report based on the comprehensive industry auditing tool by the first author. Again the general outcomes and recommendations of both tools correspond well.

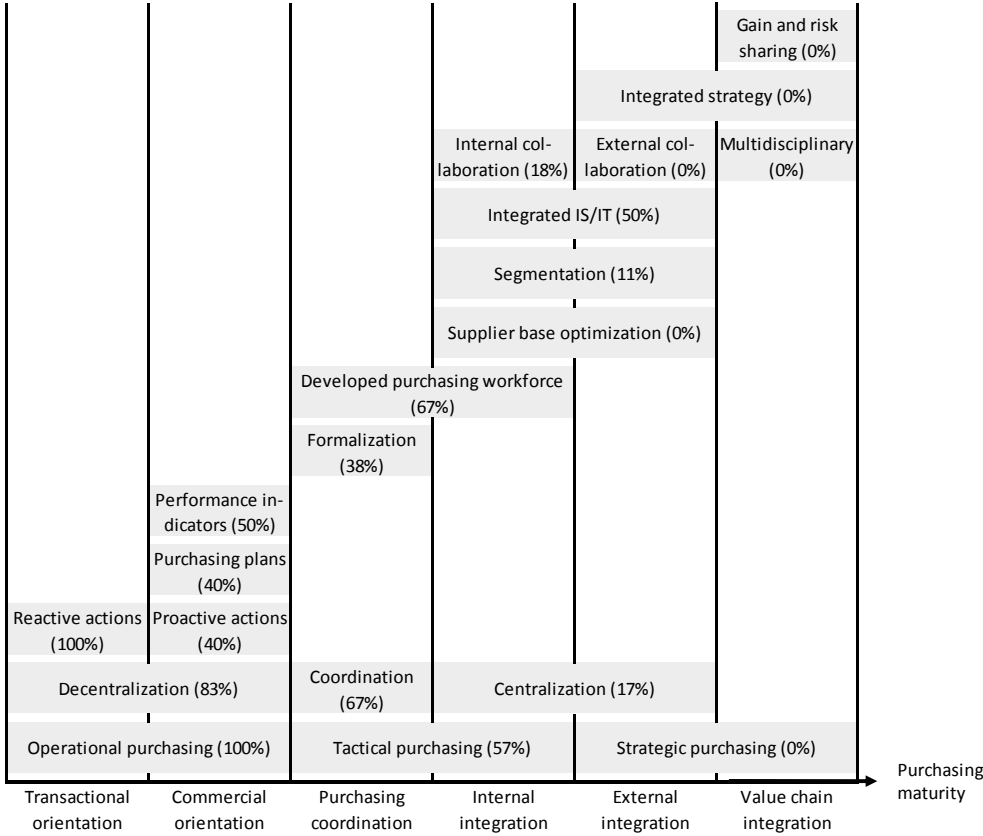


FIGURE 10: BUSINESS UNIT B, T=0 (RESULTS AT T=1 WERE IDENTICAL)

#### 4.7 APPLICATIONS, ADDITIONS AND CONCLUDING REMARKS

In this research, a quick scan purchasing maturity tool has been developed and tested through applying the design science research method of Hevner *et al.* (2004). By applying this framework, rigour is assured. By designing and applying the maturity tool developed for the purchasing function of contractors, the relevance of this research is also assured. In line with the design research framework of Hevner, the final steps of this research were to apply the results to business need in an appropriate environment and then add these results to the contents of the knowledge base for further research and practice.

The case company had a need for a tool that could quickly assess the purchasing maturity of a single business unit, and suggest improvements, within approximately two to three hours. Furthermore, it had to be possible to compare the outcomes of this new quick scan tool with the results of earlier extended audits. The tool developed in this research fulfils this business need. This new concise tool is tailor-made for the case company and can be integrated into its normal working processes. Further, the tool developed could be appropriate for application in other construction companies as well. The conciseness and the limited time needed to execute the tool are major advantages for construction companies wanting to monitor and improve their purchasing maturity.

A pertinent question for further research is whether the proposed tool can be generalized for the sector. To answer this, the tool has to be further developed through reflection and induction, and then tested and refined by executing additional cases in other construction companies. This tool is able to provide the sector with insights into improvement possibilities and, by implementing these, the performance of the sector as a whole could improve. Justification of the new tool and its approval by construction practice have been obtained through testing the developed tool in the specific context of a case company with previous experience with the existing industry auditing tool. An interesting research subject is the applicability of the new tool at companies that have not previously used the existing comprehensive industry auditing tool.

A further interesting future research topic is the link between the successful use of a portfolio of buyer-supplier relationship types and the purchasing maturity of a company. It has been claimed that a portfolio approach can make the difference between an unfocused, ineffective purchasing organization and a focused, effective one (Haderler and Evans, 1994) and that the use of such an approach drives purchasing maturity (Gelderman and Van Weele, 2005). The adoption of a portfolio approach is addressed within the developed quick scan purchasing maturity tool, but is an area that could be further explored. Especially for the strategic suppliers within a portfolio approach, collaboration is an important subject.

According to Bhote (1989), collaboration with suppliers is even the dominant criterion in determining purchasing maturity. Collaboration between suppliers and the prime contractor determines the achieved success of a project. Differences in the maturity level of managing relationships by prime contractors may also effect the relation between supplier and contractor. On the one hand, it is interesting to explore to what extent the satisfaction of a contractor related to the collaboration with a supplier influences the relationship itself. On the other hand, it is interesting to take the perspective of the supplier into account: does contractors' maturity level of managing supplier relationships effects behaviour of the supplier?

Recent studies (see for example Steinle and Schiele (2008) and Schiele (2010)) related to this issue analyse the influence of the so-called preferred customer status on the behaviour of a supplier. If a supplier regards a buyer as a preferred customer, he will offer preferential resource allocation to the buyer (Steinle and Schiele, 2008). Thus, this preferred customer status influences collaboration between suppliers and buyers. The effect of being a preferred customer by a supplier on the relationship between supplier and prime contractor has not been fully explored yet in the construction industry.

In conclusion, the designed quick scan tool assesses purchasing maturity and provides improvement possibilities in a limited timeframe. Another advantage of the new quick scan tool is that it suggest priorities. This prioritization shows those characteristics where the company is lagging and consequently needs to develop further. In doing so the purchasing function matures and increases its potential to contribute to the overall company performance.



# Chapter 5

## WHY AND HOW TO BECOME YOUR SUPPLIERS' PREFERRED CUSTOMER

Linking contractor satisfaction, preferred customer status and maturity in managing supplier relationships in the Dutch construction industry

This chapter has been written together with Hans Voordijk, Bart Vos and Geert Dewulf and has not yet been submitted to a scientific journal. It has been submitted to WION 2012 (Lunteren, the Netherlands) and IPSERA 2012 (Naples, Italy) in present form, it will be developed further and submitted to a scientific journal.

## WHY AND HOW TO BECOME YOUR SUPPLIERS' PREFERRED CUSTOMER

Linking contractor satisfaction, preferred customer status and maturity in managing supplier relationships in the Dutch construction industry

### **Abstract**

In the construction industry, prime contractors have a leading role in designing and executing projects to the wishes of their clients. Further, prime contractors rely on the performance of their own suppliers (e.g. subcontractors, material suppliers and service suppliers) for executing the project and achieving the required quality. Thus, managing supplier relationships is important for prime contractors. Furthermore, collaboration between suppliers (and their willingness to collaborate) and the prime contractor determines the success achieved in a project.

The goal of this research is to explore both the antecedents and the impact of a contractor having preferred customer status. In terms of antecedents, we pay specific attention to an, until now, unexplored factor: the contractor's maturity in supplier relationship management *as perceived by the supplier*. In terms of impact, we focus on the link between obtaining preferred customer status from a specific supplier and the contractor's satisfaction with its collaboration with that supplier. Firstly, a conceptual framework on the relationships between these variables is developed. Secondly, in order to investigate the conceptual relationships of this framework, inductive qualitative case research is conducted. Two cases are investigated and, in each case, representatives of three companies are interviewed: one supplier plus two of its customers (both prime contractors and one with preferred status). As such, a total of four dyadic matched-pair inter-organizational relationships are investigated.

The results show that, firstly, it is beneficial for contractors to obtain preferred customer status at their suppliers, since this will have a positive impact on the contractor's satisfaction with the collaboration. Secondly, if contractors are to obtain preferred customer status at their suppliers it is important that they are perceived as mature in managing supplier relationships. To fully understand the various dynamics in relationship development it is recommended that future research adopts a longitudinal approach.

## 5.1 INTRODUCTION

In the construction industry, each project is viewed as a temporary organization among firms: teams and designs change for each new project (Hofman *et al.*, 2009). Within such a project, the prime contractor has a leading role in its design and execution to the wishes of the client. Typically in this industry, the prime contractor relies on the performance of suppliers (e.g. subcontractors, material suppliers and service suppliers) for executing the project and achieving the required quality. This is reflected in the significant purchasing spend of prime contractors, which can be up to 90% of project turnover (Hinze and Tracey, 1994; Nobbs, 1993; Vrijhoef and Koskela, 2000). The collaboration between suppliers and the prime contractor will determine the success achieved in a project. Therefore, for the contractor, managing supplier relationships is important. This is not only true for the performance of a single project, but also in the sense of sharing knowledge in a broader sense.

The purchasing function, encompassing the management of supplier relationships, has an impact on the competitive position of a company (Carter and Narasimhan, 1996; Ellram and Carr, 1994). The more developed the purchasing function, the greater its contribution to overall company performance (Schiele, 2007). A highly mature purchasing function can provide critical supplier information when it is needed and can potentially solve problems before they turn into major crises (Pearson and Gritzmacher, 1990). Moreover, by managing supplier relationships, companies can obtain a competitive advantage (Chen *et al.*, 2004; Leenders *et al.*, 2002). It has been argued that, for certain products and services in the construction industry, it could be advantageous to replace arm's-length transactions with relationship and network-oriented approaches: approaches that stimulate adaptation and joint development between buyers and suppliers (Dubois and Gadde, 2002; Storer *et al.*, 2003). An important question for construction firms is how to increase their competitive position in the industry through vertical links (Inkpen, 1998). Through vertical links, a construction firm gains greater control over the sources of critical inputs and/or the distribution of outputs. Vertical links facilitate investment in efficiency-enhancing specialized assets. The focus in this research is on such *vertical buyer-supplier relationships*. Moreover, differences in the maturity level (i.e. level of professionalism) of prime contractors in managing these relationships may also effect the relationship between supplier and contractor.

In analysing the effectiveness of buyer-supplier relationships, the supplier's perspective is also important. Although one could argue that a supplier should treat all customers equally, some customers are clearly more equal than others. Recent studies on industrial firms (see, for example, Steinle and Schiele (2008) and Schiele (2010)) have focussed on the supplier, and deal with the influence of so-called preferred customer status. If a supplier regards a

buyer as a preferred customer, they will offer them preferential allocation of resources (Steinle and Schiele, 2008). Thus, preferred customer status influences collaboration between suppliers and buyers. The effect on the relationship between supplier and prime contractor of being a preferred customer of a supplier has not yet been fully explored in the construction industry.

Further, the antecedents of achieving preferred customer status remain largely unexplored in the current literature (Schiele *et al.*, 2011b) although recent publications do provide some initial ideas. For example, Steinle and Schiele (2008) note the importance of proximity between the buyer and seller, the smaller the distance the more likely it is that preferred customer status will be awarded. Secondly, they comment that a buyer's internal organizational weakness reduces the likelihood of preferred customer status being awarded. Finally, they stress the influence of purchasing volume. The larger the purchasing volume the more likely it is that preferred customer status will be awarded. In this study, these antecedents are researched, as well as another which, in our opinion, is frequently overlooked. This is that if a contractor, *from the perspective of a supplier*, is not perceived as mature, it is less likely that the contractor will be awarded preferred customer status by that supplier. Thus, being perceived as mature in supplier relationship management will increase the likelihood of becoming a supplier's preferred customer.

Based on the foregoing arguments, the goal of this research is to explore both the antecedents and the impact of a contractor having preferred customer status. In terms of antecedents, we pay specific attention to an, until now, unexplored factor: the contractor's maturity in supplier relationship management *as perceived by the supplier*. In terms of impact, we focus on the link between obtaining preferred customer status from a specific supplier and the contractor's satisfaction with its collaboration with that supplier. Firstly, a conceptual framework on the relationships between these variables is developed. Secondly, in order to investigate the conceptual relationships of this framework and the many variables, inductive qualitative case research is conducted.

In this study, empirical research is executed in which "contextually rich data from bounded real-world settings" is used to investigate a focused phenomenon (Barratt *et al.*, 2011: p.329). A case study approach is appropriate in this type of research when there are many variables of interest (Yin, 2009). Two cases are examined and, in each, we interview representatives of three companies: one supplier plus two of its customers (both prime contractors and one with preferred status). As such, a total of four dyadic matched-pair inter-organizational relationships are investigated. In Section 5.3, the research method is further explained and then, in Section 5.4, the results are presented. Following this, the results are discussed in Section 5.5 followed by conclusions and implications for management.



## 5.2 CONCEPTUAL FRAMEWORK

Within the construction industry, product designs differ from project to project (Bemelmans *et al.*, 2011). Given that, in each construction project, a 'new' product is developed, a construction project can be compared to product development. Here, involving suppliers has a positive impact on the buyer's performance (Vonderembse and Tracey, 1999) and, especially in the engineering phase of a development project, the involvement of suppliers leads to cost benefits (Clark, 1989). Unfortunately, suppliers usually manufacture to a buyer's specifications (Bensaou, 1999).

As such, it can be concluded that collaboration with suppliers, and managing supplier relationships, is a necessity for prime contractors since the outcome and quality of a construction project depend on collaboration with and management of these suppliers. Recent literature (see, for example, Steinle and Schiele (2008) and Schiele (2010)) on buyer-supplier relationships has focussed on the role of a buyer having preferred customer status with a supplier and the benefits of having such a status, and consequently takes the supplier perspective into account.

### 5.2.1 PREFERRED CUSTOMER STATUS & COLLABORATION SATISFACTION

Antecedents of preferred customer status can help explain the conditions under which preferred customer status is likely to be awarded. Unfortunately, these antecedents remain largely unexplored in the current literature (Schiele *et al.*, 2011b) although the recent literature does provide some ideas. Steinle and Schiele (2008) note some contextual factors, firstly, proximity between the buyer and seller is important: the smaller the distance the more likely preferred customer status will be awarded. Secondly, they state that, if the buyer has internal organizational weaknesses, preferred customer status is less likely to be awarded. Finally, they stress the influence of purchasing volume: the larger the purchasing volume the more likely that preferred customer status will be awarded.

Schiele *et al.* (2011b) comment that, according to various authors, having both a high level of customer *attractiveness* and a high level of supplier *satisfaction* help to ensure the prime commitment of capable suppliers (Christiansen and Maltz, 2002; Ellegaard *et al.*, 2003; Essig and Amann, 2009; Mortensen *et al.*, 2008; Nyaga *et al.*, 2010). In their research on preferred customer status, Schiele *et al.* (2011b: pp.1329-1331) define 'customer attractiveness' in the following terms: "a customer is perceived as attractive by a supplier, if the supplier is (a) aware of the existence of the customer and knows his relevant attributes and (b) has a positive expectation towards the relationship with him" and 'supplier satisfaction' as "a condition that appears if the quality of outcomes from a buyer-supplier relation meet or exceed the supplier's expectations".

In terms of *relationship development*, the benefits of having preferred customer status are that the buyer and seller grow closer together: they will jointly reduce costs, the interaction between the two companies will intensify and the companies will become more similar. Overall, the supplier learns more about the buyer and its issues (Schiele, 2010).

Another relevant antecedent of preferred customer status for this research is the *relationship specific investments* made by a supplier for a specific customer. If a supplier makes these kinds of investments it will find itself, in terms of Bensaou (1999), either in a captive supplier situation (when only the supplier has made relationship specific investments) or in a partnership situation (both companies have made relationship specific investments).

Being a preferred customer also means that the supplier offers the buyer *preferential resource allocation*, that is they dedicate their best personnel to the development and customization of products in line with the buyer's wishes, offer innovations (exclusive to them) and privileged treatment in terms of production capacity (Steinle and Schiele, 2008). Schiele *et al.* (2011a) adapted items from Ganesan (1994) to operationalize preferred customer status. With these adapted items, *preferential treatment* (in terms of making sacrifices for, caring about, in the event of shortages going out on a limb for, being on the side of and dedicating ones best resources for the customer) can be measured. On a more general level, if a supplier provides *suggestions for innovation/improvement* to a customer, such that the customer can save production/assembly time and/or costs, this can also be seen as an antecedent.

### 5.2.2 SUPPLIER RELATIONSHIP MANAGEMENT

Following the antecedents described above, we believe that there exists an overlooked antecedent that enables contractors to obtain preferred customer status at their suppliers. This antecedent is similar to the 'internal organization weakness' contextual factor described by Steinle and Schiele (2008). A mature (i.e. professional) purchasing function contributes to the overall performance of a company (Schiele, 2007) and, focusing on supplier relationship management, this implies that a company should have the ability to formulate a purchasing policy: "to classify suppliers into various categories in order to focus attention on the most important suppliers, to set the correct priorities and to manage all suppliers according to their importance to the business" (Bemelmans *et al.*, 2011: p.6) and overall to behave professionally towards a supplier. Moreover, if a contractor, *from the perspective of a supplier*, is not perceived as mature, it is less likely that the contractor will be awarded preferred customer status by that supplier. Thus, being perceived as more mature in supplier

relationship management increases the likelihood of becoming a preferred customer of the supplier.

### 5.2.3 RELATIONSHIPS BETWEEN CONCEPTS

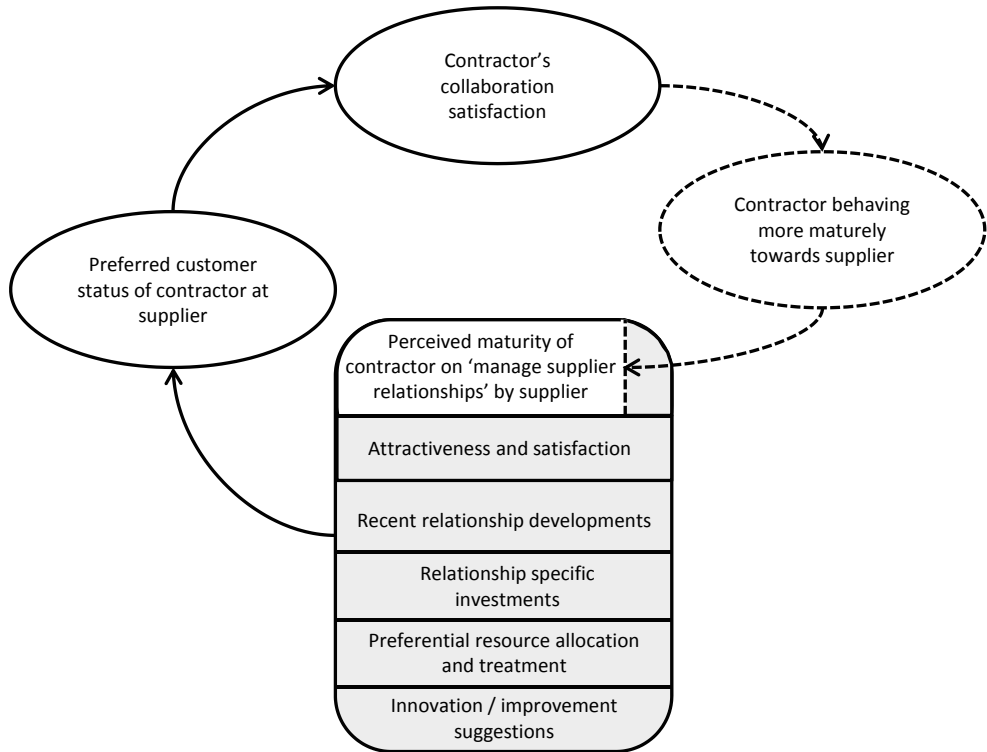
The concepts described in this section are related to each other in the following ways.

*Firstly, we expect that the maturity of a contractor in supplier relationship management, as perceived by a supplier, impacts on the customer status of that contractor at the supplier. More specifically, the more mature a contractor is perceived to be by a supplier, the more likely it is that it will be awarded preferred customer status by that specific supplier.*

Secondly, in this study, it is assumed that having preferred customer status at a supplier is beneficial for prime contractors. When it comes to collaboration with a supplier (who has awarded preferred customer status to the contractor), this will result in a higher level of satisfaction for the contractor. In other words, *we expect that having preferred customer status at a supplier impacts positively on the contractor's satisfaction regarding collaboration with that supplier.*

Finally, *we expect there to be an implicit relationship between a contractor's satisfaction regarding collaboration with a supplier and the perceived maturity of this contractor by the supplier. If a contractor is satisfied with the collaboration, it is likely to behave in a more mature fashion towards the supplier, and this will result in the supplier perceiving a higher maturity level.*

Combining the above results in the conceptual framework presented in Figure 11. This conceptual framework is the basis for this study, and the related research method is presented in the following section.



**FIGURE 11: CONCEPTUAL FRAMEWORK**

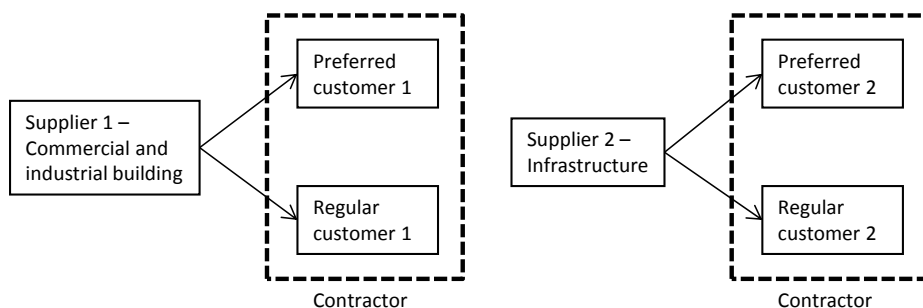
### 5.3 RESEARCH METHOD

In order to investigate the conceptual relationships presented in Section 5.2, inductive qualitative case research is conducted. Since there are many variables of interest in this research, a case study approach is appropriate. By analysing the results, it becomes possible to compare an empirical pattern with a predicted theoretical one (Yin, 2009). According to Barratt *et al.* (2011), there are three key drivers that improve the methodological rigour and contributions of this type of research. First, one must justify the choice of case-based research. Second, the unit of analysis must be clearly stated. Third, multiple cases should be employed to enable both within- and cross- case analyses. This study has followed these three pieces of advice as described in the remainder of this section.

First, in our study, the empirical research executed uses “contextually rich data from bounded real-world settings” to investigate a focused phenomenon (Barratt *et al.*, 2011: p.329). As noted by these authors, in this type of research one can, as we intend, explore

and better understand emerging, contemporary phenomena (Flynn *et al.*, 1990; Meredith, 1998), and build and extend theories (Eisenhardt, 1989a; Yan and Gray, 1994).

Second, we research two cases. For each, representatives of three companies are interviewed; one supplier and two customers (i.e. prime contractors) of this supplier. This amounts to four dyadic matched-pair inter-organizational relationships being investigated. Each case started by selecting a large Dutch supplier with nationwide coverage and a diverse customer base. Since the Dutch construction industry can be divided into two primary subsectors (commercial and industrial building, and infrastructure), one supplier was selected from each. To select the two customers for each case, the supplier was asked to nominate its most liked (preferred) customer plus a regular customer (see Figure 12). In selecting this regular customer, the suppliers were asked to select a customer with which they did business and were willing to increase this business, but also one that they would not worry if they lost this business. In other words, to select a customer for which they have a ‘neutral feeling’. Semi-structured interviews were conducted with the representatives of the case companies during which all the subjects identified in Section 5.2 (see Table 12) were discussed.



**FIGURE 12: CASE DESIGN**

Third, the following steps were executed for each case. Firstly, an interview was held with the supplier since the outcome of this interview determines which customers will be visited. The supplier was first asked to answer general questions to provide the context (see Table 12 – Part 1). Next, in the second part of the interview, the questions dealt with operational issues regarding the two relationships identified. Here, the various subjects of the ‘Manage supplier relationships’ construct created by Bemelmans *et al.* (2011) were discussed (see Table 12 – Part 2). From these answers, we could assess the maturity of the two contractors as perceived by the supplier. In the third and final part of the interview, the supplier answered questions concerning the collaboration with the two customers. In this part, subjects dealing with preferred customer status and collaboration satisfaction were discussed (see Table 12 – Part 3). These answers were used to check whether the anticipated

antecedents of preferred customer status were present for the preferred customer and lacking for the regular customer. Further, in terms of the regular customer, the supplier was asked what they would do differently if that customer would have preferred customer status.

**TABLE 12: MAIN TOPICS OF THE INTERVIEWS**

<b>Part 1 – General</b>		
<i>Interviewee details</i>	<i>Company details</i>	<i>Relationship details (supplier – contractor)</i>
Function	# of FTE	Products exchanged
	Yearly sales	Account / product group manager
	Main activities	Annual sales (an antecedent of preferred customer status)
		Proximity (an antecedent of preferred customer status)
<b>Part 2 – Supplier relationship management</b>		<b>Part 3 – Preferred customer status and collaboration satisfaction</b>
Communication		Attractiveness and satisfaction
Cooperation and goals		Recent relationship developments
Management participation		Relationship specific investments
Involvement (improvement / development programs)		Preferential resource allocation and treatment
Information sharing		Innovation / improvement suggestions

After the interview with the supplier, both identified contractors were then interviewed. These interviews also started with general questions to assess the context (see Table 12 – Part 1). In the second part of the contractor interviews, the contractors were asked about the same aspects of supplier relationship management that had been discussed with the supplier (see Table 12 – Part 2): how the contractor acts towards the specific supplier of the case study and in general. Further, the general maturity of the contractor’s supplier relationship management was measured using the tool described in Bemelmans *et al.* (2011). On the basis of the answers to this second part by both the supplier and the contractors it was then analysed whether *a supplier’s perception of a contractor’s maturity regarding supplier relationship management has an impact on its customer status at the supplier* (see Figure 11). Furthermore, any difference between the general maturity (regarding supplier relationship management) of the contractors and their behaviour towards the case suppliers could confirm *the implicit relationship between the contractor’s satisfaction regarding its collaboration with a supplier and the perceived maturity of this contractor by the supplier* (see Figure 11). In the third and final part of the contractor interviews, the contractors were asked questions regarding their satisfaction with the collaboration with the supplier and also ones dealing with topics about preferred customer status (see Table 12 – Part 3). This was a mirrored version of the third part of the supplier interview and provides insight on whether there are perceived differences about the collaboration. On the basis of the answers to this part by both the supplier and the

contractors, it was assessed *whether having preferred customer status at the supplier had a positive impact on the contractor's satisfaction regarding their collaboration* (see Figure 11).

We conclude this section with some extra information about the interviews. All the interviews were recorded and their average duration was 75 minutes. In compliance with the 24-hour rule (Eisenhardt, 1989b), comprehensive interview notes were completed within one day of the interview. These notes, compiled following the interview protocol, formed the basis for writing up the case descriptions and the analysis presented in the following section.

## 5.4 RESULTS

In this section, the results of the two inductive qualitative case studies are presented. As noted in Section 5.3, representatives of three companies were interviewed in each case: one supplier plus two of its customers (both prime contractors and one with preferred status). As such, a total of four dyadic matched-pair inter-organizational relationships were investigated (see Figure 12). All the participating companies gave permission for the researchers to openly discuss their answers regarding a relationship with the other party. However, in presenting the results in this article, the names of the participating companies and interviewees are not revealed. In the following subsections, the two cases are described, providing the case context, the specific results and interim conclusions.

### 5.4.1 CASE 1

The data collection for Case 1 started at Supplier 1 where the interviewee was the 'Head of Sales' and responsible for the entire sales department. At the start of the interview, two specific customers were selected for discussion and the contact details of the contact people at these customers were provided. The customer selected as the most favoured customer of Supplier 1, Preferred Customer 1, was not the largest customer in terms of sales volume (Interviewee Supplier 1: "the volume of sales of a customer has little to do with the status of the customer"). This customer had been a preferred customer for many years and, according to Interviewee Supplier 1, all the employees of Supplier 1 perceived Preferred Customer 1 to be the most preferred customer (Interviewee Supplier 1: "most nice, loyal and good customer we have"). The customer selected as just a regular customer, Regular Customer 1, according to Supplier 1, always requested many quotations (Interviewee Supplier 1: "we as market leader are good for comparing quotations") but almost every time accepted a competitor of Supplier 1's offer. Supplier 1 also indicated that Regular Customer 1 was more likely to choose Supplier 1 if wanting a very customized / special product. In Subsection

5.4.1.1, the three companies involved in Case 1 are further introduced (see Table 13 for an overview of the indicators for Case 1).

#### 5.4.1.1 CONTEXT

Supplier 1 is located in the centre of the Netherlands and sells products for commercial and industrial building. Its main product is prefabricated (prefab) hollow core slabs (approximately 2,700,000 m<sup>2</sup> per year), and this product was the focus in this case. It also sells a 'Casco' system (combination of prefab hollow core slabs and prefab walls) and moulds for foundations. With regard to the prefab hollow core slabs, it has approximately a sixty per cent market share within the Netherlands. At the time of the research, Supplier 1 was establishing key account managers for its preferred customers (but not yet officially appointed).

Preferred Customer 1 is active only in the commercial and industrial building sector and not in the infrastructure sector. In addition to prefab hollow core slabs, it occasionally buys the Casco system from Supplier 1. Preferred Customer 1 has over twenty offices divided across five regions in the Netherlands: North, East, Middle, South and West. The locations in the North, East and Middle regions are responsible for most of the sales by Supplier 1 to Preferred Customer 1. The other locations (in the South and West regions) are still treated as preferred customers even though Supplier 1 hardly conducts any business with these offices. As such, the relationship being considered here is Supplier 1 – Preferred Customer 1 (North, East and Middle). In the remainder of this paper, the term Preferred Customer 1 should be read as covering only these three regions. The interviewee from Preferred Customer 1 was the Regional Director of the Middle region and also responsible for prefab hollow core slabs across the whole company. As the responsible person, he arranges and maintains a framework contract for prefab hollow core slabs. However, the regions are not obliged to use this contract. Preferred Customer 1 regards Supplier 1 as its preferred supplier for prefab hollow core slabs.

Regular Customer 1 is active both in the commercial and industrial building sector and in the infrastructure sector. It also conducts some special works (such as wind turbine towers and special concrete projects) that cannot be classified as belonging to either of the named subsectors. Regular Customer 1 has two locations in the south of the Netherlands which were formally separate companies. Its relationship with Supplier 1 involves both locations and for the remainder of this study when referring to Regular Customer 1, this covers both locations. Regular Customer 1 only conducts business with Supplier 1 over prefab hollow core slabs but has no specific person responsible for the purchase of this product; rather the slabs are bought by individual project leaders. In 2010, Regular Customer 1 purchased



approximately 80,000 m<sup>2</sup> of prefab hollow core slabs which was less than half of its typical annual purchases, which Supplier 1 estimated at approximately 500,000 m<sup>2</sup>. According to Regular Customer 1, its purchasing had dropped because it was now using more ‘full slabs’ rather than ones with hollow cores. Normally, Regular Customer 1 buys prefab hollow core slabs from Supplier 1 on an occasional basis and, in recent years, the spend has not been constant. On a management/policy level, Regular Customer 1 has selected three suppliers (including Supplier 1) of prefab hollow core slabs and has no preference between them. The project leaders are free to use any of these three suppliers and they judge every offer on design (engineering), delivery time and price. It is possible that, on the project level, Regular Customer 1 employees could have a preference for other suppliers than Supplier 1. Nevertheless, according to Regular Customer 1, the price quoted by Supplier 1 is never competitive and that is the main reason why the spend at Supplier 1 is low (Regular Customer 1 would prefer to spread its spend more equally and increase purchases from Supplier 1).

TABLE 13: INDICATORS FOR CASE 1

	Supplier 1	Preferred Customer 1	Regular Customer 1
<i>Function of interviewee</i>	Head of Sales	Region Director	Commercial Director
<i>Number of FTE</i>	≈ 180	≈ 750	≈ 300
<i>2010 annual sales of prefab hollow core slabs</i>	≈ 2,700,000 m <sup>2</sup>	n/a	n/a
<i>2010 annual purchases of prefab hollow core slabs (% at Supplier 1)</i>	n/a	≈ 150,000 m <sup>2</sup> (100%)	≈ 80,000 m <sup>2</sup> (0%)
<i>Key account manager at Supplier 1 for customer</i>	n/a	In development	No
<i>Product group manager for prefab hollow core slabs</i>	n/a	Yes	No

5.4.1.2 SUPPLIER RELATIONSHIP MANAGEMENT

In order to analyse *whether the maturity of a contractor in terms of supplier relationship management, as perceived by a supplier, has an impact on its preferred customer status with that supplier*, two steps were executed (as described in Section 5.3). First, Supplier 1 was asked a set of questions relating to ‘Manage supplier relationships’ subjects: communication, cooperation and goals, management participation, involvement (improvement / development programs), and information sharing (see Table 12 – Part 2). They were asked about these aspects in relation to both the customers and so it was possible to assess how mature both contractors were perceived by Supplier 1. In the second step, the actual maturity of the supplier relationship management was measured at both contractors using the tool of Bemelmans *et al.* (2011). Next, addressing the same subjects as discussed with Supplier 1 (see Table 12 – Part 2), the contractors were asked if they treated

Supplier 1 differently to other suppliers. Following these two steps, the first part of the *implicit relationship between a contractor's satisfaction regarding collaboration with a supplier and the supplier's perception of the maturity of this contractor* could be assessed, namely *does behaving in a more mature way towards a supplier result in a higher perceived maturity by the supplier?*

In the remaining part of this subsection, the answers provided are presented and compared for each of the relationships (Supplier 1 – Preferred Customer 1 and then Supplier 1 – Regular Customer 1). This subsection concludes by analysing what can be learnt from these two supplier-contractor relationships in terms of the expected relationships described above (see also Section 5.2).

#### *Supplier 1 - Preferred Customer 1*

The maturity level of Preferred Customer 1 in terms of 'Manage supplier relationships' obtained using the construct of Bemelmans *et al.* (2011) is 3 (see Appendix E). Preferred Customer 1 is currently in a development that will move it from having preferred suppliers (and contracts) to official partnerships. In this development, Preferred Customer 1 is targeting reliable stable suppliers that are industry experts with a national coverage (Supplier 1 meets all these demands). Regarding Supplier 1, Preferred Customer 1 declares itself to have a good 'click' with respect to their philosophy (mind-set): the companies help each other and problems are solved. Below, we discuss the maturity of Preferred Customer 1 as perceived by Supplier 1 and the inconsistencies in the treatment of Supplier 1 by Preferred Customer 1 in comparison with the general maturity level measured.

Communication – Preferred Customer 1 has formal communication frameworks with their suppliers, at least at the sales-purchasing level. With their preferred customers, it has a formal communication framework in place covering multiple functions at both companies. Regarding Supplier 1, this framework includes representatives from sales, technical departments, design and logistics. The companies have jointly developed a special process to optimize delivery times.

Cooperation and goals – Both companies state that the criteria and objectives for a project are mainly set by the client and that Preferred Customer 1 passes these on to the supplier. Regarding the criteria and objectives for the supplier relationship, Preferred Customer 1 declares that it formalizes these kinds of objectives internally and tries to discuss them with its preferred suppliers. It claims to have the same mind-set on, for example, sustainability as Supplier 1, but has yet to set specific objectives and goals with Supplier 1. Both companies indicate that they share the same philosophy with regard to prefab / industrialized building, lean management, speed, CO<sub>2</sub> footprints and chain integration. They also mention not yet having set real goals and objectives cooperatively. Supplier 1 and Preferred Customer 1 both

intend to develop the current framework contract into a formal partnership agreement. In this framework they want to align future plans on technologies and strategies, and also set mutual objectives and goals. Interestingly, both companies have started the development of a partnership program to improve relationships. At Supplier 1, the, to be appointed, key account managers are expected to take a leading role in this process. At Preferred Customer 1, product group managers have this role.

Management participation – Preferred Customer 1 indicates that all supplier relationships are evaluated by the management team. Further, senior management works together with the senior management of their preferred suppliers to lead and manage the relationship (also stated by Supplier 1). This is also done for some very large project-based incidental purchases.

Involvement (improvement / development programs) – With regard to shared product development, Preferred Customer 1 indicates that, apart from some occasional development work on projects, it does not normally develop ideas together with suppliers. Instead, it just provides suppliers with its wishes and expects the suppliers do the development work (this was also mentioned by Supplier 1). Neither company has an open book policy, but both indicate that they share cost calculations with each other when necessary.

Information sharing – Preferred Customer 1 declared that it does not always provide information on time to its suppliers. It strives to do so, but both internal and external factors cause it to not always succeed. Supplier 1 indicated that it did generally receive information from Preferred Customer 1 on time, there were some incidents but, according to Supplier 1, these were due to other external parties.

#### *Supplier 1 - Regular Customer 1*

The obtained maturity level of Regular Customer 1 in terms of the 'Manage supplier relationships' construct of Bemelmans *et al.* (2011) is 2 (see Appendix E). Below, we discuss the maturity of Regular Customer 1 as perceived by Supplier 1 and the inconsistencies in the treatment of Supplier 1 by Regular Customer 1 in comparison with the general maturity level measured.

Communication – Regular Customer 1 indicates that it has a formal communication network in place with all its suppliers, with fixed contact persons in various functions (purchasing, design, etc.). However, Supplier 1 disagreed, claiming this was not even the case between their own sales department and the purchasing department of Regular Customer 1.

Cooperation and goals – Regular Customer 1 stated that the criteria and objectives of a project are set by the client and that these are passed on to its suppliers. Further, Regular Customer 1 sets additional objectives and criteria on a project basis, occasionally in cooperation with suppliers (if it lacks sufficient knowledge regarding a product or process). These extra objectives and criteria were not mentioned by Supplier 1. Regular Customer 1 sees itself as good at determining the process regarding prefabricated hollow core slabs and so it determines the schedule for assembly and thus dictates to suppliers when it wants to receive which products during the building process. Regular Customer 1 does not set criteria and objectives for a relationship. However, it is internally developing collaborative, annual and framework contracts with which it does intend to set these kinds of objectives and criteria. Regular Customer 1 has had partnership agreements in the past with suppliers, but has none at this moment although it does intend to develop new ones. There was no contract between the two companies at the time of the interviews. Regular Customer 1 has not aligned future plans on technologies, strategies and objectives with suppliers.

Management participation – The management of Regular Customer 1 only discusses relationships with suppliers if there are problems. Recently, the management had discussed developing partnership contracts. They have not talked with Supplier 1 about their relationship, something Supplier 1 had expected. The senior management of both companies had recently talked together about the relationship, but nothing had since developed.

Involvement (improvement / development programs) – Occasionally, Regular Customer 1 has developed products with suppliers (although not with Supplier 1), not only on regular projects but also on special development projects. Regular Customer 1 does not share cost calculations with suppliers, but has asked suppliers to share their calculations.

Information sharing – Regular Customer 1 claims that it does mostly provide information to suppliers on time. Supporting this, Supplier 1 does not regard Regular Customer 1 as having a reputation for being late (but equally not for being on time as there has not been sufficient business to establish a reputation).

#### *Case study 1 supplier relationship management conclusions*

In general, the maturity level of Preferred Customer 1 in terms of managing supplier relationships can be seen as developed/professional: policies and operational processes are aligned. Especially with its preferred suppliers (where most relationships are evolving into partnerships) it seems to proactively manage them. The perception of Supplier 1 regarding the maturity of Preferred Customer 1 matches the reality. The long-lasting relationship between the two companies is evolving into a partnership, and both companies are happy with this and seem capable of seeing it through. Regular Customer 1 is less mature in

managing supplier relationships than Preferred Customer 1. Supplier relationships are managed on a project level and not on a companywide basis. Although the 'numerical difference' in maturity between the two contractors is small (3 against 2), the difference perceived by Supplier 1 is large. Both Regular Customer 1 and Supplier 1 want to increase business with each other, but seem incapable of doing so: miscommunications and differing views are probably the main reasons. One of the reasons for the miscommunications is probably that Regular Customer 1 does not have a product group manager for prefab hollow core slabs. Currently, many different employees of Regular Customer 1 communicate with Supplier 1.

Based on these two relationships, it can be concluded that, *if contractors are perceived as managing their supplier relationships mature, then it is more likely that the contractor will become a preferred customer of the supplier.* Furthermore, in this case, it was seen that a *contractor who behaves more maturely towards the supplier will also be perceived as more mature than a contractor who behaves in a less mature way.*

#### 5.4.1.3 PREFERRED CUSTOMER STATUS & COLLABORATION SATISFACTION

Two steps have been performed in assessing *whether having a preferred customer status at the supplier positively impacts on the contractor's satisfaction regarding collaboration with that supplier.* Both Preferred Customer 1 and Regular Customer 1 answered questions regarding their *satisfaction with the collaboration* with Supplier 1 and others addressing *preferred customer status* topics as presented in Section 5.2; namely, attractiveness and satisfaction, recent relationship developments, relationship specific investments, preferential resource allocation and treatment, and innovation/improvement suggestions (see also Table 12 – Part 3). Further, the same questions were answered by Supplier 1 regarding each of these two customers.

In the remaining part of this subsection, the answers provided are presented and compared for each relationship (Supplier 1 – Preferred Customer 1 and then Supplier 1 – Regular Customer 1): i.e. are there perceived differences about the collaborations? This subsection concludes by analysing what can be learnt from these two supplier-contractor relationships regarding the expected relationship as described above (see also Section 5.2).

##### *Supplier 1 - Preferred Customer 1*

Contractor's collaboration satisfaction – Overall Preferred Customer 1 is satisfied regarding its collaboration with Supplier 1.

Attractiveness and satisfaction – Preferred Customer 1 perceives Supplier 1 as attractive as it regards Supplier 1 as an authority on prefab hollow core slabs and as a reliable and stable partner (Interviewee Preferred Customer 1: “Supplier 1 proves true to what they profess”). As such, Preferred Customer 1 has a positive expectation of its relationship with Supplier 1. Similarly, Supplier 1 perceives Preferred Customer 1 as attractive and has a positive expectation of the relationship (Interviewee Supplier 1: “Preferred Customer 1 really thinks in terms of relationships and quality, both internally and with external partners”). As such, both Preferred Customer 1 and Supplier 1 indicate that they are satisfied with the relationship: Preferred Customer 1 meets Supplier 1’s expectations and vice-versa.

Recent relationship developments – Preferred Customer 1 had recently learnt more about Supplier 1 and its issues. Preferred Customer 1 says this mainly happened after Supplier 1 started to develop the Casco system and that it helped them with this development. It assisted Supplier 1 because it had more general experience than them with Casco systems. Further, both companies have openly talked about the economic crises and the consequences for their relationship. This issue was also mentioned by Supplier 1 who stated that he is aware that Preferred Customer 1 cannot award an order to Supplier 1 if they are even only a bit more expensive than a competitor. Previously, Preferred Customer 1 was willing to pay slightly more because of the good relationship. Nowadays, all prices have to be as low as possible. Both companies commented that, in terms of the prefab hollow core slabs, the interaction between the companies had not intensified and they had not become more similar in recent years. However, they both said that this was because the relationship was already very close and long-lasting. They both stated that, in recent years, they had worked together to reduce costs, mainly in terms of logistics and failure costs.

Relationship specific investments – Supplier 1 indicated that it had made relationship specific investments in the sense of having developed a special sales process (flowchart) for Preferred Customer 1 in order to shorten delivery time. However, Preferred Customer 1 found it difficult to assess whether Supplier 1 had made relationship specific investments. It was aware of the special sales process, but did not know if Supplier 1 only used this process for this relationship. Preferred Customer 1 views the time and costs given in consulting with Supplier 1 over the Casco system as a relation specific investment in Supplier 1.

Preferential resource allocation and treatment – In terms of preferential resource allocation and treatment, Preferred Customer 1 indicated that it expects Supplier 1 to dedicate its best personnel and resources to their relationship (both for normal projects and for developments). This was also understood by Supplier 1. Preferred Customer 1 would expect that, in the event of production capacity problems at Supplier 1, it would get privileged treatment. Supplier 1 indicated that there were no capacity problems at the time of the research but that it had happened in the past and indeed Preferred Customer 1 had received

privileged treatment. However, Supplier 1 also said that it could conceive of asking Preferred Customer 1 if it could delay a delivery because of their good relationship so that it could first serve other customers, with which 'firm' delivery dates had been agreed. In the event of shortages (such as of raw materials) both parties stated that Preferred Customer 1 would get privileged treatment. According to Preferred Customer 1, Supplier 1 will customize products to meet its wishes, and Supplier 1 agreed this was the case. Both companies mentioned that Supplier 1 offers innovations to Preferred Customer 1 first (so that it can get a head start) before offering them to other customers. Preferred Customer 1 often hosts the pilot project for an innovation. When Preferred Customer 1 was asked if Supplier 1 had made sacrifices for them in the past, Preferred Customer 1 agreed and gave some examples. In the event of a fluctuating market situation for raw materials, the fluctuation costs are not passed on to Preferred Customer 1. Further, according to Preferred Customer 1, Supplier 1 will solve problems for them and work overtime (without charge). This last example was also mentioned by Supplier 1. Overall, Preferred Customer 1 has the feeling that Supplier 1 cares for him and is on its side. This was also indicated by Supplier 1.

Innovation / improvement suggestions – Finally, both companies were asked if Supplier 1 provides suggestions to Preferred Customer 1 on how it could save production/assembly time and costs. Supplier 1 said they did and gave an example where it had helped Preferred Customer 1 to optimize the production time for a stairwell hole. This had also required a change in their own product. Further, it had not yet provided this idea to other customers, although it would probably do so in the future. This same example was mentioned by Preferred Customer 1, along with some other examples including the development of polystyrene foundation moulds and the Casco system. Preferred Customer 1 mentioned that Supplier 1 continually worked on process optimizations and industrialization.

#### *Supplier 1 - Regular Customer 1*

Contractor's collaboration satisfaction – Turning now to the relationship with the regular customer, Regular Customer 1 was not fully satisfied regarding its collaboration with Supplier 1.

Attractiveness and satisfaction – Regular Customer 1 regards Supplier 1 as an attractive supplier and has a positive feeling about Supplier 1. According to Regular Customer 1, Supplier 1 has a good image, is innovative and is one of the top three suppliers of prefab hollow core slabs in the Netherlands. However, Regular Customer 1 has mixed feeling regarding its expectations of the relationship. It would like to conduct more business with Supplier 1 but major obstacles are price and some other recent joint issues. Unfortunately, in the opinion of Regular Customer 1, Supplier 1 has failed to follow up on these in a satisfactory way. Supplier 1, at the moment, does not regard Regular Customer 1 as an

attractive option. In principle, it would like to conduct more business with Regular Customer 1, but does not expect this to happen. According to Regular Customer 1, Supplier 1 does not really engage in acquisition activities, nor explain its offers (such as the price), nor follow up after making an offer. That is, Supplier 1 should talk more with the project organization of Regular Customer 1. There is a lack of good interaction between the companies, at least in the negotiation phase. Supplier 1 is not satisfied with the relationship (and neither is Regular Customer 1), but is not able to really judge if the other party meets its expectations since they have conducted so little business.

Recent relationship developments – Regular Customer 1 claimed that it had recently obtained more insight into the situation of Supplier 1, but had not really learnt much more about Supplier 1 and its issues. They had held one recent meeting with Supplier 1 to discuss the relationship and the reasons why they conduct so little business but this had not led to more interaction and business. Supplier 1 also stated that he had learnt more but only superficially about Regular Customer 1 and its issues. It seems odd to Supplier 1 that while having a 60% market share it only has an estimated 4% of Regular Customer 1's business. Both companies stated that they had not grown closer together in recent years, nor had they jointly reduced costs.

Relationship specific investments – Both companies said that they had not made relationship specific investments. This had almost occurred once, when Regular Customer 1 needed a product with a specific motif in it and Supplier 1 would have had to adapt the production line to produce this, but, in the end, Regular Customer 1 did not buy this product from Supplier 1.

Preferential resource allocation and treatment – In terms of preferential resource allocation and treatment, Regular Customer 1 had no idea whether Supplier 1 dedicates its best personal and resources to their relationship (Interviewee Regular Customer 1: “we don't hear or see them”). However, Supplier 1 did indicate that it dedicated its best personal and resources to Regular Customer 1 since this was a necessity. According to Supplier 1, Regular Customer 1 only buys customized products from them, and that they need to use their best personal to design and produce these. Interestingly, Regular Customer 1 believes that it only buys standard products and not customized ones. Both companies recognize that Regular Customer 1 will not receive privileged treatment in the event of production capacity problems or shortages (Interviewee Regular Customer 1: “I assume others will receive priority”). In terms of innovations, Regular Customer 1 stated that it does not get offered innovations by Supplier 1 except for the project with the special motif mentioned above. Supplier 1 did claim to offer innovations to Regular Customer 1, although admitting that it was cautious since sister companies of Regular Customer 1 also produce prefab concrete products and effectively these sister companies were competitors of its own sister



companies. Both companies thought that Supplier 1 had never made sacrifices for Regular Customer 1 nor that it particularly cared about it or was on its side.

Innovation / improvement suggestions – Supplier 1 does not provide suggestions to Regular Customer 1 on how it could save production/assembly time and costs. This was confirmed by Regular Customer 1. Finally, Supplier 1 indicated that it would have acted in a more benevolent way in general towards Regular Customer 1 if it was viewed as a preferred customer.

*Case study 1 preferred customer status and collaboration satisfaction conclusions*

Analysing the relationship between Supplier 1 and Preferred Customer 1, it can be concluded that almost all the indicators of having preferred customer status at the supplier are present (see Table 14). The relationship can be classified as long-lasting, close, collaborative and intense. Both companies understand each other and have a similar view on the relationship. Furthermore, both companies are satisfied with the relationship. However, when analysing the relationship between Supplier 1 and Regular Customer 1, it can be concluded that almost none of the indicators of preferred customer status are present (see Table 14). Although both companies have openly talked about their problems, a lot of misunderstanding remains between the companies. Neither of the companies is satisfied with the current relationship.

Based on these two relationships, it can be concluded that *having preferred customer status at a supplier has a positive impact on a contractor’s satisfaction regarding collaboration with that supplier.*

**TABLE 14: PRESENCE OF PREFERRED CUSTOMER STATUS ANTECEDENTS IN CASE 1**

<b>Antecedents of preferred customer status</b>	<b>Present for Preferred Customer 1</b>	<b>Present for Regular Customer 1</b>
Yearly sales	Fully	Not at all
Proximity	Partly	Partly
Attractiveness and satisfaction	Fully	Not at all
Recent relationship developments	Partly	Not at all / Partly
Relationship specific investments	Fully	Not at all
Preferential resource allocation and treatment	Fully	Not at all / Partly
Innovation / improvement suggestions	Fully	Not at all

**5.4.2 CASE 2**

The data collection for Case 2 started at Supplier 2, where the interviewee had the function of ‘Manager Sales & Engineering’ and was responsible for the sales department. As in the previous case, the interview started by selecting two specific customers to discuss and then

obtaining their contact details. Selecting the most favoured customer was no problem for Supplier 2; Preferred Customer 2 is its largest customer by sales volume and regarded as its number one preferred customer. Selecting a regular customer was a little more difficult, with Supplier 2 indicating that it had a lot of small customers with which it would like to increase business: there were no customers that it did not care about. Further, according to Supplier 2, from the moment it obtains an order, it treats every customer the same. For the case study, Regular Customer 2 was selected; a customer Supplier 2 conducts little business with and would not worry unduly if this customer no longer dealt with them. In Subsection 5.4.2.1, the three companies involved in Case 2 are further introduced (see Table 15 for an overview of the indicators for Case 2).

#### 5.4.2.1 CONTEXT

Supplier 2 mainly sells prefab concrete joists for bridges and flyovers (the focus product in this case). It also sells prefab concrete sheet pile walls and prefab concrete rail products (e.g. sleepers). All these products are used in the infrastructure sector. In terms of the prefab concrete joists, it has approximately a 40% to 50% market share within the Netherlands. Supplier 2 is located in the west of the country. Supplier 2 has a small sales organization with just one sales manager and one account manager who each manage all customer relationships at their respective levels.

Preferred Customer 2 is active in the infrastructure sector and has an average spend of approximately €10,000,000 per year on prefab concrete joists although this fluctuates significantly and in 2010 was ≈ € 20.000.000. Very occasionally it also purchases prefab concrete sheet pile walls from Supplier 2. Preferred Customer 2 has a head office and some regional offices (which can be seen as production locations) and purchasing is organized centrally at head office. Sometimes, for small projects, the regional offices will purchase directly, but this is also carried out by staff from head office who also work in the regional offices on a number of days. All the locations of Preferred Customer 2 are regarded as preferred customers by Supplier 2, even though the actual sales are effectively always conducted through the head office of Preferred Customer 2. The head offices of both companies are located within 30 kilometres of each other. In the remainder of this paper, when referring to Preferred Customer 2 this term covers all of its locations. Within Preferred Customer 2's organization there are product group managers responsible for maintaining all supplier relationships for their respective product groups. However, officially, these had yet to be appointed since the official policy was still being developed.

Regular Customer 2 is similarly active in the infrastructure sector and has, just as Preferred Customer 2, a very fluctuating yearly spend on prefab concrete joists. Most of its purchases

from Supplier 2 are prefabricated concrete joists, although it too also occasionally buys prefabricated concrete sheet pile walls. The head office of Regular Customer 2 is located in the west of the Netherlands, and Supplier 2 views this as the only office it has a relationship with. However, according to Regular Customer 2, its other locations also conduct business with Supplier 2 although, similar to Preferred Customer 2, this is arranged by the head office (and again, similarly, the term Regular Customer 2 as used here covers all locations). The head offices of both companies are located within 25 kilometres of each other. Regular Customer 2 has no product group manager for prefabricated concrete joists and all its buyers can purchase this product. Regular Customer 2 indicated that there had recently been some problems between the two companies which had led to a lack of confidence but before that more business was conducted between the companies.

**TABLE 15: INDICATORS FOR CASE 2**

	<b>Supplier 2</b>	<b>Preferred Customer 2</b>	<b>Regular Customer 2</b>
<i>Function of interviewee</i>	Manager Sales & Engineering	Director Projects	Purchase Manager
<i>Number of FTE</i>	≈ 150	≈ 450	≈ 750
<i>2010 annual sales of prefabricated concrete joists</i>	≈ € 40,000,000	n/a	n/a
<i>2010 annual purchases of prefabricated concrete joists (% at Supplier 2)</i>	n/a	≈ € 20,000,000 (75%)	≈ € 5,000,000 (15%)
<i>Key account manager at Supplier 2 for customer</i>	n/a	Yes	Yes
<i>Product group manager for prefabricated concrete joists</i>	n/a	Yes	No

**5.4.2.2 SUPPLIER RELATIONSHIP MANAGEMENT**

As in Case 1, two steps were executed (as described in Section 5.3) to analyse *whether the maturity of a contractor in terms of supplier relationship management, as perceived by a supplier, has an impact on its preferred customer status with that supplier*. First, Supplier 2 was asked a set of questions relating to ‘Manage supplier relationships’ subjects: communication, cooperation and goals, management participation, involvement (improvement / development programs), and information sharing (see Table 12 – Part 2). They were asked about these aspects in relation to both the customers and so it was possible to assess how mature both contractors were perceived by Supplier 2. In the second step, the actual maturity of the supplier relationship management was measured at both contractors using the tool of Bemelmans *et al.* (2011). Next, addressing the same subjects as discussed with Supplier 2 (see Table 12 – Part 2), the contractors were asked if they treated Supplier 2 differently to other suppliers. Following these two steps, the first part of the *implicit relationship between a contractor’s satisfaction regarding collaboration with a*

*supplier and the supplier's perception of the maturity of this contractor could be assessed, namely does behaving in a more mature way towards a supplier result in a higher perceived maturity by the supplier?*

In the remaining part of this subsection, the answers provided are presented and compared for each of the relationships (Supplier 2 – Preferred Customer 2 and then Supplier 2 – Regular Customer 2). This subsection concludes by analysing what can be learnt from these two supplier-contractor relationships in terms of the expected relationships described above (see also Section 5.2).

#### *Supplier 2 - Preferred Customer 2*

The maturity level of Preferred Customer 2, in terms of the 'Manage supplier relationships' construct, obtained using the method described in Bemelmans *et al.* (2011) is 0 (see Appendix E). At the time of the interview, Preferred Customer 2 was updating its policies (and will explicitly mention, in its purchasing policy, with which suppliers to build strategic relationships) and processes to move from having preferred suppliers to real partnerships. Once it adds this definition to its purchasing policy it will immediately achieve a maturity level of 3. Below, we discuss the maturity of Preferred Customer 2 as perceived by Supplier 2 and the inconsistencies in the treatment of Supplier 2 by Preferred Customer 2 in comparison with the general maturity level measured.

Communication – On the sales-purchasing level, Preferred Customer 2 has formal communication frameworks in place with its suppliers. It does not, however, have formal communication frameworks that cover multiple functions. Preferred Customer 2 indicates that different people and functions interact with suppliers on each project, and that suppliers do have fixed people (by function) to contact (Interviewee Preferred Customer 2: "we are a multi-headed monster towards suppliers"). This was recognized by Supplier 2.

Cooperation and goals – Both companies indicated that most criteria and objectives are set by the project client and then passed on by Preferred Customer 2 to Supplier 2. Preferred Customer 2 tends to add extra criteria (e.g. safety and design demands) for a project and, with its preferred suppliers, these extra criteria are set cooperatively. Preferred Customer 2 intends to evolve some of its preferred supplier relationships into partnerships (including with Supplier 2), but currently there are only framework contracts in place. It has not yet set partnership objectives with suppliers. Both companies mentioned that they have jointly signed a declaration of intent which states how they will approach the market together. For both companies, the intention is to evolve this into a partnership agreement and then cooperatively set objectives, to further align future plans on technologies and strategy, and to work closer together.

Management participation – The management team of Preferred Customer 2 regularly discusses supplier relationships. In general, the senior management of Preferred Customer 2 is involved in leading and managing relationships with its preferred suppliers together with the senior management of these suppliers. In terms of its relationship with Supplier 2, the management of both companies indicated that they met every four to six weeks.

Involvement (improvement / development programs) – Preferred Customer 2 has research and development teams that work on ‘general’ innovations (i.e. not specific to a project), and these teams work together with suppliers if their knowledge is required. It has jointly developed products with Supplier 2, but these were project-specific (confirmed by Supplier 2). Preferred Customer 2 has not started shared improvement programs with its suppliers but, with Supplier 2, it does ensure that earlier optimizations are maintained. This matches the statement given by Supplier 2 that the two companies have started a sort of shared improvement program. Supplier 2 shares to a certain extent cost calculations and prices with Preferred Customer 2 and regards this as a “semi-open book” policy. Preferred Customer 2 is willing to share cost calculations and prices with Supplier 2 (and strategic partners in general), but has only done this very limited so far.

Information sharing – Turning, finally, to information sharing, Preferred Customer 2 admits that it is almost always too late (and mostly its own fault) in providing information to suppliers, which results in frustrations. According to this customer, this is typical of the market - and prime contractors should take the lead in improving this since they have a central role in a project. In terms of Supplier 2, Preferred Customer 2 indicated that they were often more timely in providing information than on average. According to Preferred Customer 2, Supplier 2 has more influence on this process since it is involved from an early stage of a project. Nevertheless, Preferred Customer 2 suspected that Supplier 2 would probably still have complaints, and indeed the latter did state that Preferred Customer 2 could improve the timeliness of information delivery.

#### *Supplier 2 - Regular Customer 2*

The maturity level of Regular Customer 2 in terms of the ‘Manage supplier relationships’ construct, obtained using the method of Bemelmans *et al.* (2011), is 0 (see Appendix E). In contrast with Preferred Customer 2, Regular Customer 2 has no plans to update their policy in the near future. Below, we discuss the maturity of Regular Customer 2 as perceived by Supplier 2 and the inconsistencies in the treatment of Supplier 2 by Regular Customer 2 in comparison with the general maturity level measured.

Communication – Regular Customer 2 claims to have fixed contact people for all its suppliers within its purchasing department, and that the sales departments of its suppliers similarly each have a fixed contact person. However, with regard to other functions, it has no formal

communication framework in place and this varies by project. Supplier 2 agreed with this assessment in terms of its dealings with this customer.

Cooperation and goals – As also noted by the other three contractors (i.e. customers) in this research, it is generally the client that sets the criteria and objectives for a project and these are passed down to the suppliers. Regular Customer 2 says it tries to design according to these criteria and objectives in conjunction with its suppliers, and Supplier 2 agreed this was so. At the time of the interview, Regular Customer 2 was developing framework contracts for its preferred suppliers and was selecting suppliers that would become preferred suppliers. As such, it had yet to set additional criteria and objectives for its relationships but the intention was to focus on corporate social responsibility, lean management, safety and CO<sub>2</sub> emission. Supplier 2 was being considered as potentially the preferred supplier of prefab concrete joists, but no decision had been made. Supplier 2 was aware that Regular Customer 2 was selecting preferred suppliers and had the impression that this customer wanted to have a framework contract with him. Up to the time of the interview, Regular Customer 2 has not worked on partnership agreements and programs, or aligned future plans on technologies, objectives and strategies. The aim was, within a couple of years, to have developed framework contracts with preferred suppliers that would evolve into partnerships.

Management participation – The management team of Regular Customer 2 discusses its relationships with suppliers on a regular basis. Together with the management teams of their suppliers, they are trying to establish framework contracts and preferred supplier relationships. Regular Customer 2's management had held a recent meeting with the management of Supplier 2 to try and resolve recent problems, a fact also mentioned by Supplier 2.

Involvement (improvement / development programs) – Regular Customer 2 has jointly developed products with suppliers but only for specific projects, not as a general policy. It said it had not developed a product with Supplier 2, and this was confirmed by the supplier. Regular Customer 2 had started to use lean methodologies on some projects as part of an improvement program, but not with Supplier 2. Regular Customer 2 does not share its calculations with suppliers (Interviewee Regular Customer 2: “a bit scary isn't it?”), but does ask suppliers to share their cost calculations with them. Supplier 2 indicated that it had shared, in general terms, its cost calculations with Regular Customer 2, but not in as detailed a way as with Preferred Customer 2. Regular Customer 2 has shared some of its strategies with suppliers but does not have an open book policy. It sees itself as being rather old fashioned in this respect.

Information sharing – To conclude this assessment we turn to information sharing and, with regard to providing information on time, Regular Customer 2 claimed that during the preparation phase of a project it would normally provide timely information to suppliers. However, during the actual construction process, it would provide information as often just in time. Suppliers, however, the interviewee of Regular Customer 2 noted, often see this as just too late, and these suppliers he admitted are generally correct. Sometimes they were late due to external parties, but sometimes it was their own fault. Regular Customer 2 thought it should communicate better/more clearly. Supplier 2, on the other hand, could not recall any experiences that stood out (either positively or negatively).

#### *Case study 2 supplier relationship management conclusions*

Although the overall maturity of Preferred Customer 2 in terms of managing supplier relationships was formally placed on level 0, it was rather professional and under further development. This company, similarly to Preferred Customer 1 in the previous case, was working on partnership agreements. At the time of the research, it was busy updating its policies and processes. Supplier 2 perceives the maturity of Preferred Customer 2, to be at a higher level than the formal score reflects. However, since this score of 0 was the result of a single criterion regarding the purchasing policy, and the ‘practical’ maturity is higher, it is fair to conclude that the maturity perceived by Supplier 2 is not unrealistic of the current state at Preferred Customer 2. The criticisms by Supplier 2 (having to deal with many different people outside the purchasing department and not always providing information on time) are known by Preferred Customer 2, and these do not seem to have influenced the customer status awarded by Supplier 2 (the general maturity apparently sufficiently compensates). The relationship between these two companies is evolving into a partnership. The maturity of Regular Customer 2 in terms of managing supplier relationships is lower than that of Preferred Customer 2. This is most clearly reflected in collaboration with suppliers: Regular Customer 2 was just starting to select suppliers to become preferred suppliers, whereas Preferred Customer 2 had had these for many years and was now working on turning these into partnerships. The maturity of Regular Customer 2 perceived by Supplier 2 matched the reality.

Based on these two relationships, it can be concluded that, *if contractors are perceived as managing their supplier relationships mature, then it is more likely that the contractor will become a preferred customer of the supplier.* Furthermore, in this case, it was seen that a *contractor who behaves more maturely towards the supplier will also be perceived as more mature than a contractor who behaves in a less mature way.*

#### 5.4.2.3 PREFERRED CUSTOMER STATUS & COLLABORATION SATISFACTION

As in the first case, two steps were carried out in order to analyse *whether having a preferred customer status at the supplier positively impacts on the contractor's satisfaction regarding collaboration with that supplier*. Both Preferred Customer 2 and Regular Customer 2 answered questions regarding their *satisfaction with the collaboration* with Supplier 2 and others addressing *preferred customer status* topics as presented in Section 5.2; namely, attractiveness and satisfaction, recent relationship developments, relationship specific investments, preferential resource allocation and treatment, and innovation/improvement suggestions (see also Table 12 – Part 3). Further, the same questions were answered by Supplier 2 regarding each of these two customers.

In the remaining part of this subsection, the answers provided are presented and compared for each relationship (Supplier 2 – Preferred Customer 2 and then Supplier 2 – Regular Customer 2): i.e. are there perceived differences about the collaborations? This subsection concludes by analysing what can be learnt from these two supplier-contractor relationships regarding the expected relationship as described above (see also Section 5.2).

##### *Supplier 2 - Preferred Customer 2*

Contractor's collaboration satisfaction – Preferred Customer 2 is satisfied with its collaboration with Supplier 2 although there is a minor concern over prices. Recently, Preferred Customer 2 has concluded that the prices charged by Supplier 2 are too high, and feels no longer able to pay above the prices offered by competitors of Supplier 2. This has forced Preferred Customer 2 to buy more from the competitors of Supplier 2 than it really wants to, and it would like to see the situation change.

Attractiveness and satisfaction – Preferred Customer 2 perceives Supplier 2 as attractive (Interviewee Preferred customer 2: “Supplier 2 is our preferred supplier for prefab concrete joists”), and the relationship has existed for many years. According to Preferred Customer 2, both companies are always seeking ‘smart’ solutions. Preferred Customer 2 likes it that Supplier 2 is an independent supplier and not tied to a large concern. It sees Supplier 2 as good at solving complex problems, going one step further than its competitors and coming up with clever solutions. Supplier 2 similarly perceives Preferred Customer 2 as attractive, with a strong attribute being Preferred Customer 2 maintaining long-term partner relationships. Other attributes of Preferred Customer 2 that are seen as relevant vary by project and the quality depends on the people they deal with on specific projects. Preferred Customer 2 has a positive expectation of the relationship: it expects it to continue and improve. Supplier 2 meets all the expectations of Preferred Customer 2 but does recognize prices as the main tension between the two companies at present, a situation resulting from the current market circumstances (strong price competition). Supplier 2 similarly has a



positive expectation of the relationship: it is generally satisfied with the relationship although some projects were less satisfactory due to design issues.

Recent relationship developments – The interviewee at Preferred Customer 2 had personally conducted business with Supplier 2 for 21 years, and the relationship between the two companies goes back even further, and has been good and close for a long time. As such, Preferred Customer 2 feels that it has not really learnt anything new about Supplier 2 in recent years (Interviewee Preferred Customer 2: “I understand them, I recognize their issues and they ours”). Nevertheless, since the start of a very large project in 2005, contact has intensified and the companies have grown closer together and even more similar. Supplier 2 similarly referred to the same project and agreed that the companies had grown closer together (Interviewee Supplier 2: “We understand our customer and their motives, you constantly obtain new insights”). Supplier 2 did comment that it was difficult to keep the relationship running smoothly in a declining market. Both companies indicated that they jointly reduce costs by optimizing processes and logistics and by jointly coming up with new designs.

Relationship specific investments – According to Preferred Customer 2, investments (such as in special moulds) have been made by Supplier 2, but it would not label these as relationship specific. Although these investments were initially made for them, Supplier 2, according to Preferred Customer 2, can also use them in products for other customers. In contrast, Supplier 2 indicated that the special moulds developed for Preferred Customer 2 could not be used for other customers.

Preferential resource allocation and treatment – In terms of preferential resource allocation and treatment, Preferred Customer 2 has no idea if Supplier 2 dedicates its best personnel/resources to the relationship, but has no complaints regarding the personnel (Interviewee Preferred Customer 2: “I recognize fixed teams, I like that”). Supplier 2 claims to make no distinction by customer - allocation of resources depends on the complexity of the work. Preferred Customer 2 expects to receive privileged treatment in terms of production capacity if Supplier 2 has capacity problems. Supplier 2 sees this as a hypothetical situation, but says it would give privileged treatment to Preferred Customer 2. The same applies in the event of a shortage of raw materials (Preferred Customer 2 sees this as a more likely problem but one that would affect the whole market). Supplier 2 customizes all its products to meet the wishes of Preferred Customer 2. According to Preferred Customer 2, it is the first to receive innovations from Supplier 2, and it believes that Supplier 2 looks out for innovations that can be applied by them. This aspect was also mentioned by Supplier 2, although innovations are not exclusively for Preferred Customer 2, they are applied more often for them than for other customers. In terms of making sacrifices, Preferred Customer 2 recognizes that, if necessary, Supplier 2 will reduce its prices as far as it can (Supplier 2 won't

make a loss, break-even is as low as it will go). Preferred Customer 2 has the feeling that Supplier 2 will take the extra step for them, and thinks that Supplier 2 has made sacrifices in the past. This was also indicated by Supplier 2 (Interviewee Supplier 2: “if you have a good partnership with a customer, this is for both good and bad times ... if they [Preferred Customer 2] have to achieve a project and this is proving difficult, then I don’t make a big profit”). Further, Supplier 2 indicates that it is willing to work extra hours without charge for Preferred Customer 2. In general, Supplier 2 cares for and is on the side of Preferred Customer 2. Preferred Customer 2 recognizes this, and that it is not only based on the long relationship but also on the simple fact that Preferred Customer 2 is responsible for a significant part of Supplier 2’s sales volume.

Innovation / improvement suggestions – Addressing the final topic, Preferred Customer 2 believes that Supplier 2 proactively thinks along with themselves throughout a project and regularly provides ideas on how they might save production/assembly time and costs. Supplier 2 made a similar statement, but interestingly added the remark that the ideas have to be mutually beneficial (Interviewee Supplier 2: “I don’t do something that is only beneficial for them”).

#### *Supplier 2 - Regular Customer 2*

Contractor’s collaboration satisfaction – Regular Customer 2 has been satisfied with its collaboration with Supplier 2 in the past, but is currently not satisfied.

Attractiveness and satisfaction – Regular Customer 2 regards Supplier 2 as attractive. Regular Customer 2 says there are five possible suppliers of prefab concrete joists for bridges and fly-overs, but that Supplier 2 is the specialist: with respect to technical know-how, product development and design it is the best in the Netherlands. Further, because the two companies have openly talked about their mutual problems, Regular Customer 2 has positive expectations regarding the relationship, although they need to work on regaining mutual trust. Supplier 2 finds Regular Customer 2 attractive to some extent: Regular Customer 2 is the largest general contractor in the Netherlands (with the largest market share), and thus a major potential customer. Although Supplier 2 does not know the relevant attributes of Regular Customer 2, it nevertheless has positive expectations of their relationship (Interviewee Supplier 2: “We actually fit nicely together”). According to Regular Customer 2, Supplier 2 does meet its expectations, although in recent years trust has been harmed. Supplier 2 considers the business between the two companies as too low to be able to really judge if Regular Customer 2 meets their expectations, and so Supplier 2 cannot really say it is satisfied.

Recent relationship developments – When asked if it had learnt new things about Regular Customer 2 and their issues, Supplier 2 could not give any examples and so answered

negatively. In sharp contrast, Regular Customer 2 provided a full analysis of recent developments and described the relationship as generally open. Just prior to our research, the interviewees of both companies had held a meeting to discuss the recent problems. The problems seem to have started with a project for which they worked exclusively together to draw up a tender offer for the client; unfortunately the resulting price was so high that they could not even enter the tendering process and consequently they both 'lost' a potentially large amount of work. Subsequently, Regular Customer 2 had asked Supplier 2 for a quotation for another project, but the quoted figure was way in excess of offers from other suppliers. Furthermore, Regular Customer 2 had inadvertently delivered incorrect data for a tender to Supplier 2 (and to other potential suppliers) which had also led to arguments and frustration. Overall, Regular Customer 2 considers Supplier 2 to be too expensive (by about 20%) and coupled with the experiences of recent years this has led to a breach of confidence. Regular Customer 2 is willing to pay a little 'extra' for the experience and technical knowledge of Supplier 2, but the differences in quotations are too large. Regular Customer 2 stated that the two companies had not become more similar, nor intensified their interactions (only one recent meeting) or grown closer together. This was also indicated by Supplier 2, recalling the same recent meeting but not going into details. Further, neither company felt they had worked together to jointly reduce costs although Regular Customer 2 did concede that they had once worked together in the tender and design phases of a project and this had saved some costs.

Relationship specific investments – Both companies felt that neither themselves nor their 'partner' in this relationship had made relationship specific investments.

Preferential resource allocation and treatment – Regular Customer 2 had never really thought about being given preferential resource allocations or treatment by Supplier 2. Regular Customer 2 considered the employees of Supplier 2 as competent and assumed that Supplier 2's best personnel were working for them on design and development. This view matches with the earlier statement of Supplier 2 that they make no distinction by customer in allocating personnel and resources, and that this is determined by project complexity. Both companies agreed that Supplier 2 would not provide privileged treatment to Regular Customer 2 in the event of production capacity problems or shortages. According to Supplier 2 all its products are custom-made, whereas Regular Customer 2 regards the products sold by Supplier 2 as somewhat standard. However, Regular Customer 2 did admit that Supplier 2's products are based on a fixed delivery program, but within that cooperatively designed with its customers. Both parties agreed that Supplier 2 had offered innovations to Regular Customer 2, although Regular Customer 2 commented that all suppliers now do this and that those offered by Supplier 2 were not offered on an exclusive basis. Supplier 2 did not consider that it had made any sacrifices for Regular Customer 2 in recent years (and Regular

Customer 2 thought the same). There was a difference in perceptions over whether Supplier 2 cares for and is on the side of Regular Customer 2. According to the interviewee of Supplier 2, the company does care about Regular Customer 2, although not every employee necessarily feels this way (Interviewee Supplier 2: "we have had some frustrations in the past") but, unfortunately, this had not led to increased business. In contrast, the perspective of Regular Customer 2 was that Supplier 2 did not care for them (Interviewee Regular Customer 2: "I come second, I am not the number one with Supplier 2, and he has said this to me ... if you hear you come second and are not number one, you have a different feeling [compared to feeling that he is on your side]". Regular Customer 2 is aware that Supplier 2 wants to increase their shared business and build the relationship, and they share this desire.

Innovation / improvement suggestions – Supplier 2 stated that it continually provides ideas to save production/assembly time and costs to all suppliers, but this view is not shared by Regular Customer 2.

#### *Case study 2 preferred customer status and collaboration satisfaction conclusions*

The preferred customer status that Supplier 2 has awarded to Preferred Customer 2 is genuine: almost all the indicators are present (see Table 16). The relationship between the two companies has a long history and they work closely together. The companies understand each other and each other's situations, and have similar perspectives on the relationship. Overall, the two companies remain satisfied with the relationship, although the current market circumstances and prices are putting a strain on it. The relationship between Supplier 2 and Regular Customer 2 contains a lot of misunderstandings, different perspectives and trust issues (although they had recently held a meeting to openly talk about the issues). In the view of Supplier 2, it treats every customer the same, and there are some indicators that support this statement (see Table 16). However, this is not the impression gained by Regular Customer 2. Further, several of the indicators of a preferred customer status are missing in this relationship. Regular Customer 2 is not satisfied with the current relationship, with trust issues needing to be resolved, and also regards Supplier 2's prices as too high.

As with the two relationships assessed in Case 1, the two relationships analysed in this second case indicate that *having preferred customer status at a supplier has a positive impact on a contractor's satisfaction regarding collaboration with that supplier.*

**TABLE 16: PRESENCE OF PREFERRED CUSTOMER STATUS ANTECEDENTS IN CASE 2**

<b>Antecedents of preferred customer status</b>	<b>Present for Preferred Customer 2</b>	<b>Present for Regular Customer 2</b>
Yearly sales	Fully	Not at all
Proximity	Fully	Fully
Attractiveness and satisfaction	Fully	Partly
Recent relationship developments	Partly / Fully	Not at all / Partly
Relation specific investments	Fully	Not at all
Preferential resource allocation and treatment	Fully	Partly
Innovation / improvement suggestions	Fully	Partly

## 5.5 DISCUSSION

As explained in the Introduction, a company’s purchasing function, encompassing the management of supplier relationships, has an impact on the competitive position of a company (Carter and Narasimhan, 1996; Ellram and Carr, 1994). The more developed the purchasing function, the greater its contribution to overall company performance (Schiele, 2007). A highly mature purchasing function can provide critical supplier information when it is needed and can potentially solve problems before they turn into major crises (Pearson and Gritzmacher, 1990). Moreover, by managing supplier relationships, companies can obtain a competitive advantage (Chen *et al.*, 2004; Leenders *et al.*, 2002).

Although there is some logic in buyers assuming that a supplier will do its absolute best for them since they are the customer, recent research has shown that suppliers do not treat every customer the same (see, for example, Steinle and Schiele (2008) and Schiele (2010)). In managing supplier relationships, contractors should recognize this and use this knowledge in their best interests. The differing treatments by suppliers are reflected in them having awarded, or not, preferred customer status to a contractor. This study provides new insights into the benefits for contractors of being a preferred customer of a supplier, and how they can obtain such a status. In making this contribution, a conceptual framework has been developed as outlined in Section 5.2 and the results (as presented in Section 5.4) confirm the overall expectations: the empirical pattern matches the theoretical one presented in Figure 11. However, some of the details were not quite what we had expected or somewhat surprising, and these will be further discussed in this section.

### 5.5.1 PREFERRED CUSTOMER STATUS & COLLABORATION SATISFACTION

As anticipated, the annual spend by a contractor at a specific supplier influences the likelihood of it acquiring preferred customer status (Steinle and Schiele, 2008), but Case 1 showed that being the largest customer of a supplier does not automatically mean that that

contractor will also be the most preferred customer. With regard to the claimed benefits of proximity (Steinle and Schiele, 2008), both the identified preferred customers were indeed located close to supplier, but the regular customer in Case 2 was also located close to Supplier 2. Thus, a customer can be physically close to a supplier without achieving preferred customer status.

Investigating the topics of growing closer together, getting more similar, intensifying interactions and learning more about the other company and understanding their issues, we found that these are not as straightforward antecedents as we had been led to believe: one expected these trends to be observable in supplier – preferred customer relationships (Schiele, 2010). However, in both cases, the companies indicated that the preferred relationships were long-lasting and tight; it was more that these facets were already long established rather than continuing to develop. Conversely, in the supplier – regular customer relationships, the case companies indicated that these trends were happening to some extent: they had recently held open meetings to discuss the relationships. Given the design of this research, it was possible to follow up on the brief answers and get some sense of context and, through this, we saw that considering the starting point (how old is the relationship, how close are the companies already, what do they already know about one another) is very important. Certainly, if one intends to ask these types of questions in a survey, one should also include control questions.

As expected, both suppliers had made relationship specific investments (Bensaou, 1999) for their preferred customers, but not for the regular customers. However, both the preferred customers were not sure if all of these investments were really made just for themselves.

With regard to preferential resource allocation and treatment (Schiele *et al.*, 2011a; Steinle and Schiele, 2008) it is interesting to observe that while neither supplier offered innovations exclusively to their preferred customers, they did offer innovations to them first. When it came to dedicating their best personnel, resource allocation and customizing products, we found that it was essential to again ask control questions if one wanted to fully understand the situation. Whether suppliers see themselves as producers of standard products can influence their answers (as it did in our case studies). The contractors saw the issue of whether a supplier would go out on a limb for them in the event of shortages (such as of raw materials) more relevant than the subject of privileged production capacity. They thought that if there were shortages then this would be a problem for all their potential suppliers and, in this situation, suppliers would really have to take sides, whereas they saw production capacity problems as more likely to only occur at one supplier at a time.

Overall, in terms of the antecedents of achieving preferred customer status discussed in the existing literature (see Section 5.2), it seems that there are indeed many antecedents to

obtaining a preferred status, but that not all antecedents have to be in place to obtain such a status. Conversely, even if all the antecedents are in place, preferred customer status is not guaranteed. This research has however clearly supported the claim that, *when preferred customer status is awarded by a supplier, this positively impacts on the contractor's satisfaction regarding the collaboration with that supplier.*

#### 5.5.2 SUPPLIER RELATIONSHIP MANAGEMENT

While investigating the maturity of contractors in managing their supplier relationships, it became clear that all the companies in our study found it 'normal' that contractors are frequently late in providing information to suppliers, and that this has no notable influence on the relationships (it is seen as typical for the industry). While this has led to practical problems and frustrations between the companies, they do not seem to be actively trying to change this 'norm'.

Another remarkable situation found concerned sharing cost calculations. While contractors do expect suppliers to share their cost calculations with them, they are very reserved in sharing their own calculations with the suppliers. Especially in such an industry, where contractors are dependent on their suppliers for realising projects and achieving quality, one would expect to see more open collaboration to achieve the best possible outcomes.

The case studies have brought to light that contractors do not necessarily demonstrate their true maturity in managing relationships with suppliers. This is counterproductive since the results of this research show that it is their behaviour (and thus the *perceived* maturity) that determines whether the supplier will award the contractor with preferred customer status. Contractors thus need to focus on being *perceived as mature* in supplier relationship management, as much as on actually being mature.

It seems that, when a supplier is a preferred supplier of a contractor (and the contractor is *satisfied with the collaboration*), the contractor will almost automatically focus more on and give more attention to that supplier (thus *behaves in a more mature way*). This leads to a *higher perceived maturity* (in terms of managing supplier relationships) by that supplier which *consequentially increases the likelihood of awarding that contractor preferred customer status*). A related finding was that contractors who have assigned product group managers are perceived as more mature by suppliers. The reason behind this is thought to be that these contractors have clearer communication channels with the suppliers.

Overall, *contractors being perceived by suppliers as mature in managing supplier relationships* is an antecedent of being awarded preferred customer status. This antecedent is, as mentioned in Section 5.2, similar to the internal organization weakness antecedent of

Steinle and Schiele (2008). The main difference is that our antecedent adds an important aspect: the supplier's perspective.

## 5.6 CONCLUSIONS AND MANAGERIAL IMPLICATIONS

The goal of this research was to explore both the antecedents and the impact of a contractor having preferred customer status. In terms of antecedents, we paid specific attention to an, until now, unexplored factor: the contractor's maturity in supplier relationship management *as perceived by the supplier*. In terms of impact, we focused on the link between obtaining preferred customer status from a specific supplier and the contractor's satisfaction with its collaboration with that supplier. Firstly, a conceptual framework on the relationships between these variables was developed. Secondly, in order to investigate the conceptual relationships of this framework, inductive qualitative case research was conducted. Two cases were investigated and, in each case, representatives of three companies were interviewed: one supplier plus two of its customers (both prime contractors and one with preferred status). As such, a total of four dyadic matched-pair inter-organizational relationships have been investigated.

Based on the results described in Section 5.4, it is concluded that, for contractors, it is beneficial to *obtain preferred customer status at a supplier, since this will have a positive impact on their satisfaction with the collaboration with that supplier*. Secondly, if contractors *are to obtain preferred customer status at their suppliers it is important that they are perceived as mature in managing supplier relationships*. In achieving this, a clear communication framework (with appointed product group managers) is helpful. Thirdly, *if a contractor is satisfied with a collaboration, it is more likely to behave in a more mature way towards the supplier concerned, and this will result in the supplier perceiving that contractor as having a higher maturity level*.

Although contractors and suppliers often both want to increase their mutual business, there can be many factors that impede this. The framework presented in this research can help companies to obtain greater insights into such relationships and this will help in overcoming these impediments. Although many variables that influence the relationship between a supplier and a contractor have been researched, to fully understand the various dynamics in relationship development it is recommended that future research adopts a longitudinal approach (a good example being Woolthuis *et al.* (2005)).



# Chapter 6

## CONCLUSIONS, MANAGERIAL IMPLICATIONS AND RECOMMENDATIONS

The construction industry is a large, fragmented market in which construction firms operate in a decentralized network of suppliers and customers. Projects within this industry can be seen as temporary organizations among and within the organizations involved. The responsibility scope of prime contractors within construction projects is increasing, and client demands are shifting from a focus on just price to a focus on criteria like innovation, sustainability and speed. Another development related to this is that contractors are increasingly depending upon their suppliers to realize projects, and for achieving the required performance in these projects. Therefore, the importance of managing the purchasing function within construction companies is growing. This increasing dependence emphasizes the growing importance for contractors of collaborating with and managing suppliers.

In general, the more mature the purchasing function, which encompasses buyer-supplier relationship management, the greater its contribution to overall company performance. However, in the construction industry only very limited research has been conducted on the maturity level of the purchasing function of prime contractors. The concept of supply chain management has to an extent been researched in the construction industry, but the focus has mainly been on the client-contractor relationship rather than the contractor-supplier one (Dainty *et al.*, 2001a; Eom *et al.*, 2008). An important question still to be answered was how construction firms could increase their competitive position in the industry through their relationships with their suppliers.

Given the growing importance for construction companies of managing the purchasing function, the collaboration with and managing of suppliers, and the limited research conducted in the construction industry on supplier-contractor relationships, the aim of this research was defined as follows:

*The aim of this research is to gain insight into ways in which contractors could improve the management of, and the collaboration with, suppliers in order to increase their competitiveness.*

In this final chapter, the overall conclusions (Section 6.1) as well as managerial implications are presented (Section 6.2), followed by recommendations for future research (Section 6.3).

## 6.1 CONCLUSIONS

Based on a taxonomic approach to the literature of the 2000-2009 decade, in *Chapter 2*, it is concluded that supplier-contractor research in the construction industry is still a relatively under-researched phenomenon. Of the sample of 50 articles, only 25 focus solely on supplier-contractor relationships. During the search process for relevant articles, a large number were rejected because they focused solely on the contractor-client relationship and this supports the statement that research has so far largely focussed on the contractor-client relationship. The first group of major topics discussed in the identified articles cover aspects of partnering, such as conditions for partnering, characteristics of partnering, barriers/obstacles to partnering, or a combination thereof. The other group of major topics discussed involved (sub)contracting/procurement issues, such as the practices employed, selection criteria, performance, characteristics, or a combination of these.

Within the first group, the conditions for, and success factors in, partnering have received research attention over the last decade. One of the most interesting results concerns the role of communication and information sharing. Compared to trust and confidence, which are widely accepted as the most influential factors in partnering success, communication and information sharing actually seem to be more influential (Doloi, 2009; Titus and Bröchner, 2005). The testing of organisational barriers to partnering, such as the external environment, organisational culture, organisational climate and organisational structure, has received only limited attention. One of the barriers found to partnering is the lack of belief in the benefits of partnering by practitioners (Dainty *et al.*, 2001b). Nevertheless, many researchers assume partnering is beneficial. Other conditions which were found to lead to closer relationships include creating a learning culture (Cheng *et al.*, 2004) and having institutional norms (Phua, 2006). The effect of learning experiences on developing relationships and the factors that affect vertical integration have also been addressed, but only to a limited extent.

In the second group of major topics discussed, practices of (sub)contracting/procurement issues are discussed including approaches used in subcontracting, such as the rate of subcontracting, reasons behind this choice and business relationships with subcontractors

(Costantino *et al.*, 2001), subcontractor and supply enquiries (Laryea, 2009) and e-business strategies (Robeiro and Love, 2003). The most important selection criterion used by contractors in selecting subcontractors remains the price (Greenwood, 2001; Hartmann *et al.*, 2009). Considering the general characteristics of subcontracting, Greenwood (2001) argues that the typical subcontractor-contractor relationship remains traditional and cost-driven, although contractors are becoming interested in having closer relationships (partnerships) with their subcontractors. Ross and Goulding (2007) support this view, that contractors are willing to develop closer relationships, but conclude that such relationships are still in the early stages of development.

Based on the literature review, it was concluded that a logical next step in supplier-contractor research would be to design tools that help companies/organisations form and develop closer relationships (see also Dainty *et al.* (2001b)). In designing such tools it is important to take into account the conditions already identified as influencing partnering success and the factors that determine the success of a partnership, such as the commitment of resources, equity of relationship, clear and mutual objectives, and trust (Akintoye and Main, 2007; Tang *et al.*, 2006).

In order to shed light on obstacles to, and opportunities for, increasing the effectiveness of construction firms in managing buyer-supplier relationships, in *Chapter 3*, a measurement tool was developed which was then used to assess the current status of buyer-supplier relationship management within the Dutch construction industry. More specifically, the focus was on assessing the maturity level of buyer-supplier relationship management by construction firms. It is concluded that the vast majority of these companies have maturity levels, in terms of buyer-supplier relationship management, which remain within the project-level classification (i.e. maturity levels no higher than 3 on a scale of 1 to 10). This finding emphasises the dominance of the more traditional, project-based way of working in construction supply chains. While there are major factors impeding, there are, at the same time, developments stimulating the effectiveness of managing buyer-supplier relationships.

The major impeding factors are the lack of formalization, documentation and communication (both internally and with suppliers) linked to the various policies, plans, processes and measurement systems that form part of the management of buyer-supplier relationships. These obstacles reinforce the natural tendency for temporary project work to result in a lack of continuous relationships between firms (see also Dubois and Gadde (2000)). On the positive side, many initiatives regarding the optimization of the supply base, the management of supplier relationships, the integration of suppliers into the operational and value creation processes and the development of suppliers have been started. Contractors have opportunities to further develop these initiatives, for example by paying specific attention to involving suppliers. These positive developments and opportunities

reinforce the improvement potential of buyer-supplier relationship management in the construction industry.

An important conclusion from this assessment is that construction companies do not maximize the use of the knowledge and of the competences of their suppliers when buying in goods and services. The results demonstrate a large potential to improve the management of buyer-supplier relationships. The quick scan purchasing maturity tool, as described in *Chapter 4*, can support construction companies in identifying concrete improvement possibilities that will enable them to capture this potential. In developing this tool, design science (Romme, 2003; Simon, 1996) was an important starting point. A typical product of design science is not a causal model but an act, a sequence of acts, a process, a system or a tool (Hevner *et al.*, 2004; Van Aken, 2004; Voordijk, 2009). In order to make a contribution to design research, the framework first presented by Hevner *et al.* (2004), and further elaborated in 2007 (Hevner, 2007), was applied to purchasing research.

In this case a construction company had the need for a quick scan tool that could assess their purchasing maturity. The tool developed is indeed able to quickly assess the purchasing maturity of a single business unit, and suggest improvements, while involving no more than approximately two to three hours of work. Another advantage of the new quick scan tool is that it suggests priorities. This prioritization shows those characteristics where the company is lagging and consequently needs to develop further. In doing so, the purchasing function matures and increases its potential to contribute to the overall company performance. Moreover, by improving the management of supplier relationships, companies can obtain a competitive advantage (Chen *et al.*, 2004; Leenders *et al.*, 2002).

The collaboration between suppliers and the prime contractor determines the achieved success of a project. Differences in the maturity level of managing these relationships by prime contractors may also affect the relation between a supplier and the contractor. In *Chapter 5*, the perspective of the supplier is considered: does a contractor's maturity level in managing supplier relationships affect the behaviour of the supplier? Although there is some logic in buyers assuming that a supplier will do its absolute best for them since they are the customer, recent research has shown that suppliers do not treat every customer the same (see, for example, Steinle and Schiele (2008) and Schiele (2010)). The differing treatments by suppliers are reflected in them having awarded, or not, preferred customer status to a contractor.

Based on the results in *Chapter 5*, it is concluded that there are many antecedents (e.g. attractiveness and satisfaction, recent relationship developments, relationship specific investments, preferential resource allocation and treatment, and innovation / improvement suggestions) to obtaining preferred status, but that not all these antecedents have to be in

place to obtain such a status. Conversely, even if all the antecedents are in place, preferred customer status is not guaranteed. The results also reveal the presence of an overlooked antecedent that enables contractors to obtain preferred customer status at their suppliers: namely, the contractor's maturity in managing buyer-supplier relationships. Moreover, if contractors are to obtain preferred customer status at their suppliers, it is important that they are perceived as mature in managing supplier relationships. This new antecedent adopts an overlooked important aspect: the supplier's perspective. A conclusion that follows is that it is beneficial for a contractor to obtain preferred customer status at a supplier since this will have a positive impact on their satisfaction with the collaboration with that supplier. Finally, if a contractor is satisfied with a collaboration, it is more likely to behave in a more mature way towards the supplier concerned, and this will result in the supplier perceiving that contractor as having a higher maturity level.

## 6.2 MANAGERIAL IMPLICATIONS

Contractors do see a need to develop closer and more collaborative relationships with their suppliers. In this research, topics have been highlighted that need to be addressed by contractors if they are to create conditions for and overcome barriers/obstacles to partnering. To create conditions for partnering, contractors should focus on aspects such as creating a learning culture, communication, cultural and contextual factors, employee attitudes, trust, institutional norms and information sharing. Barriers/obstacles that need to be overcome are the lack of top management commitment, poor understanding of partnering, an inappropriate organisational structure to cope with partnering and a lack of belief that there are mutual benefits to be gained.

Several developments that should stimulate the effectiveness of managing buyer-supplier relationships are observed. A strong recommendation is that construction companies should not only react towards suppliers when something goes wrong, but communicate proactively with suppliers in order to develop closer and trusting relationships. Construction firms and their suppliers should jointly analyse processes and integral cost in order to reduce costs linked to failures and improve the quality of the final product. A minority of construction firms do already invest in formal supplier improvement programs, do analyze processes and costs jointly with suppliers and do ask suppliers to contribute to process improvements. By involving suppliers in value creation projects, construction companies can maximize their use of the knowledge of suppliers in developing new products, processes or services. To further optimize the supply base and realize an effective and efficient management of buyer-supplier relationships, companies should develop an optimization plan to determine the correct number of, and the most suitable, suppliers (and document this) and structurally pay

attention to research on the supply market. Furthermore, based on their analyses with purchasing models of the supply base, they should develop differentiated strategies towards their suppliers and determine those suppliers with which it would make sense to establish more collaborative relationships.

The quick scan purchasing maturity tool developed in this research provides directions as to where the purchasing maturity of a company needs to improve, and so increase the purchasing function's potential to improve the overall company's performance within a short period of time. Options that were highlighted as ways to improve purchasing maturity were focused on four characteristics: decentralization, proactive actions, performance indicators and purchasing plans. The recommendation is that contractors should start by implementing a formal, structured and documented process for the development of product group strategies. Further, contractors should develop a thorough understanding of the structure of, and developments in, the national supplier market. Their measurement of their suppliers' performances should also be further developed. This information could then be used to improve supplier performance and in the development of the purchasing function. Supplier improvement programs could also be defined based on the gathered performance information.

Finally, taking the supplier's perspective into account to further improve the management of, and the collaboration with, suppliers it is recommended for contractors to obtain preferred customer status at their suppliers, since this will have a positive impact on their satisfaction with the collaboration with that supplier. In order to obtain preferred customer status, contractors should focus on being perceived as mature in managing supplier relationships. To be perceived as mature by suppliers, contractors should pay attention to the following subjects in their relationship: communication, cooperation and goals, management participation, improvement and development programs, and information sharing.

### 6.3 FUTURE RESEARCH RECOMMENDATIONS

In this research, the focus has been on obtaining insights into ways in which contractors could improve the management of, and the collaboration with, suppliers. Taking the large potential for improvements in the management of buyer-supplier relationships by construction firms as a starting point, more research is needed to determine the optimum portfolio, if such an optimum exists, of relationship types (something which was beyond the scope of the current research) between contractors and suppliers in the construction industry. The portfolio approach by Bensaou (1999) could be an interesting starting point in that it argues that the various product, market and supplier conditions require a portfolio of

relationship management approaches. Cox (2004) builds further on the principle of a portfolio of relationships by differentiating strategies for managing these relationships. If a portfolio of relationships is developed, based on the appropriate management styles, the competitive advantage of construction firms will increase (Bensaou, 1999). More specifically, further research could focus on determining under which conditions a supplier is able to provide structural added value for a contractor. Further, the link between the successful use of a portfolio of buyer-supplier relationship types and the purchasing maturity of a company could be researched more deeply. It has been claimed that a portfolio approach can make the difference between an unfocused, ineffective purchasing organization and a focused, effective one (Hadelier and Evans, 1994) and that the use of such an approach drives purchasing maturity (Gelderman and Van Weele, 2005). The adoption of a portfolio approach is addressed within the developed quick scan purchasing maturity tool of *Chapter 4*, but is an area that could be further explored.

Another question for further research is whether the quick scan purchasing maturity tool of *Chapter 4* can be generalized for the sector. To answer this, the tool has to be further developed through reflection and induction, and then tested and refined by executing additional case studies in other construction companies. Following this, an issue becomes how this tool could be applied on a large-scale basis within the construction industry.

Supplier-contractor (empirical) research in the construction industry is still relatively scarce, and more research on collaborative relationships between suppliers and contractors in the construction industry is needed. Many variables are seen to influence the relationship and collaboration between a supplier and a contractor. To fully understand the various dynamics in relationship development it is recommended that future research adopts a longitudinal approach (a good example being Woolthuis *et al.* (2005)). Further, adopting a supplier's perspective, as in *Chapter 5*, and paying structural attention to interpersonal relationships would enhance future research. Such future research should focus on testing organisational barriers to partnering, the benefits of partnering in practice, conditions under which the formation of collaborative relationships between suppliers and contractors takes place, and experiences with this formation process.





# APPENDICES

## APPENDIX A

In this appendix all articles selected in the research of Chapter 2 are presented in Table A1. The articles listed in this appendix are only included in the references if they have been used in the main text.

TABLE A1: A COMPLETE OVERVIEW OF ALL ARTICLES AND THEIR ASPECTS

Authors	Journal	Publication year	Research method	Longitudinal approach	Research perspective	Unit of analysis	Relation(s) of analysis	Research subject	Content classification
			Case study, Conceptual, Literature review, Mixed, Other, Simulation or Survey	Yes or No	Supplier, Contractor, Client, Supplier & Contractor, Client or In three ways	Inter-organisational, Interpersonal or Both	Supplier-Contractor or Contractor & Contractor-Client	Conditions for and characteristics of (un)successful collaboration	Partnering, (Sub)contracting / Procurement issues or Other
Akintoye and Main	ECAM	2007	Survey	No	Contractor	Inter-organisational	Supplier-Contractor & Contractor-Client	Key conditions for and barriers of partnering	Partnering - conditions, characteristics
Akintoye, McIntosh and Fitzgerald	JPSM	2000	Survey	No	Contractor	Inter-organisational	Supplier-Contractor & Contractor-Client	Key characteristics of partnering	Partnering - conditions, barriers/obstacles
Anvuur and Kumaraswamy	JCEM	2007	Conceptual	No	n/a	Inter-organisational	Supplier-Contractor & Contractor-Client	Operations management in the supply chain (value stream mapping)	Partnering characteristics
Arbulu, Tommelein, Walsh and Hershauer	BRI	2003	Case study	Yes	Supplier & Contractor	Inter-organisational	Supplier-Contractor	Practices of subcontracting	(Sub)contracting / Procurement issues - practices
Arditi and Chotibhongs	JCEM	2005	Survey	No	In three ways	Inter-organisational	Supplier-Contractor	Factors affecting the partnering process	Partnering characteristics
Cheng and Li	ECAM	2001	Mixed (Conceptual model tested with Survey)	No	In three ways	Inter-organisational	Supplier-Contractor & Contractor-Client	Learning culture for partnering	Partnering - conditions (learning literature)
Cheng, Li, Love and Irani	CI	2004	Conceptual	No	n/a	Inter-organisational	Supplier-Contractor & Contractor-Client	Decision support system for partnering	(Sub)contracting / Procurement issues - selection criteria (Monte Carlo approach)
Costantino, Dotoli, Flagario, Fanti and Lacobellis	JBIM	2009	Mixed (Conceptual framework tested with a Case study)	No	Contractor	Inter-organisational	Supplier-Contractor	Practices of subcontracting	(Sub)contracting / Procurement issues - Practices (Transaction Costs Economics)
Costantino, Pietroforte and Hamill	CME	2001	Survey	No	Contractor	Inter-organisational	Supplier-Contractor		

Cox and Ireland	ECAM	2002	Conceptual	No	n/a	Inter-organisational	Supplier-Contractor	Power dependency approach in supplier-contractor relations	Other - power dependency approach
Dainty, Briscoe and Millett	CME	2001	Case study	No	Supplier	Inter-organisational	Supplier-Contractor & Contractor-Client	Obstacles for alliances	Partnering - barriers/obstacles
Davidson	CI	2009	Case study	Yes	Contractor	Inter-organisational	Supplier-Contractor & Contractor-Client	Principal agency theory in the construction industry.	Other - principal agency theory (part of TCE)
Doloi	CME	2009	Mixed (Hypothetical model tested with Survey)	No	In three ways	Inter-organisational	Supplier-Contractor & Contractor-Client	Factors determining partnering success	Partnering - conditions
Dubois and Gadde	JPSM	2000	Case study	Yes	Supplier & Contractor	Inter-organisational	Supplier-Contractor	Network analysis	Other - Industrial Marketing & Purchasing approach
Eom, Yun and Paek	JCEM	2008	Mixed (Conceptual framework evaluated with a Case study)	No	Supplier & Contractor	Inter-organisational	Supplier-Contractor	Subcontractor performance	(Sub)contracting / Procurement issues - performance (balanced score card)
Fong and Lung	JCEM	2007	Mixed (Conceptual model tested with Survey)	No	In three ways	Both	Supplier-Contractor & Contractor-Client	Factors contributing to collaboration	Partnering - conditions
Gil, Tommelein, Kirkendall and Ballard	ECAM	2001	Case study	No	In three ways	Both	Supplier-Contractor	Supplier involvement in early design	(Sub)contracting / Procurement issues - performance
Greenwood	CME	2001	Survey	Yes	Supplier & Contractor	Inter-organisational	Supplier-Contractor	Subcontract procurement	(Sub)contracting / Procurement issues - characteristics
Hartmann, Ling and Tan	JCEM	2009	Other (Choice experiment)	No	Contractor	Inter-organisational	Supplier-Contractor	Subcontractor selection criteria	(Sub)contracting / Procurement issues - selection criteria
Hofman, Voordijk and Halman	BRI	2009	Case study	No	Supplier & Contractor	Inter-organisational	Supplier-Contractor	Modularity approach in supplier-contractor relations	Other - modularity approach
Holmen, Pedersen and Jansen	JBIM	2007	Case study	Yes	Supplier & Contractor	Inter-organisational	Supplier-Contractor	Supply base management	(Sub)contracting / Procurement issues - practices, characteristics
Jin and Ling	JCEM	2005	Mixed (Hypothetical model tested with Survey)	No	In three ways	Inter-organisational	Supplier-Contractor & Contractor-Client	Risk and trust in project development stage	Partnering - characteristics

Karim, Marosszeky and Davis	ECAM	2006	Mixed study (Case and Conceptual DS tool)	No	Contractor & Client	Inter-organisational	Supplier-Contractor	Decision support tool for long-term management of subcontractors	(Sub)contracting / Procurement issues - performance
Khalifan and McDermott	CI	2006	Case study	No	In three ways	Inter-organisational	Supplier-Contractor & Contractor-Client	Innovative procurement as stimulus for partnering	Partnering - conditions / (Sub)contracting / Procurement issues - Characteristics (Transaction Costs Economics)
Lai	CME	2000	Conceptual	No	n/a	Inter-organisational	Supplier-Contractor & Contractor-Client	Contractual nature of subcontracting	(Sub)contracting / Procurement issues - Practices
Laryea	CME	2009	Case study	Yes	Contractor	Inter-organisational	Supplier-Contractor	Subcontractor and supply enquiries	(Sub)contracting / Procurement issues - Practices
Lau and Rowlinson	CME	2009	Case study	No	In three ways	Both	Supplier-Contractor & Contractor-Client	Trust and partnering in inter-firm context	Partnering - conditions / (Sub)contracting / Procurement issues - Criteria (Transaction Costs Economics)
Lee, Seo, Park, Ryu and Kwon	JCEM	2009	Conceptual	No	n/a	Inter-organisational	Supplier-Contractor	Transaction costs based selection of supplier-contractor relationship	(Sub)contracting / Procurement issues - Practices
Li, Cheng and Love	ECAM	2000	Literature review	No	n/a	Inter-organisational	Supplier-Contractor & Contractor-Client	Literature overview on partnering	Partnering characteristics / Procurement issues - Characteristics (behavioural theory)
Liu and Fellows	ECAM	2001	Conceptual	No	n/a	Inter-organisational	Supplier-Contractor & Contractor-Client	Eastern perspective on partnering	(Sub)contracting / Procurement issues - performance
Loh and Ofori	ECAM	2000	Survey	No	Contractor	Inter-organisational	Supplier-Contractor	Performance of subcontractors	Partnering characteristics / Procurement issues - performance
Love, Irani, Cheng and Li	ECAM	2002	Mixed (Conceptual model demonstrated with Case study)	No	n/a	Inter-organisational	Supplier-Contractor & Contractor-Client	Partnering in the supply chain	Partnering characteristics (learning literature)
Mason	CME	2007	Mixed (Hypothesis tested with Survey and Case study)	No	Supplier	Inter-organisational	Supplier-Contractor	View of specialist subcontractors on partnering	Partnering - conditions, characteristics

Mbachu	CME	2008	Mixed (Survey used to develop a Conceptual framework and demonstrated with a Case study)	No	Supplier & Contractor	Inter-organisational	Supplier-Contractor	Assessment of subcontractors	(Sub)contracting / Procurement issues - selection criteria, performance
Ng and Tang	CME	2008	Survey	No	Supplier & Contractor	Inter-organisational	Supplier-Contractor	Criteria for subcontractor appraisal	(Sub)contracting / Procurement issues - performance
Nicholas Edwards and	CME	2003	Mixed (1 Survey used for conceptual model 1, 2 Conceptual model 2 applied in Case study and combining 1 and 2 for a Conceptual model)	No	Supplier	Inter-organisational	Supplier-Contractor	Utility value for materials' suppliers (utility modelling)	(Sub)contracting / Procurement issues - performance
Nicolini, Holti and Smalley	CME	2001	Mixed (Conceptual framework applied in 2 Case studies)	No	Supplier & Contractor	Inter-organisational	Supplier-Contractor	Organisational approach of work clustering supply chain integration	Other - work clusters
Phua	CME	2006	Mixed (Hypotheses tested with Survey)	No	Supplier & Contractor	Inter-organisational	Supplier-Contractor	Role of institutional norms: conditions for partnering	Partnering - conditions
Phua and Rowlinson	ECAM	2004	Mixed (Case study results tested with Survey)	No	Contractor	Inter-organisational	Supplier-Contractor & Contractor-Client	Grounded empirical approach to determine construction project success	Other - grounded approach
Proverbs and Holt	JPSM	2000	Mixed (Case study used to develop Conceptual model)	No	Contractor	Inter-organisational	Supplier-Contractor	Minimising construction labour costs	Other - labour cost minimisation
Reeves	BRI	2002	Other (Descriptive sector paper)	No	n/a	Inter-organisational	Supplier-Contractor & Contractor-Client	Contracting system of the Japanese construction industry	(Sub)contracting / Procurement issues - practices, characteristics

Robeiro and Love	CI	2003	Case study	No	Supplier & Contractor	Inter-organisational	Supplier-Contractor & Contractor-Client	E-business in the construction supply chain	(Sub)contracting / Procurement issues - practices
Ross and Goulding	CI	2007	Survey	No	Contractor	Inter-organisational	Supplier-Contractor & Contractor-Client	Transactional barriers in tendering procedures	(Sub)contracting / Procurement issues - practices, characteristics (Transaction Economics)
Shields and West	CME	2003	Case study	Yes	In three ways	Inter-organisational	Supplier-Contractor & Contractor-Client	Ethnographic approach on quasi-fixed networks	Partnering - conditions
Tang, Duffield and Young	JCEM	2006	Mixed (Conceptual model - tested with Survey)	No	In three ways	Inter-organisational	Supplier-Contractor & Contractor-Client	Critical success factors for partnering	Partnering - conditions, characteristics
Titus and Bröchner	CI	2005	Conceptual	No	n/a	Inter-organisational	Supplier-Contractor & Contractor-Client	Information management and partnering in supply chains	Partnering - conditions (Information management)
Voordijk, de Haan and Joosten	JPSM	2000	Case study	No	Supplier & Contractor	Inter-organisational	Supplier-Contractor & Contractor-Client	Changing governance in building supply chains	(Sub)contracting / Procurement issues - practices, performance, characteristics (Transaction Economics)
Vrijhoef and Koskela	JPSM	2000	Case study	No	Supplier & Contractor	Inter-organisational	Supplier-Contractor	Materials flow in construction supply chain	(Sub)contracting / Procurement issues - practices, performance, characteristics
Welling and Kamann	JSCM	2001	Mixed (Conceptual theory supported with Case study)	No	Supplier & Contractor	Both	Supplier-Contractor	Vertical collaboration (focus on individuals)	(Sub)contracting / Procurement issues - practices (game theory)
Wood and Ellis	CME	2005	Case study	No	Contractor	Inter-organisational	Supplier-Contractor & Contractor-Client	Main contractor experiences with partnering	Partnering - conditions

# APPENDIX B

In this appendix the maturity levels in terms of the five constructs of Chapter 3 are presented in four tables.

**TABLE B1: MATURITY LEVELS ON A PROJECT LEVEL**

		<b>Maturity level</b>		
		<b>1</b>	<b>2</b>	<b>3</b>
<i>Project levels</i>	<b>Construct</b>			
	Optimize supply base	Supplier selection is based on price and availability. There are no initiatives to optimize the current supplier base, supplier assessment based on qualitative perception of performance and basic evaluation of costs and risks. Basic differentiation is made between key and non-key suppliers.	As 1, plus ad hoc (work) instructions are applied for supplier selection. To a limited extent there are initiatives for optimisation of the supplier base. No or little evidence of a policy for differentiation in strategic and non-strategic suppliers. Ad hoc supplier market research takes place with the objective to learn more about potential suppliers.	As 2, plus basic supplier rating system in place. at least quality and delivery performance of key suppliers are measured. There is a multidisciplinary involvement within a project. Little evidence of formal communication towards key stakeholders.
	Manage supplier relationships	In the purchasing policy a formal definition identifies for which categories of suppliers to establish strategic supplier partnerships. Formal process in place to identify the criteria and objectives for relationships within a project, in line with the project purchasing plan. Documented and structured process in place to identify, assess and select potential partners against relationship criteria on a project level.	As 1, plus little evidence of formal communication framework and common project exceeding goal setting.	As 2, but a documented and structured process is present to identify, assess and select potential (strategic) suppliers on corporate level, based on defined criteria.
	Integrate suppliers into the operational process	No evidence of supplier integration into the operational process. No requirement planning and scheduling process, this mainly happens ad hoc and / or based on gut feeling.	As 1, but there is little evidence for integration of suppliers into the operational process. There is a limited requirements planning and scheduling process on a project level.	As 2, plus there is evidence of targets for reduction of lead times and throughput times as part of the purchasing improvement plan (only internally discussed). There is evidence of internal optimization of the requirement planning and scheduling process on a project level.
	Integrate suppliers into the value creation process	No or little evidence of a value creation process (VCP) policy/procedure available, including a description of the role of purchasing and determining tasks and responsibilities at every milestone for purchasing and suppliers. No or little evidence of supplier integration in the VCP.	As 1, but there is a VCP policy/procedure and formal (make/buy) decision making process is in place to identify project needs of external technologies and capabilities. Evidence of purchasing involvement in the VCP from early start (in pre-concept phase).	As 2, plus the selection of suppliers is based on clear understanding of (development & process) capabilities against those needs identified in level 2. Further (process) assessments if necessary.
	Develop suppliers	No evidence of a supplier improvement program. Ad hoc supplier improvement actions, without structured follow-up. Important suppliers are on the process side, before contracting, marginal examined on legally necessary aspects (this is not documented).	As 1, plus limited evidence of a formal system in place for basic measurement of supplier performance. A simple checklist is present for basic measurement of supplier performance. Little evidence of communication of these results (towards suppliers) with appropriate analysis and corrective action planning (towards internal organization). Important suppliers are on the process side marginal reviewed before contracting, on legally necessary and relevant aspects.	As 2, plus ad hoc response to supplier problems (e.g. poor quality or late delivery) communicated towards suppliers: reactive supplier development. Measurement is aligned with the internal organization and there is a further development of the supplier improvement program. All suppliers are on the process side marginal reviewed before contracting, on legally necessary aspects.



TABLE B2: MATURITY LEVELS ON A REGIONAL LEVEL

Regional levels		Maturity level	
Construct	4	5	6
Optimize supply base	Formal and documented supplier selection process in place, focused on current needs and capabilities of the company, with a supplier rating system extended with a basic supplier categorization system which supports a supply base optimization plan.	As 4, but supplier base is extensively analyzed based on turnover and risk. Documented evidence of analysis based on purchasing models. There is little evidence of differentiated actions in line with these analyses.	As 5, but there is clear evidence of differentiated supply base management on the basis of purchasing models. Documented evidence of differentiated strategy/actions towards suppliers. Also, an advanced supplier rating system is in place: covering on-going production and value creation process, criteria are weighted (aligned with business objectives), multidisciplinary involvement within the company, objective measurements. Communication about the results are used internal concerning the assessment of repetitive use of the suppliers. There is the possibility to spend time and resources on structural supplier market research.
Manage supplier relationships	As 3, plus a formal process is in place to identify the criteria and objectives for each relationship, in line with the project exceeding purchasing plan and the business objectives. And, if relevant, for the most strategic supplier there are partnerships agreements available, including documented evidence that they work on a partnership program (improving supplier relations). Supplier relationships are sometimes discussed as a separated agenda point in meetings of the management team. Multiple-level communication in all functions is established, including a formal communication framework.	As 4, plus senior management is involved at both companies to lead and manage the relationship.	As 5, at which (if applicable) the strategic supplier relation is integrated in the value creation process. Shared improvement programs (with supplier) are started.
Integrate suppliers into the operational process	As 3, plus there is a formal internal communication structure and internal multidisciplinary teams are organized to align market demand, production capacity and supply. Suppliers are involved in the process to optimize operational purchasing.	As 4, plus there is evidence of an active process resulting in less process steps, less invoices and lower inventory levels. There is an internal optimization of the requirement planning and scheduling process on a regional level.	As 5, plus there is evidence of cross-organizational teams (client, contractor and supplier) to reduce inventories, lead times, and throughput times and to optimize the internal administrative process. Evidence of an action plan, implementation of actions and review of targets.
Integrate suppliers into the value creation process	As 3, plus formal decision making process to determine moment of supplier involvement, based on degree of development responsibility and development risk. Some evidence of target setting and contracting (at least non-disclosure and intellectual property agreement).	As 4, plus project objectives are clearly set (including timing, quality and costs), and translated into purchasing and supplier objectives. Development contracts available in which supplier objectives are defined.	As 5, plus regular meetings are scheduled. Cross-functional multiple-level communication established to address project objectives (more than product functionalities).
Develop suppliers	As 3, plus formal complaint procedure in place in order to communicate efficiently internal complaints towards suppliers. The general supplier performance is communicated towards suppliers. Evidence of follow-up of suppliers' corrective actions based on these complaints and the supplier rating results. All suppliers are on the process side marginal reviewed before contracting, on legally necessary and relevant aspects.	As 4, plus supplier visits and/or days are organized for supplier recognition/evaluation and to communicate structurally business strategy and purchasing objectives. The strategic suppliers are reviewed at the process side before contracting on relevant aspects. Several formal supplier audits have taken place.	As 5, plus there is evidence of process studies and audits at all strategic suppliers in order to fully understand all suppliers' current and future capabilities. This information is documented, regularly updated and effectively communicated towards key stakeholder and is internally accessible for all personnel.

**TABLE B3: MATURITY LEVELS ON A BUSINESS UNIT LEVEL**

<i>Business unit levels</i>	<b>Maturity level</b>	
<b>Construct</b>	<b>7</b>	<b>8</b>
Optimize supply base	As 6, plus evidence of improving results and achieved targets. Information is communicated towards suppliers, and discussed in regular meetings/improvement programs. Following information is available for all key suppliers and communicated towards stakeholders based on current requirements and skills: current status of the supply base, supplier performance and improvement actions.	As 7, plus there is a formal documented supplier selection process based on future needs. Also, regular assessments take place for all strategic suppliers in order to clearly understand and communicate current and future capabilities of suppliers (in relation to current and future needs of the business).
Manage supplier relationships	As 6, plus shared project exceeding objectives are formalised with suppliers. There is a joint objective setting and joint planning process in place. Little evidence of alignment of future strategies and objectives.	As 7, plus value chain cost and processes are jointly analyzed. Open book policy to share cost calculations and cost breakdowns for the whole value chain and exceeding multiple projects.
Integrate suppliers into the operational process	As 6, plus there is an automated integrated scheduling and order processing system (production planning system) in place to optimize internal information exchange. There is evidence of a documented evaluation process. There is an internal optimization of the requirement planning and scheduling process on a corporate level.	As 7, plus there is a comprehensive alignment and integration over the full supply chain with both multiple tier suppliers and clients for planning, inventory reduction, invoicing, etc. and there is evidence that key first tier suppliers are involved in the requirement planning and scheduling process. Automated forecasts are shared with those suppliers.
Integrate suppliers into the value creation process	As 6, plus supplier performance is measured and reviewed against expectations. Corrective actions are planned and implemented if necessary. There is a formal advanced supplier rating system for supplier performance in VCP. There is evidence of improving results and achieved targets.	As 7, plus an open book policy of sharing appropriate technology roadmaps, costs and customer information is practiced. Evidence of key supplier involvement in (pre-concept) stages of development.
Develop suppliers	As 6, plus process control systems have been agreed with all appropriate strategic suppliers. There is statistical evidence of stability & capability from those suppliers or there is evidence that corrective actions are planned. The complaint procedure is evaluated.	As 7, plus there is evidence of pro-active supplier development concentrating efforts to the most important commodities/product groups and suppliers. On site supplier assessments have been organized.

**TABLE B4: MATURITY LEVELS ON A CORPORATE LEVEL**

<i>Corporate levels</i>	<b>Maturity level</b>	
<b>Construct</b>	<b>9</b>	<b>10</b>
Optimize supply base	As 8, plus time and resources are available for fundamental market research, based on full understanding of business requirements on the supplier base. Documented evidence of market research planning and execution.	Differentiated commodity/product group strategies in place in order to optimize the supplier base and to maximize performance with the correct number and correct suppliers.
Manage supplier relationships	As 8, plus clear evidence of a joint ambitious and continuous improvement agenda (with the supplier), based on benchmarks. Continuous assessment of the partnership against objectives. Evidence of achieved targets and improving results.	As 9, plus there is a formal alignment of mutual future plans on technologies, objectives and strategies. Complete openness to share future product and technology information.
Integrate suppliers into the operational process	As 8, plus there is evidence that supply chain capabilities are maximized through optimal design of systems and procedures and the use of among other things e-tools and other innovative systems.	As 9, plus information systems allow information sharing across the full supply chain with multiple tier suppliers and clients. Cross-organizational supply chain benchmarking resulting in permanent improvement programs.
Integrate suppliers into the value creation process	As 8, plus internally/externally linked information systems facilitate information exchange in order to reduce throughput time and development costs. There is a formal evaluation process in place to evaluate development projects with the supplier and to determine future improvement programs.	As 9, plus preferred supplier lists are available per product group, supported by worldwide searches, continuous industry monitoring, and joint technology roadmap discussions.
Develop suppliers	As 8, plus advanced quality measurement systems are in place: cost of non quality is measured and targets are set and communicated towards suppliers and key stakeholders. Evidence of a zero defect/error program for critical deliveries. Evidence of improving results and achieved targets.	As 9, plus supplier assessment and joint/mutual trainings are organized to learn in two directions and to establish common improvement programs (with targets and follow-up). Trained and dedicated personnel are accessible for supplier quality and development.

## APPENDIX C

In this appendix the topics related to purchasing management that are covered in the existing comprehensive industry auditing tool of Chapter 4 are summarized.

*In- and out- sourcing* – Insourcing means that a company invests in all the resources necessary to carry out a certain activity (e.g. assets, infrastructure, people and competencies). Outsourcing means that a company renounces these resources, letting all activities be carried out by a supplier, so as to focus more effectively on developing its own core competencies.

*Product (commodity) group strategies* – A product group strategy is a systematic plan or approach, for each product group of a company, aimed at realizing predefined short-term and long-term (more than one year) objectives. The strategy combines various elements into an executable plan with timelines, accountabilities and measurable performance expectations.

*Optimize supply base* – Optimization of the supply base is a process to determine the correct number and most suitable suppliers for a company. It is important to focus on the policy of the company regarding the supply base. For instance, a company can have a policy to use only regional suppliers, or can demand certain certifications from suppliers.

*Manage supplier relationships* – It is necessary to classify suppliers into various categories (e.g. supplier, preferred supplier, co-maker or partner) in order to focus attention on the most important suppliers, to set the correct priorities and to manage all suppliers according to their importance to the business.

*Integrate suppliers into the operational process* – Integrating suppliers into the operational process involves strategies and activities directed at simplification, standardization and synchronisation with the operational processes of the company.

*Integrate suppliers into the value creation process* – The knowledge of suppliers is used to develop new products, process or services that are aimed at maximizing the performance of one's own company (in terms of costs, time, quality etc.). If suppliers are repetitively integrated in various of these development projects, learning effects occur which smooth the value creation process.

*Develop suppliers* – In essence, supplier development focuses on identifying possibilities for ongoing performance improvements. In particular, attention is paid to facilitating performance improvements at suppliers.

*Strategic costs management* – Strategic cost management considers activities at the buyer and the supplier in identifying and prioritizing costs and in suggesting improvement strategies. These strategies have an impact on the costs and the cost drivers - the goal is to achieve cost reductions throughout the supply chain.

*Purchasing policy and plans* – The purchasing policy (or purchasing strategy) is a translation of the corporate strategy for the purchasing function. The purchasing strategy is translated into purchasing plans. These plans include tasks, responsibilities and budgets.

*Aligning the purchasing organization* – This topic deals with the alignment of the purchasing organization and structure with the policies, objectives and structure of a company in order to optimize the operational, tactical and strategic purchasing processes.

*Utilizing market possibilities* – This topic deals with the utilization of supply market possibilities such that the organization of purchasing activities on local, regional, national and international levels can be optimized.

*Performance indicators* – Performance indicators are important for measuring the actual results and comparing these with the targets set. Performance indicators can be related to both the internal purchasing organization and to supplier performance. Adequate measurements provide the opportunity to take corrective actions or adjust objectives.

*Information technology* – Developing and implementing electronic information systems are important activities for controlling the value chain. Fully integrated systems are the basis for improvement (both internally and for external collaboration) and in developing products and processes.

*Human resource management* – This topic deals with the identification of the necessary competencies for realizing and implementing the purchasing goals and targets. Aspects covered include rewarding, training, recruitment and selection, integrity principles and retaining knowledge (i.e. succession planning).

## APPENDIX D

In this appendix, the definitions of the twenty characteristics of the new quick scan purchasing maturity tool of Chapter 4 are presented.

*Operational purchasing* – Within the company, the main focus is on the timely availability of the correct materials and products for the primary process. As such, the purchasing function performs a clerical and administrative role and there is no clear policy on purchasing. Based on this, the main indicator of the performance of the purchasing function is the undisturbed progress of the company processes. For that reason, price and availability are the main factors in the selection of suppliers.

*Tactical purchasing* – The purchasing function is becoming an important part of the company, resulting in a situation where it is used as a knowledge centre for information about suppliers and the supplier market. Due to this, on a project level, multidisciplinary involvement comes into existence. Purchasing models/tools, such as the Pareto analyses and portfolio analysis, are used to optimize the supplier base and for the development of product group objectives. The purchasing function begins to have a strategic role, which results in a general purchasing strategy.

*Strategic purchasing* – Within the company, the purchasing function plays an essential role in the decision-making process. One of the reasons for this is that most of the purchases by the company are based on the total cost of ownership principle. Alongside this, there is also a differentiated strategy in place for every product group in order to optimize the supplier base and to maximize the performance of the right amount/type suppliers. The strategy is evaluated continuously and the strategy development process is frequently improved.

*Decentralization* – There is little or no coordination and/or cooperation between the different functions and projects within the company. Due to this, purchasing plans are established by the purchaser exclusively for each specific project. Nevertheless, there is an autonomous purchasing department in place, albeit one that does not participate in the management team.

*Coordination* – Major strategic product groups are coordinated on a central level and are centrally negotiated and purchased through central contracts. Coordination and cooperation also exist between the different projects and functions within the company. This results in internal optimization of the requirements' planning and scheduling process on a project level. In realizing this, it is important that the purchasing plan is well communicated to key internal stakeholders.

*Centralization* – The structure of the purchasing function is ‘centre-led’, i.e. the purchasing policy and the organization of the purchasing processes are determined centrally. Here, the corporate purchasing policy is used as a guide for the individual product group plans, and this will result in a purchasing plan. To support the product group managers, a steering group is in place which leads the teams and coordinates the decision-making between the teams. In order to make effective use of the knowledge of suppliers, there are development initiatives for selected/qualified suppliers such that they can become (strategic) corporate suppliers.

*Internal collaboration* – Cross-functional purchasing teams are in place on a company-wide or divisional level, and this is combined with a formal consultation structure on purchasing. As examples of the benefits, this can result in cost reduction opportunities or can contribute to the harmonization of suppliers. The purchasing plan is well implemented within the organization since it is deployed through intensive discussions and approval in multidisciplinary teams. To assure the effective use of multidisciplinary teams, there is a reward and recognition plan that is to an extent related to team performance.

*External collaboration* – Cross-organizational teams (buyer and supplier) are established to realize continuous improvement of the operational process. In this way, the supplier contributes to value creation and to the competitive position of the company. Further, there are strategy meetings between the management and the supplier to align processes and to stimulate the development of new products/processes. All these actions result in an open-book policy with the supplier that involves sharing cost calculations and cost breakdowns for the entire value chain and which goes beyond the project level.

*Multidisciplinary* – As an addition to internal and external collaboration, this characteristic is focused on spreading the purchasing function throughout the organization. This will lead to a multidisciplinary performance appraisal and decision-making process.

*Segmentation* – Purchasing models are used to distinguish commodity/product groups and to identify strategic suppliers. Cost models are used to select suppliers and to improve cost structures. Based on the information available, multidisciplinary teams are used to develop product group strategies and goals for strategic purchases within the company.

*Supplier base optimization* – The number of suppliers is reduced substantially to realize an efficient purchasing function through the use of optimal supplier selection processes. To assure a transparent optimization of the supplier base, information is communicated to suppliers and multidisciplinary teams are involved in these processes.

*Reactive actions* – An ad hoc approach, which results from a reactive mentality of the key internal stakeholders, exists within the company. Crisis-related decision and implementation

processes for in- and out- sourcing, and basing the integration of suppliers in the operational process on gut feelings are good examples of the consequences of this approach.

*Proactive actions* – Formal, structured and documented processes exist within the organization, and the employees share a commercial mentality. Further, measurement data are available which, in combination with knowledge on internal and external requirements, make it possible to take adequate actions towards suppliers.

*Formalization* – Processes are standardized and formalized throughout the organization in order to realize a professional purchasing function. Among other things, this can lead to formal complaint procedures, formal policies, formal decision processes and a formal documented supplier-selection process.

*Integrated IS/IT* – Extensive use of integrated IS/IT systems is made, providing the overall purchasing organization with all the necessary data that originate in both internal and external sources. Further, the IS/IT systems are linked across the full supply chain, involving multiple-tier suppliers and customers, in order to facilitate information exchange and so reduce throughput time and development costs.

*Performance indicators* – An advanced integrated set of performance indicators is in place on the corporate level to measure, for example, supplier performance. Periodically, these results are compared with purchasing targets in order to develop the purchasing function and as input for future purchases.

*Developed purchasing workforce* – Trained and dedicated employees are available for the purchasing function and are selected for the competencies and technical knowledge that are necessary for a professional organization. Personal development plans are in place, including individual training and career planning, to realize continuous development of the workforce. It is also necessary for the purchasing professionals to have a broad management orientation, which is assured through active career planning across functional disciplines.

*Purchasing plans* – Within the purchasing department, officials are appointed to formulate purchasing objectives and there is some specialization of the workforce based on product segmentation. This results in clear purchasing objectives for projects and for the different product groups. These are laid down in purchasing plans which include detailed project purchasing budgets for the financial year.

*Integrated strategy* – Here, the purchasing organization is fully aligned with the company's policy, objectives and structure. Within the company, this results in an integrated purchasing and company strategy which is laid down in formal reports available throughout the organization.



*Gain and risk sharing* – Together with suppliers, there is a formal alignment of mutual future plans in the fields of technology, objectives and strategies. Further, information on future products, technology roadmaps, costs and customers is shared openly. To stimulate this, there is a formal organized incentive programme to solicit cost reduction ideas from suppliers (e.g. profit and gain sharing contracts, supplier suggestion programmes, idea rewarding).

APPENDIX E

In this appendix, the obtained maturity level of each contractor of Chapter 5, in terms of the ‘Manage supplier relationships’ construct of Bemelmans *et al.* (2011), is presented.

*Preferred Customer 1*

The maturity level obtained for Preferred Customer 1 in terms of the ‘Manage supplier relationships’ construct was 3 (see Table E1, white cell: criterion not met; black cell: criterion met; hatched cell: no criterion for this level). To reach level 3 requires the purchasing policy of a contractor to include a formal definition in which it is stated for which categories of suppliers that strategic supplier partnerships should be established. Further, there needs to be a formal process in place to identify the criteria and objectives for relationships within a project, and that these should align with the project purchasing plan. Next, there needs to be a documented and structured process in place to identify, assess and select potential strategic partners based on defined criteria on both project and corporate levels. Furthermore, there has to be some evidence of a formal communication framework (sales - purchasing) and shared project-exceeding goals (Bemelmans *et al.*, 2011). One of the reasons why Preferred Customer 1 did not obtain level 5 was that it lacked a formal process to identify criteria and objectives for each relationship that aligned with its project-exceeding purchasing plans and business objectives. Further, it lacked partnership agreements with its strategic suppliers, and had not established a partnership program. However, it was currently in a development process that would move on from having preferred suppliers (and contracts) to official partnerships.

TABLE E1: RESULT MATRIX 'MANAGE SUPPLIER RELATIONSHIPS' OF PREFERRED CUSTOMER 1

<i>Manage supplier relationships</i>	Maturity level									
Aspects	1	2	3	4	5	6	7	8	9	10
Purchasing policy	Black	Hatched	Hatched	Hatched	Hatched	Hatched	Hatched	Hatched	Hatched	Hatched
Assessment process	Hatched	Hatched	Hatched	White	Hatched	Hatched	Hatched	Hatched	Hatched	Hatched
Documentation	Hatched	Hatched	Black	Hatched	Hatched	Hatched	Hatched	Hatched	Hatched	Hatched
Cooperation with supplier	Hatched	Black	Black	White	Black	White	White	White	White	White
Improvement programs	Hatched	Hatched	Hatched	Hatched	Hatched	Black	Hatched	Hatched	Hatched	Hatched
Communication	Hatched	Black	Hatched	Black	Hatched	Hatched	Hatched	Hatched	Hatched	White

*Regular Customer 1*

The maturity level obtained for Regular Customer 1 in terms of the ‘Manage supplier relationships’ construct was 2 (see Table E2). This lower level, compared with Preferred Customer 1, was because this contractor did not have a documented and structured process in place to identify, assess and select potential strategic suppliers on the corporate level, but only on the project level.

**TABLE E2: RESULT MATRIX 'MANAGE SUPPLIER RELATIONSHIPS' OF REGULAR CUSTOMER 1**

<i>Manage supplier relationships</i>	<b>Maturity level</b>									
<b>Aspects</b>	<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>	<b>6</b>	<b>7</b>	<b>8</b>	<b>9</b>	<b>10</b>
Purchasing policy	█	█	█	█	█	█	█	█	█	█
Assessment process	█	█	█	█	█	█	█	█	█	█
Documentation	█	█	█	█	█	█	█	█	█	█
Cooperation with supplier	█	█	█	█	█	█	█	█	█	█
Improvement programs	█	█	█	█	█	█	█	█	█	█
Communication	█	█	█	█	█	█	█	█	█	█

*Preferred Customer 2*

The maturity level obtained for Preferred Customer 2 in terms of the ‘Manage supplier relationships’ construct was 0 (see Table E3). Preferred Customer 2 was so evaluated because it failed to meet one level 1 criterion: it lacked a formal definition in its purchasing policy to identify categories of suppliers with which to establish strategic supplier partnerships (but in practice it did know this). Preferred Customer 2 is updating its policies (and will explicitly cover this aspect) and processes to move on from preferred suppliers to establishing real partnerships. With such a definition added to its purchasing policy, it would immediately earn a maturity level of 3. This is based on the fact that it already achieves this level in terms of all the other aspects. It does have a formal process in place to identify the criteria and objectives for relationships within a project in line with the project purchasing plan. There is already a documented and structured process in place to identify, assess and select potential strategic partners based on defined criteria on both project and corporate levels. Furthermore, there is some evidence of a formal communication framework (sales - purchasing) and shared project-exceeding goals. It is even possible that, in the near future, Preferred Customer 2 could evolve to maturity level 5. To achieve this it needs to update its current purchasing processes so that it can identify criteria and objectives for each relationship, in line with its project-exceeding purchasing plans and company objectives. It will also have to develop official partnership agreements with suppliers and start a partnership program. These two requirements fit nicely with its current developments.

However, it will be more challenging to establish a formal multilevel multi-functional communication framework since purchasing is organized centrally but the more technical functions are very decentralized. Despite the implications of a 'formal' maturity level of 0, Preferred Customer 2 is actually managing its supplier relationships rather professionally and, given its current developments, these will become even more mature in the near future.

**TABLE E3: RESULT MATRIX 'MANAGE SUPPLIER RELATIONSHIPS' OF PREFERRED CUSTOMER 2**

<i>Manage supplier relationships</i>	<b>Maturity level</b>									
<b>Aspects</b>	<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>	<b>6</b>	<b>7</b>	<b>8</b>	<b>9</b>	<b>10</b>
Purchasing policy										
Assessment process										
Documentation										
Cooperation with supplier										
Improvement programs										
Communication										

*Regular Customer 2*

The maturity level obtained for Regular Customer 2 in terms of the 'Manage supplier relationships' construct was 0 (see Table E4). Just as with Preferred Customer 2, Regular Customer 2 has no formal definition incorporated in its purchasing policy that identifies those categories of suppliers for which strategic supplier relationships should be established. In contrast with Preferred Customer 2, Regular Customer 2 has no plans to update its policy in the near future. Also, Regular Customer 2 only has a documented and structured process to identify, assess and select potential strategic suppliers on the project level, and not on the corporate level.

**TABLE E4: RESULT MATRIX 'MANAGE SUPPLIER RELATIONSHIPS' OF REGULAR CUSTOMER 2**

<i>Manage supplier relationships</i>	<b>Maturity level</b>									
<b>Aspects</b>	<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>	<b>6</b>	<b>7</b>	<b>8</b>	<b>9</b>	<b>10</b>
Purchasing policy										
Assessment process										
Documentation										
Cooperation with supplier										
Improvement programs										
Communication										

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The aim of this PhD research is to gain insight into ways in which contractors could improve the management of, and the collaboration with, suppliers in order to increase their competitiveness. To achieve this aim, four research phases are conducted. Firstly, the current status of supplier-contractor research in the construction industry is explored. Secondly, the current status of buyer-supplier relationship management within the Dutch construction industry is assessed in order to shed light on obstacles to, and opportunities for, increasing the effectiveness of construction firms in managing buyer-supplier relationships. Thirdly, a quick scan purchasing maturity tool is developed and tested through applying a design science research method. Finally, the suppliers' perspective is considered in order to gain further insight into ways in which contractors could improve the management of, and the collaboration with, suppliers.

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