

A supply-driven approach applied to the Contractor's organisation

"a view on supply chain management for medium-sized contractor companies in large scale road construction projects"



Section Design and Construction Processes



Master of Science
graduation thesis

Status:
FINAL

Student:
Martijn Verster

1040006

July 2009

General information

Title

A supply-driven approach applied to the Contractor's organisation

Subtitle: "a view on supply chain management for medium-sized contractor companies"

Personal information student

Martijn Verster

Cornelis Trooststraat 31-III

1072JA Amsterdam

T: +31 6 41361652

@: m.p.verster@student.tudelft.nl

Student no.: 1040006

General information company

Ooms Construction BV

part of Ooms Avenhorn Group

Scharwoude 9

1634 EA Scharwoude

T: 0229-547700

Graduation committee

Head of the committee

Prof. dr. ir. H.A.J. de Ridder (Hennes)

Delft University of Technology; Civil Engineering

Section Design and Construction Processes

T: 015-2784774

@: H.A.J.deRidder@tudelft.nl

Member of committee

Ir. R. Vrijhoef (Ruben)

Daily tutor TU Delft

Delft University of Technology; Civil Engineering

Section Design and Construction Processes

T: 015-2781642

@: R.Vrijhoef@tudelft.nl

Member of committee

Ir. M.W. Ludema (Marcel)

Delft University of Technology; Technology, Policy and Management

Section Transport Policy and Logistics' Organisation

T: 015-2781885

@: M.W.Ludema@tudelft.nl

Member of committee

Ir. I. Oost (Ide)

Daily tutor Ooms Construction

Ooms Avenhorn Holding BV; division Ooms Construction BV

T: 0229-547707

@: IOost@ooms.nl

Preface

As a student in the department Design and Construction Processes, I have always been interested in the processes that result in the execution of projects. Nowadays there is a lot of dissatisfaction about the performance of construction industry. Luckily this environment is changing. In my opinion a large improvement can be reached by changing the processes in construction industry. This change has always interested me and it motivated me to graduate at the department of Design and Construction Processes within Civil Engineering.

In new contracting forms the contractor company is taking in an increasing part of the total construction process tasks. This complies with a government that is willing to contract out total projects at once. Together with that the contractor is given more and more freedom in developing a solution themselves. Consequently the contractor is challenged to meet and exceed the expectations of the client. If the contractor wants to be prepared for these new developments, the company has to change its business processes to be capable to accept these new responsibilities. This is in my opinion the biggest challenge of the contractor nowadays. Therefore I think it is very interested to do a research in this dynamic business environment of the contractor.

This research is done at Ooms Construction which is part of Ooms Avenhorn group. Historically Ooms Avenhorn has always had a strong focus on research and development. This has resulted in several patented products mainly in road construction. This product development is considered very important within Ooms Avenhorn because it is securing market share for the company. Ooms is therefore eager to apply their innovative products in practice and thereby present themselves as a proactive player in the construction industry. The more supply-driven approach as is proposed above therefore seems very appealing to Ooms and this is in my opinion why our motivations matched. This match resulted in the decision of collaborating; this Master of Science graduation thesis is the result of this collaboration.

I would like to thank my supervisors at Delft University of Technology, being Prof. dr. ir. Hennes de Ridder, Ir. Ruben Vrijhoef and Ir. Marcel Ludema for their feedback and critical advice during the sessions and meetings at the university. Many thanks to all the people and especially Ir. Ide Oost at Ooms Construction for giving me the opportunity to gain insight in the road construction world. Furthermore I would like to thank my family and friends for the everlasting support. And last but not least I thank my girlfriend, Jessica, for pulling me through the hard times, for providing me with the best advice, when I got stuck in the subject, and for all the love and care during the eight months of graduation.

Martijn Verster July 2009

Summary

Introduction

Construction industry has been heavily criticised regarding budget and time overruns, lack of innovation, lack of quality, lack of end-user focus, lack of standardisation, lack of supply chain integration, fragmentation of the industry, adversarial behaviour and fraud. The industry's organisation doesn't seem to be able to cope with increasing complexity, changing requirements, changing wishes and customer satisfaction of the present market. The search for improved performance has resulted in a variety of new contract forms, i.e. design-build, design-build + finance, maintenance or operation, and public-private partnerships. These changes however still do not yield satisfactory improvement of project performance.

Contractors are forced to compete mainly on price and the consequential severe price fighting results in structural low profit margins. Contractors however are willing and able to gain competitive advantage through quality against premium price. A supply-driven approach should give the contractors the opportunity to do so.

Research objective

As the traditional demand-driven construction industry is changing, trends in the market point in the direction of an alternative approach, i.e. a supply-driven market. In a supply-driven industry, the responsive pull market changes to a proactive push market. This transformation asks for a change in the business structure of contractor companies such as Ooms Construction. The aim of this research is to give a view on the desired business organisation for contractors in a supply-driven construction industry. Besides that the client, via the way in which procurement takes place, plays a critical role in the transformation. Therefore an additional research objective is to provide the client with a demand specification fit for the supply-driven strategy for contractors.

The research focus is on the characteristic position Ooms Construction as well as a multiple other contractor companies are in: A medium-sized contractor company with the ambition to be a competitive player in large scale road infrastructure projects.

Characteristics construction industry and Ooms Construction's situation

The problems encountered in construction are related to peculiarities of the construction industry. The most important peculiarities as described in scientific literature are:

- One-of-a-kind approach of projects
- On-site production
- Temporary organisation
- High level of client interference and accompanying focus on price
- Fragmented in terms of number of specialised enterprises and integration of actors in project phases

These peculiarities have led to the current traditional business structure within contractor companies and subsequently lead to the bad performance of construction industry. Therefore the peculiarities should be resolved, reduced or better managed in the proposed alternative and subsequently lead to higher levels of performance and better customer value.

The particular situation of medium sized contractor companies like Ooms Construction implies that they don't have the wide range of disciplines in-house to take on a large scale road construction project independently. Therefore it needs to collaborate with partners to be able to do so. The challenge for Ooms, as well as her partners, lies in aligning the supply chain from top till bottom.

From a responsive demand-driven to a proactive supply-driven market approach

It seems that the construction industry is currently in transitional period between a demand-driven traditional market and a future supply-driven market. In the traditional market the client determines the project solution into detail and the supplier only assembles according to the detailed design. In the current DB+ (FMO) contracts the client retreats from the construction process and leaves considerable pre-contractual tender work to the supplier. The product developments in standard designs and construction methods however are not extended beyond element level. The suppliers still acts responsive to client demand. In the supply-driven construction industry, a responsive pull market with a high level of client interference is replaced by a proactive push market with less client interference. From a conceptual perspective, a supply-driven construction industry implies that concepts or designs are less client-specific and more pre-engineered. Suppliers already have virtually pre-engineered product families which can be made client-specific in accordance with specific wishes and requirements.

A supply-driven market would enable the contractor to change the traditional one-off approach to a multi-project strategy. This leads to more stable types of production organisation and project delivery and thereby to improved levels of performance, better value to the client and more profitable business.

Framework for large scale road construction delivery

In general theory on supply-driven business a couple concepts have been investigated, that can be helpful in tackling the research problem and the peculiarities in construction. The relevant theory comes together in a framework for the supply chain structure for large scale road construction project delivery. It describes a hierarchically structured supply chain with system and subsystem suppliers on multiple tiers. A systems integrator role has been identified to serve as principal supplier on the various tiers. This role can be taken by a separate organisation, one of the subsystem contractors or by an alliance of contractors. On every tier a principal supplier acts as the systems integrator at that particular tier and is supplied by a small number of direct suppliers which provide for entire subassemblies rather than component parts. Separate supply chains headed by a system integrator can develop and deliver their integrated products together as well as independently and separately. The framework enables contractors to develop a delivery process with a multi-project strategy in a stable, repetitive, highly flexible, and cooperative way. The framework elaborates on multiple dimensions of the project delivery process, i.e. supply chain structure, products and production strategies and the associated relationships in the supply chain. Furthermore the framework provides insight in possible strategic positions in the project delivery supply chain.

Empirical research

The field research in Ooms Construction's business exists of 1) interviews within Ooms Construction's management and managers at possible partners and clients in the road construction market and 2) research in Ooms Construction's product portfolio.

Strengths, weaknesses, opportunities and threats for medium-sized contractor companies attaining a supply-driven market strategy and developing products for the large scale road construction market.

Strengths	Weaknesses
1) Knowledge throughout the entire road construction supply chain 2) Flexible and responsive organisation 3) Experienced and skilled in collaboration with partners	1) Production capacity is bound to the West of the Netherlands 2) Lack of management capacity 3) Guarantee of available financial resources
Opportunities	Threats
1) Increase attractiveness for collaboration with potential partners 2) Possibility to remain a player in the large scale road construction market, in spite of relatively small size 3) Distinguish from market competitors and give product guarantees	1) Risk of non-profitable investment in product development and organisation 2) Compatibility of product developments with existing maintenance and operation procedures 3) Suppliers that are reluctant to attain a supply driven strategy and take responsibility

In perspective of the theoretical framework Ooms Construction currently supplies products for the road construction market on various tiers (in a demand-driven market). The investigated production strategies on these various tiers have shown that on lower tiers Ooms Construction has the capacities to work supply-driven. On project level this is not feasible at the moment.

Conclusion

A confrontation of the theoretical framework and the interview outcome has shown that the application of a supply-driven market in large scale road construction is desirable on the long run. There are still several major changes to be made at the client as well as contractor side. Both need substantial investments of money, time and effort. The client can accelerate the process of change by creating more opportunities to the contractor in their demand specification. A considerable change of business process is to be asked from the contractor as well. The size of Ooms Construction in relation to the size of the projects in large scale road construction seems to put Ooms Construction in a 1st tier direct supplier role in the market. Ooms Construction should invest in a separate 'systems integration' department to remain a strong player in the road construction market. From there they will probably have the possibility to grow further into the principal supplier role. Now, the contractors and clients in the market should only dare to take the challenge and put their shoulders to the wheel together.

Table of contents

General information	III
Preface.....	V
Summary.....	VII
Table of contents	XI
1 Introduction	1
1.1 Problem description	1
1.2 Research scope	3
1.3 Research objective.....	4
1.4 Research questions.....	5
1.5 Research method and thesis outline	6
2 Analysis of road construction characteristics	9
2.1 Current construction market	9
2.2 Peculiarities of construction industry.....	12
2.3 Actors.....	15
2.4 Procurement procedures	17
2.5 Innovation in Dutch road construction	23
2.6 Characteristics of Ooms Construction's situation	24
2.7 Conclusion	25
3 Theories and concepts for a supply-driven market strategy.....	27
3.1 Supply-driven market strategy	27
3.2 Marketing	28
3.3 Supply chain management	31
3.4 Complex product systems and systems integrator.....	35
3.5 Production processes	38
3.6 Lean manufacturing principles	39
3.7 Living Building concept.....	41
3.8 Conclusion	45
4 Conceptual framework for a supply-driven market strategy.....	49
4.1 Supply-driven road construction industry	49
4.2 Road construction supply chain structure	51
4.3 Production strategies for strategic positions	56
4.4 Relationships within the supply chain.....	58

4.5	Relationships with clients	61
4.6	Marketing.....	62
4.7	Summary	63
5	Field research at Ooms Construction	65
5.1	Introduction	65
5.2	Assessment of the framework for road construction industry.....	67
5.3	Position of Ooms Construction in the supply chain	70
5.4	Supply chain relationships.....	73
5.5	Summary	75
6	Applicability of the framework in practice	77
6.1	Introduction	77
6.2	Framework rules	78
6.3	Opportunities vs. framework rules	79
6.4	Threats vs. framework rules.....	81
6.5	Strengths vs. framework rules.....	83
6.6	Weaknesses vs. framework rules.....	84
6.7	Conclusions on the framework rules	85
6.8	Validation.....	87
6.9	Conclusions	89
7	Conclusions and recommendations	91
7.1	Conclusions	91
7.2	Recommendations	94
	Epilogue	97
	Literature.....	99

1 Introduction

This chapter introduces the problem that has been the motive to execute this research at Ooms Construction. Furthermore the objective of the investigation is set as well as the course of the total research.

1.1 Problem description

Currently the construction industry is struggling with itself. For decades the industry has been heavily criticised on lack of performance. Large scale projects have become known for their outrageous overrun of budget and planning. A typical example in the Netherlands is project Noord-Zuidlijn; construction started in 2003 with a budget of €1.4bn and an expected end date of 2011, nowadays the costs have augmented to €2.2bn and the delay is at least 4 years¹. Problems in construction industry are indicated to be fragmented character, lack of innovation, focus on lowest cost in stead of quality, gap between design and construction and the distance between client and end-user. (Ang et al. 2005, Pries and Dorée 2005). The need for change became once again painfully evident when a huge fraud was discovered in the construction sector in the Netherlands in 2001.

The industry's organisation doesn't seem to be able to cope with increasing complexity, changing requirements, changing wishes and customer satisfaction of the present market. This shortcoming in performance has resulted in several changes in current building practice. On one hand there has come a stronger focus on project management, risk control and improvement of construction processes. (Miller and Lessard, 2000). Together with that the opinion has arisen that construction's fragmented character can be changed by contracting out more tasks to a single supplying party. This resulted in a variety of new contract forms; design-build, design-build-maintain, design-build-finance-maintain-operate and public-private partnering. However these new contract forms still do not show satisfying results. (de Ridder, 2006)

From both demand and supply side further developments point to the intention to attain a new market strategy. The principal client in road construction industry, Rijkswaterstaat, for instance expresses the intention to return to their core business and thereby increasingly transfer activities to the contractors' side (RWS, 2008). The expertise and initiative of the market should be exploited increasingly. Contractors are increasingly engaged in the development of innovative solutions for the construction market and are considered to be able to come up with new products and solutions and construction processes themselves. In construction of housing this development has been apparent for quite some time (Hielkema et al., 2008), in civil engineering industry however the innovation seems to come up in a slower pace than in other construction industries.

Besides poor performance, the current traditional organisation of construction industry is associated with a heavy price-fighting market for contractor companies. The client's traditional procurement strategies are aimed at acquiring a fixed output against the lowest price possible. Competition is merely price based and consequently contractors face structurally low profitability. Yet a supply-driven market approach appears to innovative, product

¹ NRC Handelsblad 18-04-2008 "Opnieuw tegenslag bij Noord-Zuidlijn"

developing contractors such as Ooms to be an opportunity to differentiate and compete based on performance against a competitive price rather than on price alone. This way they can enforce their competitive position in the market by exploiting their expertise effectively and delivering customer satisfaction in an efficient manner. This way the demand side as well as the supply side will take advantage from adopting the supply-driven market strategy.

PROBLEM STATEMENT 1:

Contractor companies such as Ooms Construction cannot gain competitive advantage through performance output and therefore face low profit margins in the current demand-driven construction industry.

Within Ooms there has always been a strong focus on product and process development. Exemplary is their in-house research and development department. The proactive attitude toward product development resulted in several innovations in road construction, e.g. polymer-modified asphalt, asphalts with low energy use and low emission during fabrication, invisible joint transitions for bridges and tunnels, cold applicable crack filler and an energy collector system in asphalt paving². Ooms Construction believes that this proactive attitude provides them a stronger position in the market and therefore wishes to expand this attitude towards the road construction market. Therefore a supply-driven market approach seems fit for their business.

The change from a reactive demand-driven to a proactive supply-driven market approach will have important implications to a contractor's business organisation. In the transition phase Ooms Construction is likely to be confronted with changing business functions, relations with partners and clients, tasks, responsibilities, opportunities and threats. For Ooms Construction it is important to know the consequences of the new supply-driven construction industry for their current business functions and the relations with their suppliers and subcontractors. In addition there are various opportunities to reposition themselves in the changing market.

PROBLEM STATEMENT 2:

Contractor companies face a change in market strategy and are unaware how to adapt their business organisation accordingly and what strategic position they can take within a supply-driven construction market.

As in every market situation supply and demand in construction industry are intrinsically connected. This means that change at the demand side of construction cannot happen without change at the supply side. The client, in the way in which procurement occurs, plays a critical role in supply-driven construction. Within contractor companies there is a lot of criticism on the way Rijkswaterstaat draws up its demand specification. Specification in performance output is pretending that there is room for developing unique solutions, the demand specification is however still that exhaustive that there is no space for optimisation of the contractors business.

² For a total review on Ooms' innovative products see appendix A

PROBLEM STATEMENT 3:

The currently applied demand specification does not stimulate the contractor companies to develop better solutions to their clients and therefore it is not suitable for a supply-driven market approach to the construction market.

As has become clear in the problem description the road construction industry can be regarded a changing environment. However from both the demand side as well as supply side there is doubt about how to react to the current movements and how to be prepared for the upcoming changes. Therefore research in this subject is important for the development of the industry into a healthy consumers market.

The problems described in this paragraph are further elaborated and analysed in chapter 2. First the current situation in the construction market is described, followed by an analysis of the peculiarities of construction that have led to the current traditional structure. The changing market contractors are facing at the moment is described by the contract forms in current building practice that have been introduced to improve the design and construction processes.

1.2 Research scope

The problems mentioned in the previous paragraph are issued across the entire construction sector and through the complete building chain. Since this research is done in cooperation with Ooms Construction, it concentrates on the position Ooms Construction is in. This position can be typified by three characteristic features.

1.2.1 Supply side

Ooms Construction is in the construction process at the supply side; it fulfils a demand for road constructions. As a contractor company it delivers works to a client, which represents the demand side. Traditionally the supply is solely the execution of the project. However Ooms Construction contends that it is capable to deliver projects from scratch. Ooms construction is willing to supply the market with self developed products in the future and is eager to present herself towards the market as proactive problem solver. The research therefore focuses on the implementation of the supply-driven market approach for the supplying side of the construction sector.

1.2.2 Large scale road construction projects

For almost 100 years Ooms Construction has been a player in road construction sector in the Netherlands. Large scale road construction projects have been in their portfolio for a long time. Large scale road construction is described in this research as the multidisciplinary construction and maintenance projects on Dutch highways containing road paving, construction works and all the facilities around highways. Recently in the large scale projects the innovative integrated contracts with expanded tasks and responsibilities for the supplying party have been introduced by the government. These contract forms give the contractor the opportunity to apply their creativity and knowledge of construction processes to an increasing extent. Therefore it is of importance to investigate how the supply-driven strategy can be helpful to cope with these projects.

1.2.3 Medium-sized contractor company

The latter characteristic feature is the size of Ooms Construction. It can be typified as a medium-sized contractor company. This results in not having all the main disciplines in-house to execute a complete large scale road construction project. This situation forces Ooms Construction to tender for projects with partners. This particular situation has a very important impact on the approach Ooms Construction should take towards the challenge they are confronted with.

1.3 Research objective

In the preceding paragraphs has become clear that Ooms Construction is exploring alternative approaches in order to position themselves in the current and future market. Starting point of this research is one of the alternatives; a supply-driven market strategy. This approach appeals to Ooms Construction as a possible attractive new market strategy and the demand in the market seems to change in this direction as well.

The research is focused to Ooms Construction's current situation in the market. More companies however find themselves in a similar situation and therefore this research could also apply to their business. The research aims to develop the supply-driven theory further and apply it to the situation in practice. Therefore the main objective of this research is:

To investigate a supply-driven driven market approach for medium-sized contractor companies such as Ooms Construction that might lead to improvement of their competitive position in the changing large scale road construction market.

The change to a supply-driven market will have great implications on the organisation of the contractor company itself as well as their relations with the actors in de building process around them. The alternative market approach will open up new opportunities for contractor companies to position themselves in the market. A second objective of this research is therefore:

To develop an alternative view on the future business structure in a supply driven road construction market for contractor companies like Ooms Construction and the corresponding possible strategic positions in the supply chain.

As was put forward in the problem description, the client puts an important prerequisite to apply supply-driven theory in practice. The basic thought underlying the supply-driven approach is that a contractor company is perfectly capable to deliver a best solution to its client. The demand should therefore be specified differently to create room for freedom for the contractor and induce incentives to the contractor to deliver better work. While this demand specification is such an important starting point for the supply-driven approach, this research aims:

To deliver the client in civil engineering industry a view on the desired demand specification within large scale road construction projects from the contractor's perspective.

The changing environment of the contractor companies should give them the opportunity to improve their business performance. This research aims to give a vision on the future prospects that belong to the supply-driven market strategy for the construction industry. The research will be concluded with recommendations on the steps to be taken in the transition into a supply-driven road construction contractor.

1.4 Research questions

In this paragraph is checked what kind of information would be useful and necessary in order to realise the research objectives. Therefore research questions are formulated. These questions have been selected and formulated in such a way that the answers to them yield the information that is useful and necessary to accomplish the research objective. (Verschuren, 2007). The research objectives will be reached by answering the main question, which is divided in three questions, which again are divided in several sub-questions (See figure 1.4-a).

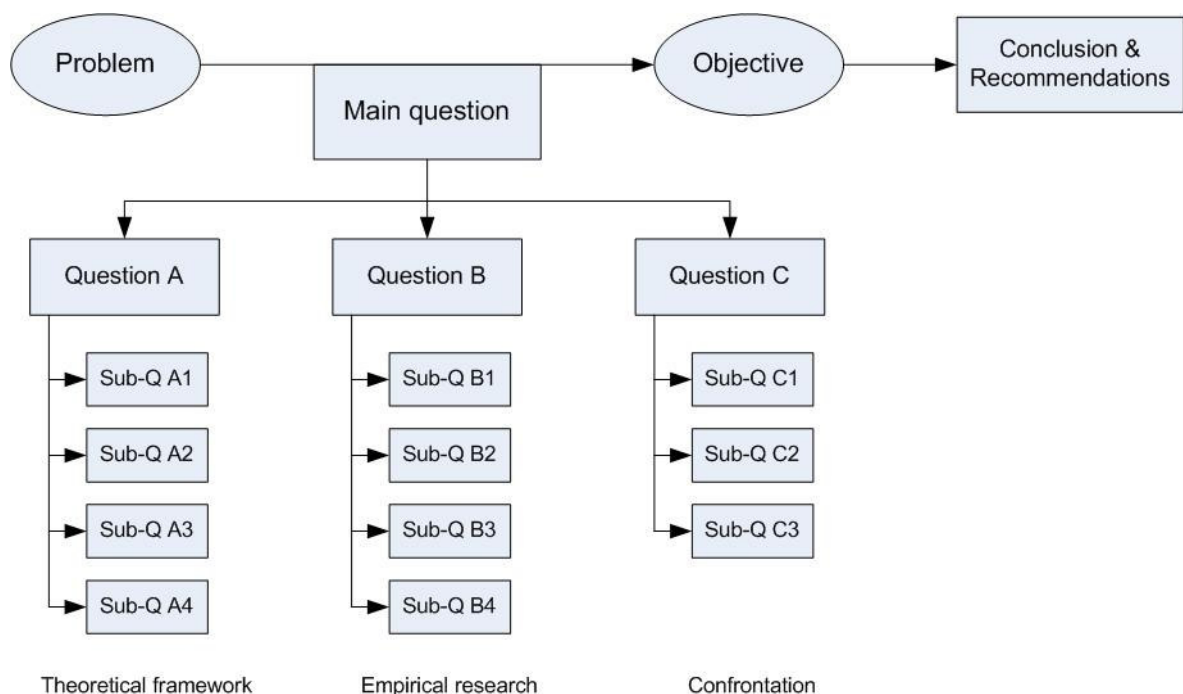


figure 1.4-a: research questions

Main question:

- How should a medium-sized contractor company with a supply-driven market strategy organise its project delivery processes for large scale road construction projects?

A. What should the business organisation of a medium-sized contractor and its supply chain look like in a possible future situation of supply-driven construction industry?	PART II
B. How does the current organisation within Ooms Construction look like and how has it changed in the recent past?	PART III
C. How should the practical application of internal organisation and supply chain management of a contractor look like?	PART IV

<i>A. What should the business organisation of a medium-sized contractor and its supply chain look like in a possible future situation of supply-driven construction industry?</i>	PART II: THEORY
A1. What relevant theoretical concepts exist in scientific literature about a supply-driven market approach in construction as well as other production industries, such as the automotive industry?	
A2. What theoretical concepts exist that are applicable to cope with the peculiarities encountered in the typical situation of Ooms Construction?	
A3. What are relations between these concepts and can they combined give more insight in the subject?	
A4. How can these relevant theoretical concepts be put into operation in a framework for the supply chain structure of medium-sized contractor companies in road construction?	
<i>B. What are the capabilities, possibilities and ambition of Ooms Construction to deliver projects with the proposed supply-driven market strategy?</i>	PART III: EMPIRICAL RESEARCH
B1. What are the opportunities and threats that Ooms Construction, their possible partners and principal client associate with attaining the project delivery structure of the framework?	
B2. To what extend does Ooms Construction have the capabilities to deliver road construction projects according to the theoretical framework?	
B3. What are the strengths and weaknesses associated with Ooms Construction in the various possible strategic positions in the supply chain and what position does Ooms Construction aspire?	
B4. What possibilities does Ooms Construction receive to work according to the framework from its surrounding parties, i.e. possible partners and principal clients?	
<i>C. How should the internal organisation and supply chain management of a contractor look like a supply-driven building practice?</i>	PART IV: CONFRONTATION
C1. What are the gaps between the proposed supply-driven approach in the theoretical framework and the outcome of the empirical research?	
C2. How can the theoretical framework of chapter 4 be applied in the current building practice and how can it help to be prepared for the expected future changes?	
C3. What position in the framework is most appropriate for Ooms Construction?	

PART V Conclusions and recommendations: *Through what steps in the near future can Ooms Construction adapt their current organisation towards a supply-driven market strategy?*

1.5 Research method and thesis outline

In this paragraph the research methodology will be explained, this methodology fits the question statements and determines the rough report outline. In figure 1.5-a the research design and corresponding report outline is depicted.

PART I: Introduction

The introductory chapter treats the problem that has been the motivation of this research. From this problem follow the objectives of the research. Together with that the research design is established. The problem context as sketched in paragraph 1.1 is further elaborated and analysed in chapter 2 with help of scientific literature. The characteristics of construction market are investigated to gain insight in the origin of current building practice problems. These characteristics distinguish construction from other industries and therefore this analysis functions as a target for the scientific literature investigated in chapter 3.

PART II: Theoretical framework

The goal of the research in relevant theory is reached in chapter 4, i.e. a framework for the business functions of a medium-sized contractor company with a supply-driven market strategy and the according supply chain structure for project delivery. A literature study is performed in relevant theories and concepts as found in scientific literature about supply-driven production industries. The theory treated in chapter 3 aims to give an alternative approach for construction adopted from general production industries and should tackle the problems encountered in current building practice as described in chapter 2. Finally the relevant theory is put into operation for the construction industry in a framework for road construction industry. The theoretical framework, in a conceptual description of supply chain structure and a set of framework rules, represents a possible desired future for the organisation of contractor companies in a supply-driven market.

PART III: Empirical research

The next research phase is field research. In this phase is investigated to what extend it is possible for Ooms Construction to structure their project delivery in correspondence to the framework presented in part II. In chapter 5 a case study in Ooms Construction's organisation will show the capacity to work with the theoretical framework and the possibilities that they receive from their possible partners and principal clients to do so. This research is performed through interview within Ooms Construction, with the surrounding parties in the project delivery process and through analysis of their past project portfolio.

PART IV: Confrontation

In chapter 6 the framework for a supply-driven approach to road construction project delivery is confronted with the current situation of Ooms Construction's business environment as found in the empirical study. The pieces of theory and concepts are moulded together with the evidence as found in the empirical analysis of Ooms Construction to a practical application of the framework in building practice. The practical application is validated through an expert meeting.

Chapter 7 draws up the conclusions about the practically applicable framework. It will reflect the results against the stated main objective of the introductory chapter. Furthermore recommendations are stated for Ooms Construction how to be proactive in the changing construction industry market. At last there are given some recommendations on further research in the future.

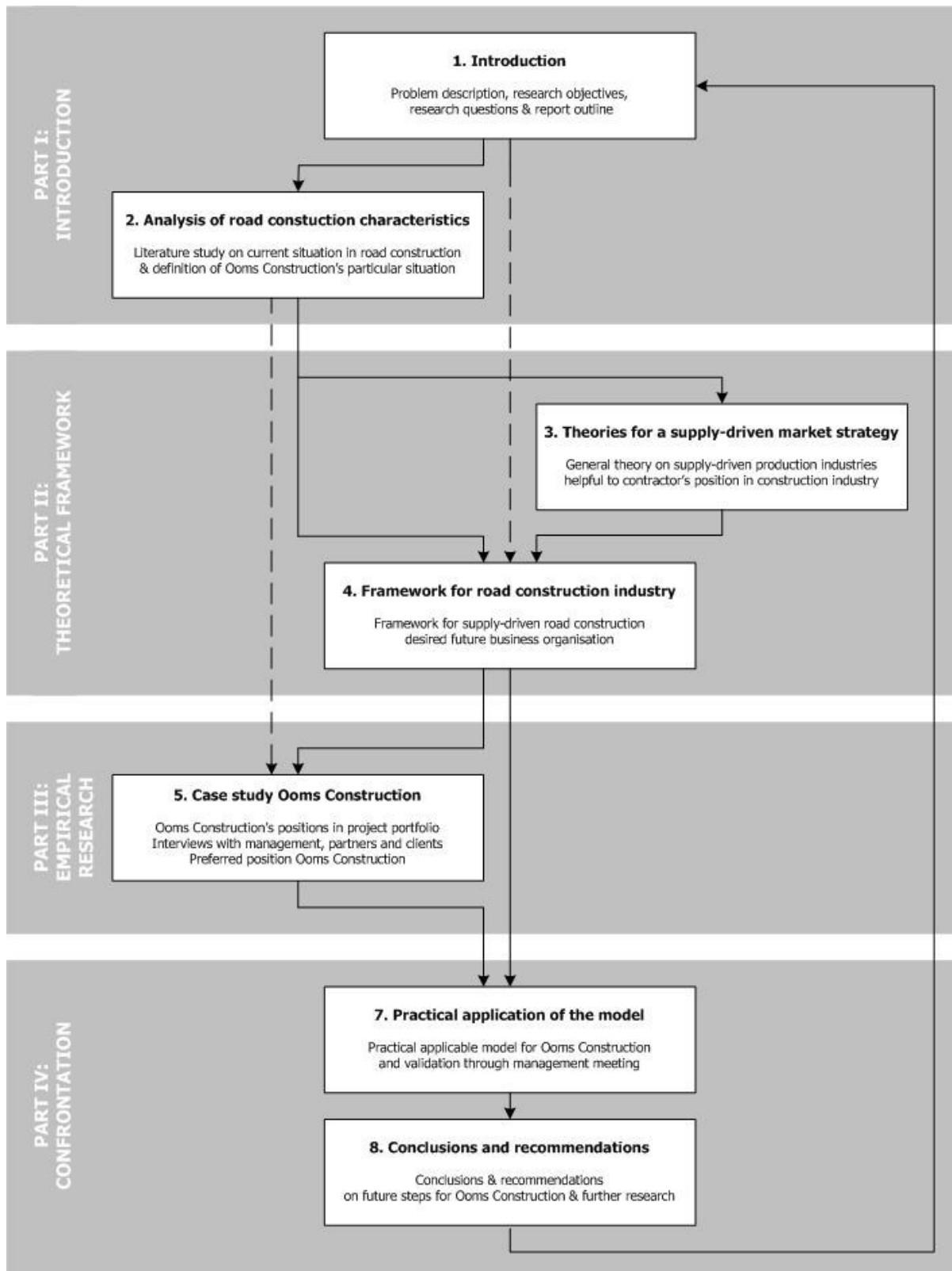


figure 1.5-a: report outline

2 Analysis of road construction characteristics

In the introduction there are some problems identified concerning the current construction industry. In this chapter the problems and the underlying characteristics that may cause the problems of construction³ are elaborated more comprehensively. Thereby this chapter feeds the next chapter with the possible origins of the problems encountered. In the next chapter theoretical concepts from other industries as well as construction industry are investigated to tackle or minimise the effect of these characteristics.

2.1 Current construction market

In this paragraph the market in which Ooms Construction operates is portrayed through some figures about the current situation and though the main players encountered in the market. The figures come from the building and civil market in general, but a similar situation exists for the road construction sector specifically.

2.1.1 Economic situation in civil engineering

In 2007 the civil engineering market had a production volume of €13.1 billion and is expected to grow with 2.5% in 2008 (source EIB). In recent years the construction market was growing in a moderate pace, but due to the current financial and economic crisis the production volume is expected to decrease in 2009 and 2010. The investments in the civil engineering sector however are mainly determined by governmental budgets and are therefore less sensitive to changes than utilitarian and housing construction. (see figure 2.1-a). In the long term an annual increase of around 2% is expected.

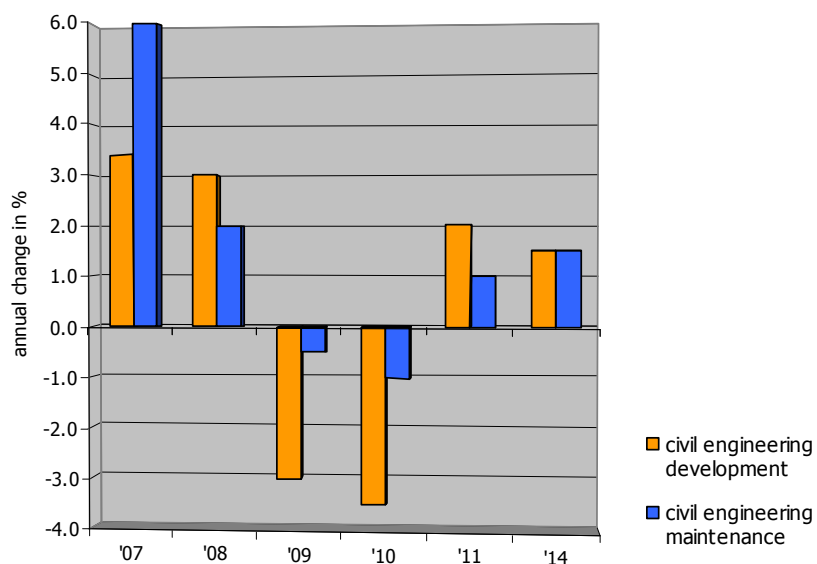


figure 2.1-a: expected production volume Dutch construction market (source EIB)

³ Road construction being a part of the general construction industry shows similar characteristics and problems.

The civil engineering sector can be subdivided in seven sectors of which road construction is responsible for approximately half of the total turnover (see figure 2.1-b). For 2008 the expenditures on maintenance projects in civil engineering were calculated to be €5 billion, around 40% of the total volume. The maintenance market is currently larger than normally due to the identification of a lag in maintenance of the Dutch civil works by Rijkswaterstaat.

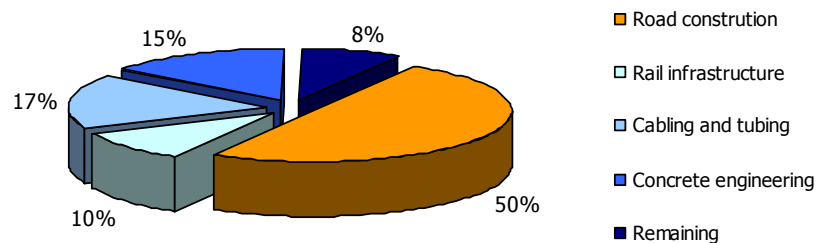


figure 2.1-b: division of turnover on civil engineering sectors in 2006 (source EIB)

Profit margins in construction industry are traditionally low at around 3% (see figure 2.1-c). In comparison, the mean profit margin of the AEX-companies was an annual 7.7% in the first half of 2008⁴. Firstly the low profit margin is the result of the capital intensive nature of construction; secondly the high level of price competition in the civil engineering market puts enormous pressure on prices. In construction industry firms cannot supply from stock and are dependent on orders to secure continuity of the business. Therefore contractor companies regularly have to lower their price under the cost level to secure turnover. That way their labour force and auxiliaries at least generate some money.

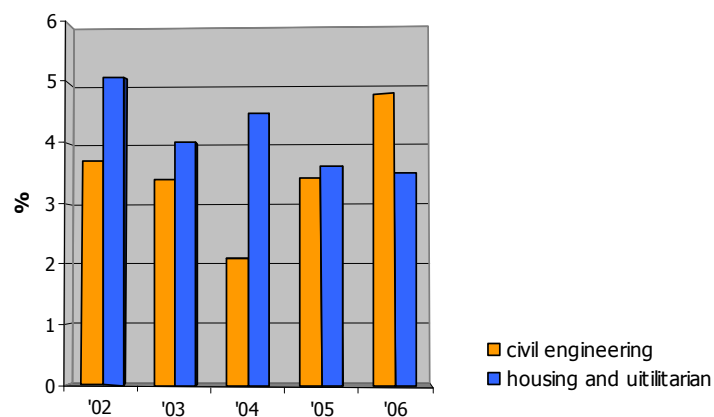


figure 2.1-c: profit margins in construction industry

A comparison of three projects⁵ of Ooms Construction's past project portfolio showed that a little more than half of the costs of a road construction costs consists of materials costs, and somewhat less than half of personnel and equipment cost. Personnel and equipment costs were also around equally divided.

⁴ Financieel Dagblad 04-09-2008 "Bedrijven paaen aandeelhouders met groter deel van winst"

⁵ The three projects were the a new highway exit on the A12, a roundabout including bicycle tunnel and a piece of provincial road

In their annual report Ooms Construction expresses that one of the motivations to tender for large scale construction projects is that the expected profit margins are higher due to increased risks. Besides in these projects there is less competition so consequently profit margins are higher. The contractors are still expected to tender based mainly on price, so competitive advantage is still reached by lowering prices. The bad position construction industry is in has been an important subject the last decennia. Now, with the financial and economical crisis at hand, it is the time to do a review on the construction industry.

2.1.2 Construction market structure

The construction market is characterised by a few large companies and a large number of small specialised firms (see table 2.1-a). This accounts for the total construction market as well as the civil engineering market and the road construction market. More than half of the total number of enterprises is a one man's business. More than half of total turnover in civil construction however is generated by companies larger than 100 people (see figure 2.1-d).

	residential and civil construction	total construction industry
1 employee	25,560 (63%)	48,400 (60%)
1-10 employees	11,290 (28%)	26,065 (32%)
10-100 employees	3,375 (8%)	6,885 (8%)
>100 employees	205 (0.5%)	340 (0.4%)

table 2.1-a: division of the construction industry enterprises based on number of employees on 1-1-2006 (source: CBS)

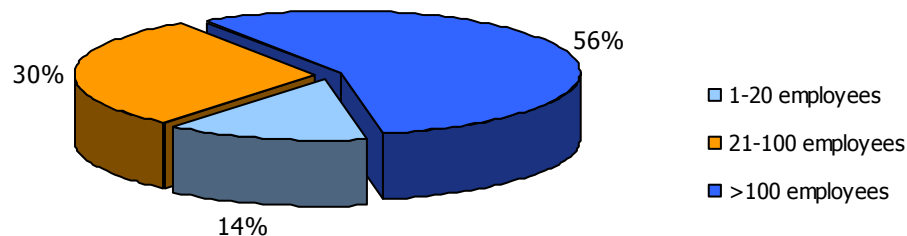


figure 2.1-d: division of turnover in civil engineering in 2006 classified by contractor size (source: EIB)

2.1.3 Road construction market structure

Ooms Construction's main discipline is road construction. In the large scale road construction market their competitors can be divided in roughly three categories with three different market positions; large-sized, medium-sized and small-sized companies. The terms large-, medium- and small-sized are somewhat misleading, because it is just partly the size that puts them in a particular competitive position in the market, however there is a strong correlation between these two characteristics. Ooms Construction can be seen as one of the largest medium-sized companies. The competitive position of the three categories can be typified through three parameters.

- Working area
- Labour capacity
- Discipline, specific knowledge on a certain field
- Engineering capacity

Large-sized contractor companies

The civil engineering market in the Netherlands is dominated by 5 nationwide operating contractor companies: BAM, VolkerWessels, Heijmans, Ballast Nedam and Dura Vermeer. These contractor companies are active in all disciplines of civil engineering. Next to civil engineering these companies are also active in utilitarian and housing construction and project development. These companies also possess an engineering firm within the company and are therefore able to provide designs. They are therefore able to contract for large scale road construction projects separately without the necessity to operate in alliance with other companies, because they are in possession of capacity in all different disciplines of civil engineering. Most of the times these contractors still collaborate with others to share risks and divide work.

Medium-sized contractor companies

Ooms Construction is one of around 10 medium-sized contractor companies in civil engineering in the Netherlands. These companies mainly operate on regional scale and in most sectors of civil engineering. Ooms Construction for instance is mainly active in the west of the Netherlands, i.e. provinces Zuid-Holland, Noord-Holland, parts of Utrecht and Friesland. In this part of the country the main medium-sized competitors are Mourik, Rasenberg, MNO Vervat and GMB. Typical for all these companies is that they have to work in alliance with other companies to be able to compete for large scale road construction projects. The capacity of these firms is not sufficient on their own to get through the pre-selection procedures, besides that they do not have expertise in all fields of discipline. Generally these companies do not have an in-house engineering department. In comparison to their competitors Ooms Construction has a fairly good position because Ooms Avenhorn Holding, which Ooms Construction is part of, does have its own engineering company. Together with that Ooms has a lot of experience in road construction and has a large R&D division with and long history.

Small-sized contractor companies

The small-sized companies mainly operate on local and regional level. The contractors are mostly specialised firms in a specific discipline. These companies work autonomously in smaller projects and are hired as subcontractors for part of the work by bigger contractors in large scale projects. The bigger part of their work comes from projects contracted out based on non-public tendering.

2.2 Peculiarities of construction industry

Compared to many other industries, construction is a specific type of project industry with certain peculiarities⁶ influencing the characteristics of constructed products, ways of production, and the industry itself (Koskela, 2003). In the search for alternative approaches to construction this research investigates theories about normal consumers markets and industrial production systems.

⁶ The term peculiarities follows from Vrijhoef and Koskela (2005). In this paper the term peculiarities is used, rather than terms such as constraints or problems, because peculiarities refer to characteristics that may but do not necessarily lead to constraints or problems.

The supply-driven market strategy that is proposed as an alternative for road construction industry, aims to minimise the negative effects of the peculiarities on performance of road construction. According to Koskela (2003) for the peculiarities, three major factors are perceived: one-of-a-kind nature of projects, site production and temporary organisation. These among others are the focus of this paragraph.

2.2.1 *One-of-a-kind nature of projects*

Basically all objects in the built environment are widely considered to be unique products. Koskela (2003) explains the one-of-kind nature of construction output is caused by differing needs and priorities of the client, by differing sites and surroundings, and by differing views of designers on the best design solutions. This one-of-a-kind nature applies mostly to the project, building or facility as a whole, and the interfaces between different subsystems. At a lower level of the facilitated solution it is not that unique. The materials, components and skills needed are usually the same or at least similar. From the point of view of contractors and design offices, there is often continuity and repetition: roughly similar projects and tasks recur. One-of-a-kind production is characterised by two issues. First, product design is an integral part of production (i.e. product design or development beyond mere selection of options or configuration design). Second, there is uncertainty, which is critical especially with regard to customer order acceptance.

In current building practice every construction job is still approached as a unique assignment. The resulting design and construction processes are considered to be unique as well. In supply-driven construction project independent development provides for a more industrialised approach to the project delivery process. The contractor pre-develops its supply and therefore the contractor is well informed on the performance of the products that are part of its supply. Through more certainty in the design and production processes productivity should go up and failure costs should go down. Since the pre-developed product is deployable in various projects, it is less client-specific however it should not necessarily hamper customer satisfaction. The aim is to supply the client with a unique specific solution composed from supplier specific systems developed by the contractor.

2.2.2 *Site production*

Typical features that are the consequence of site production are:

- Site as a resource: the site is a necessary input resource for production.
- Lack of shelter: there is usually little protection against elements or intrusion, rendering operations prone to interruptions.
- Local resources and conditions: local material and labour input often have to be used, potentially adding to uncertainty; other areas of uncertainty include site geology and other environmental factors.
- Creating the production infrastructure: the production infrastructure (machines, manpower, etc.) has to be planned, procured and set up on site.
- Space needed by production (workstations are mobile in relation to the product): the spatial flow of workstations (teams) has to be coordinated. This is in contrast to a factory, where only material flow through workstations is planned.

It is evident these characteristics of site production add to uncertainty and complexity of construction in comparison with stationary production. The essence of stationary production environments is that operations are executed in stable, conditioned environments. Means of production have a fixed location, operations are done in a standard sequence and are mutually adapted considering lead times. The production processes therefore have

a high level of predictability and certainty. These do not hold for the construction processes in which the means of production move along with production.

In comparison with for example the housing construction site, the road construction has two important characteristics added to the five named above. First the construction site, particularly in highway construction, is elongated over a couple of kilometres. Secondly due to economic importance the highways are in use by traffic during construction. This puts additional uncertainty to the road execution process.

However more certainty upon the delivery processes due to project independent solutions can improve the production on site as well. In the product development process in road construction therefore there has to be put extra emphasis to execution logistics issues in the product delivery process.

2.2.3 Temporary organisation

A construction project is usually a temporary organisation designed and assembled for the purpose of one particular project. It is made up of different companies and design practice which have not necessarily worked together before and which are tied to the project by means of varying contractual arrangements. The temporary nature of the organisation extends to the workforce, which may be employed for a particular project rather than permanently. This feature reflects the one-of-a-kind nature of a constructed product: several alternative materials may be used, each requiring specialist expertise in design and installation. On the other hand, as mentioned above, the economic necessity of using local labour or subcontractors is one cause of temporary organisation.

In other industries investments can be spread over a large number of products and arrangements with partners, subcontractors and suppliers are set in a durable way. The temporary basis on which the collaboration is set in construction asks for high transaction costs for all the contractual arrangements. Because of the short term thinking about relations with partners disagreements in contracts are fought in court, leading to an accelerating growth in cost overruns.

In contrary to this current building practice further product development in construction industry asks for a multidisciplinary approach and thus more durable relations between partners. These long-term contracts and relations are less regular in construction than in other industries.

2.2.4 Client interference and price competition

The client in construction industry has a dominant role in development of the project. Especially in civil engineering the development process is characterised by a high level of client interference. The client wants to secure the outcome of the project via detailed specification of the output solution. It takes via consultants (architects and engineers) total responsibility for project definition. In the design thorough description of materials and products and a detailed prescription for the execution is stated. An additional advantage of fixing the output in a detailed design is that the governmental client can easily justify his spending.

The client inference in the construction process intrinsically leads to price competition. The construction industry is a market with many contractors, which offer a comparable service. In hard competition a firm has two possibilities to maintain or enlarge its position on the market. According to Porter (1980) the first one is to improve its position by better performance (product differentiation) and the second one is by reduction of prices (cost leadership). In construction however contractors are not expected to add value by determining the product outcome of a project, but the product performance is fixed in detailed specifications when it arrives at the

contractors business. Because of this it is difficult for companies to follow a differentiation strategy, because of uniform demand. (Pries and Janszen, 1995)

The client interference does not only effect the client-contractor relationship. It is argued that the contractor-subcontractor relationship is of similar nature. That's what there is also a heavy price competition between subcontractors. Since the contract works with a fixed demand the only supplier selection criterion is price. This therefore leads to price competition through the entire industry.

As we have seen competition is mainly price based. What remains is a very severe price competition between contractor companies. Marketing, strategy or service are not needed and the industry fully focuses on the technology of production and organization of building processes. In general the construction industry has little contact with its customers so significant potential for innovation is not addressed. In supply-driven construction there should be the possibility to enlarge the market share by developing new products and by penetrating new markets.

2.2.5 Fragmented industry/ multidisciplinary

The construction industry shows an enormous multiformity of companies in composition and size. Porter (1980) describes 'fragmented' industry, where competitive rivalry is intense, and the chances of 'bad competitors' driving out 'good competitors' (Porter, 1985) are high. In fragmented industries, entry barriers are low, and profits are easily competed away by low-cost suppliers undermining quality standards.

In current traditional building practice the fragmentation is coped with by draw up demand in a prescriptive manner. The specifications leave no room for supplying parties to develop mutual beneficial solutions. This leads therefore to the adversarial nature of relationships, which leads to further fragmentation of the relationships between demand and supply and among supplying parties themselves.

The relations between the actors in construction industry should represent common goals, values, cultures and other "soft issues". A more integrated approach to the supply chain will contribute to more stable production systems and thereby to improvement of the supply chains performance. Ideally, the construction contractors should organise a development project should be considered with multidisciplinary teams crossing organizational functions. (Gray and Davies 2007).

2.3 Actors

The peculiarities as treated in the preceding paragraph have resulted in project-based processes in construction industry. This means that for each construction project a new network of collaborating actors is set up around that specific project. figure 2.3-a illustrates the types of actors, activities and knowledge flows found in construction activities according to Gann & Salter (2000). The actors are grouped based on their specific role in the current construction process.

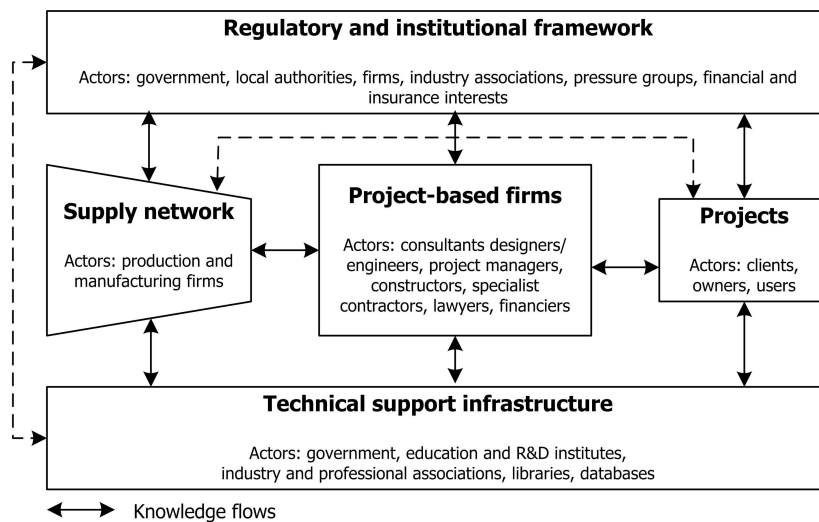


figure 2.3-a: knowledge flows and actors in project-based processes (Gann and Salter 2000, adapted by the author)

The project-based firms are the spill in the total construction process. In these project-based firms consultant designers and engineers, project managers, constructor, specialist contractors, lawyers and financiers are collaborating in changing composition to execute the total project. Each project a new composition is set up and each actor has its own tasks and responsibilities towards the client. Traditionally these parties collaborate on more or less on partnering basis while the client steers the collaboration, in the supply driven market strategy the supplying parties will through strategic alliances work together and present solutions without steering of the client. The project-based firm is supported by their supply network. These companies provide for materials components and equipment. The supply network is mostly a set group of firms that have been suppliers to the company for a long time however the supply network can change from project to project. Project based-firms usually operate by order of a client. These initiate the project and often will be the owner and/of user of the resulting product. They are the demanding side of the building process. In road construction projects this is often a governmental institution.

The building industry is controlled by a regulatory and institutional framework these parties are not directly involved in the building process but they put technical, economic, environmental and social regulations on the on it. These actors are for example governmental authorities, industrial associations and pressure groups. A technical support infrastructure consisting of the government, educational and research institutes, libraries and databases is supporting the industry with knowledge and industry-wide research. These actors aim to develop the industry further technically. In the Netherlands universities can be counted to this group as well as initiatives from firms in the industry and semi-governmental institutions to investigate industries problems. An example of such an initiative in the Netherland is PSIBouw⁷ (a network of client, companies and researchers in construction industry aimed at process and system integration)

⁷ See www.psib.nl for more information

The actors can also be structured using the hierarchical ordering presented in figure 2.3-b. On the demand side of the constructed works are the parties that are interested in value against a certain price. These can be ordered hierarchically from the single client that has a specific interest to society with a broad public interest. On the other side there is the total supply chain that delivers this value against a certain price. This consists of the suppliers of separate elements to the supplier of the total project, mostly a contracting party.

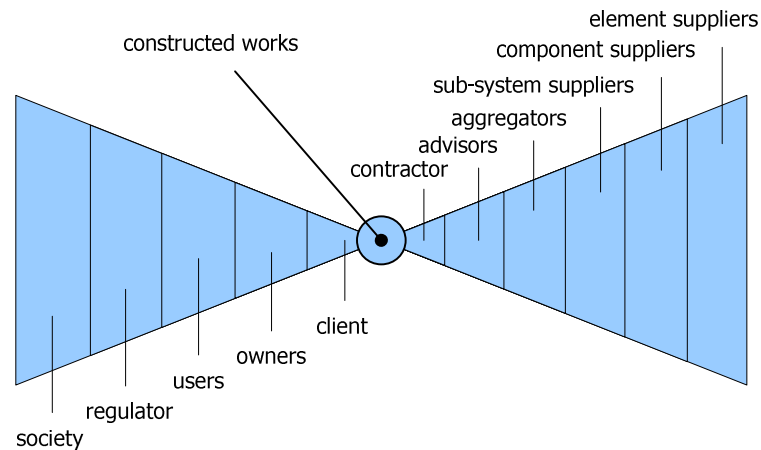


figure 2.3-b: hierarchical ordering of the actors on demand and supply side of construction (Ridder 2006)

Generally in every construction project the number of actors is very large, this especially accounts for large scale road construction projects. Both on the demand side as well as the supply side there is an enormous network of actors. Large scale road construction is therefore a complex undertaking. The theoretical model shows how this network of actors is aligned in a stable supply chain network. The actors that are now collaborating in temporary organisation will focus on a longer term scope for their collaboration.

2.4 Procurement procedures

Clients in road construction have several procedures for procurement at their disposal. In this paragraph the currently applied procurement procedures are presented and analysed. First the concept of procurement will be explained and three parameters in construction procurement are put forward on which the procurement procedures will be analysed. The analysis will show the aims of the various procedures and the advantages and disadvantages of using those particular procedures. Along with these analyses the change in the road construction market is identified.

Procurement processes are seen as fundamental to improve or hamper building performance. Inconsistent requirements and imperfect communications give rise to many of the industry's problems. There is insufficient dialogue between clients (including end users and facility managers), designers and those responsible for actual construction. This results in poor value for money for the client and overrunning projects in terms of time and cost, with the extra work reducing profitability for all concerned. (Ang et al., 2005)

2.4.1 Definition

Various definitions of procurement can be found in the literature, an often used is the following by Braun (1986, from Telgen, Buter & Schotanus, 2006):

"Procurement is the business function of acquiring raw materials, supplies and products. In this process it is important that the goods or services are available at the right quality and quantity, the right time and place and against the lowest possible costs. In procurement policy one faces the choice what quality should be purchased, the quantity and frequency of orders, necessary need for stock and suppliers selection."

Procurement procedures are often mistaken for forms of contracting. The arrangements are established in contracts. As Dorée (2001) notices, in the construction market temporary coalition-organisations are formed; per product, project a coalition of capacity suppliers are united [...] and held together by contracts. These contracts are very different from the contracts in other industries. Related to marketing procurement can be seen as the processes a customer is involved in, though which he tries to secure that the product he is buying will provide him maximum value against a minimal price. Procurement in construction therefore also includes standards determination, specifications development, supplier research and selection, value analysis, financing and price negotiation.

2.4.2 Procurement of clients in road construction

The main clients in large scale road construction are Rijkswaterstaat or provincial authorities. It can be noticed that rules and regulations (European procurement law) have a substantial influence on the procurement procedures used in projects. Basically the governmental clients have to be impartial in the procurement process, besides that they are forced to create an environment with competition. They are not free to choose for a certain contractor or a specific contractor's solution if they cannot explain the choice. In the interviews held for the case study, the respondent at Rijkswaterstaat as well as at the provincial authority of Zuid-Holland recognised that governmental clients have four parameters to steer the procurement process:

- demand specification / value definition
- reward criteria
- reimbursement/compensation
- pre-selection criteria

By these parameters the client can steer the procurement process. For the three procurement procedures the first three of the parameters are elaborated and give the interpretation of the procurement strategy. The pre-selection criteria are not investigated for this research.

2.4.3 Traditional bid-build procurement

The principle characteristic of traditional bid-build procurement is the uniform and unambiguous way in which this model is drawn up and the clearly separated functions of the parties. The client takes full responsibility for the description of the object. It starts with drawing up his demand at a high abstraction level. Based on this demand specification advisors (consulting and engineering firms) are hired to take care of the design and engineering work. This results in a fully specified object with drawings, specifications and standards. The specified object is considered to be an object with fixed quantity and quality. The next step is to invite contractors to submit a proposal containing a working method for realisation and a fixed price. The contractor

with the lowest price is selected to execute the project. After completion of the project it will be handed over to the client, which is the owner and is responsible for maintenance and operation.

In figure 2.4-a the traditional construction process is depicted. The separation between design and construction is characteristic for the traditional construction process. Because of this division of tasks the product (the constructed works) and the production process (how the works are constructed) are not optimised. In the design process the desired functionality and the possible constructability should be merged together. The separation of design and construction has been pointed out to be the main factor in the dysfunctioning of the construction process.

Parameter	Application
Demand specification	A highly prescriptive specification in a detailed design results in fixed output and should secure performance of the solution.
Reward criteria	Selection on fixed price
Reimbursement, compensation	Fixed price

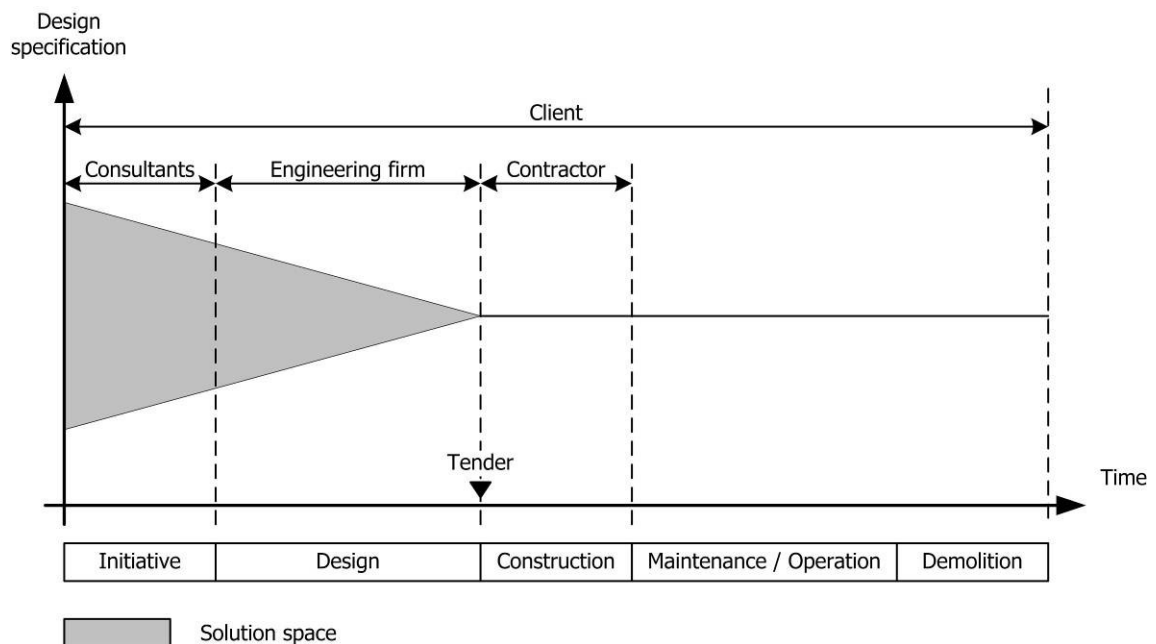


figure 2.4-a: traditional construction process, from Bijl (2008) adapted by the author

2.4.4 Integrated forms of contracting

In reaction to the problem of separation of tasks in construction integrated contract forms have come to birth. In integrated contract forms the client is contracting more tasks to the contractor. The best known integrated contract form is design and build (in Dutch: design and construct). In Design and Construct contracts the contractor makes the design and executes the works (see figure 2.4-b). The contractor can be selected based on lowest price as well as other selection criteria like duration, date of completion, traffic hindrance and quality. The selection based on more factors than only on price is a basic change in the client's procurement. Its responsibility is expanded with design and possibly with the following tasks; maintenance, operation and finance. The spectrum of possible integrated contracts is depicted in figure 2.4-c.

The basic idea behind integrated contracts is that the separation of tasks is broken down. The contractor is enabled and challenged to use its knowledge of the construction process in the design and to focus on the product's total life cycle. The integration of knowledge about the different phases in the development of the delivered solution is secured this way.

Parameter	Application
Demand specification	A fixed performance specification should secure quality of the solution outcome. A solution space is created a solution space.
Contractor selection	Price, duration, date of completion and traffic hindrance
Reimbursement, compensation	Fixed price, selection criteria are translated to bonuses or penalties

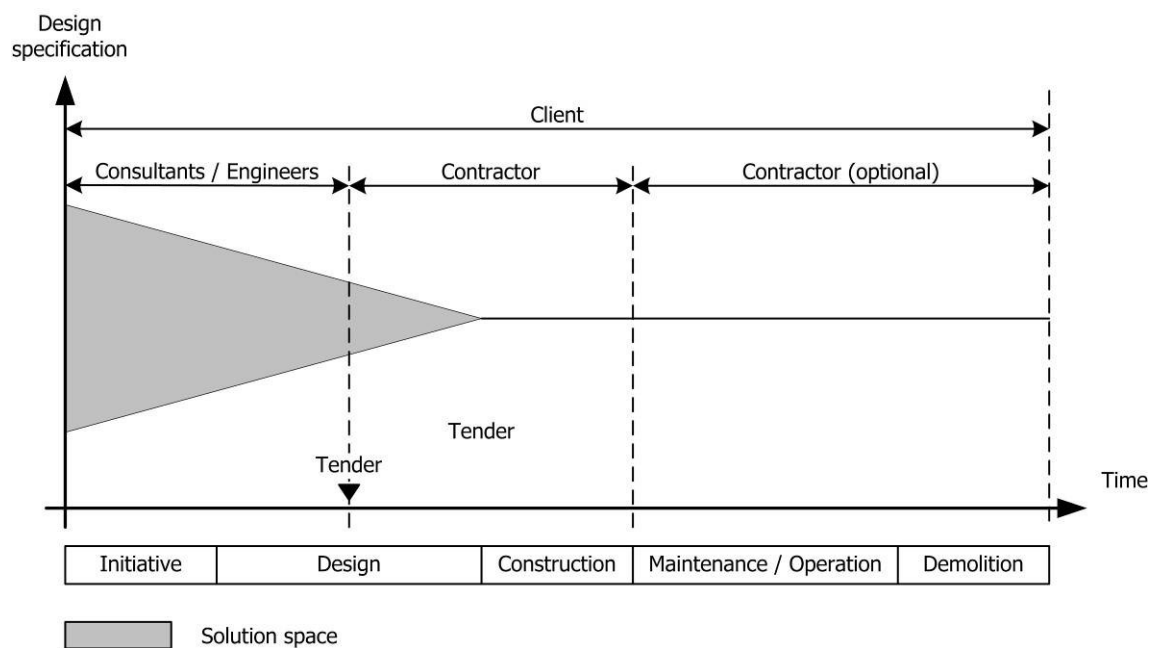


figure 2.4-b: construction processes, integrated contracts, from Bijl (2008) adapted by the author

The integrated contracts can be considered to development in right direction. The possibilities of this contract form however are not fully employed yet, because the clients in construction industry are afraid to give the contractor more freedom. In stead of a prescribed solution in drawings and detailed specifications, the client should draw up a functional demand specification. Currently the client still doesn't trust on the capacity of the contractor to fulfil their need and there wants to exert major influence on the solution. This results in large number of specifications which hamper the innovative power of the contractor.

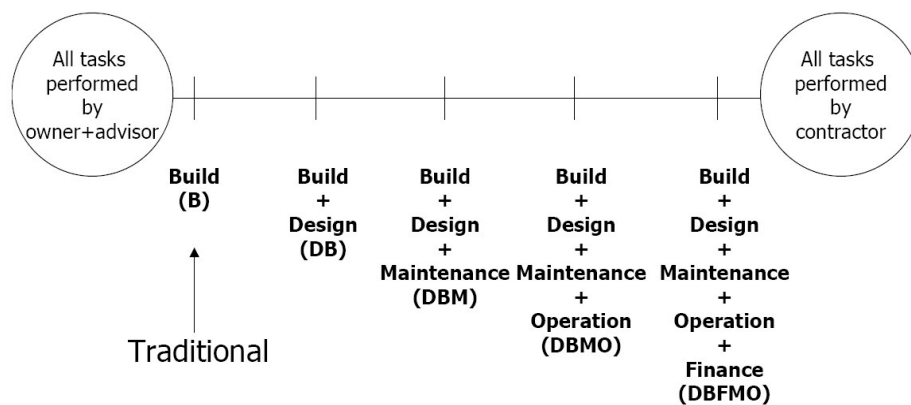


figure 2.4-c: the spectrum of integrated contract forms

2.4.5 Public-private partnership

Public-private partnership (PPP) describes a government service or private business venture which is funded and operated through a partnership of government and one or more private sector companies. PPP is mainly a change considering financing a project instead of another view on the construction process and development of the project. In PPP-contract the financing of the project is delivered by a private party. The contract has a long lead-time, approximately 20 years, and is in DBFMO-form. During this period the governmental client pays the private party annually for the delivered works based on the performance. After the duration of the contract the works are handed over to the governmental client for a price that is determined beforehand. PPP is a way to make projects financially feasible rather than a different way of project delivery by the contractor. The final responsibility remains at the governmental client during the project. The advantage of this contract form is that the feasibility of the project is considered to be greater more quickly. The product however is not better, more valuable or cheaper.

While the original motivation for PFI was to enable the financing of public infrastructure without increasing public debt, (Winch 2000) there is also a deliberate attempt to shift the reward structure within the contracting system so that construction and exploitation risks are carried by the same concessionaire, rather than the latter being taken by the final client. The aim is that this new incentive structure will stimulate cost reducing innovations; either in the construction phase itself, or in the exploitation of the asset.

2.4.6 Trend in procurement procedures

In the currently changing procurement procedures used in large scale road construction an obvious trend can be observed. The main client in large scale road construction, Rijkswaterstaat, expresses emphatically that its intention is to retreat from the construction process as much as possible. On the supplying side contractors create a profile of themselves as providers of complete solutions and that they are able to undertake a project from initiation phase through the complete lifecycle of a project.

The projects outcome is therefore increasingly determined by contractor supply and the encountered trend is towards supply-driven market strategy.

2.4.7 Supply-driven market strategy (Living Building Concept)

The strategy proposed to the construction industry in this research is a supply driven market strategy based on the Living Building Concept (see paragraph 3.7). The living building concept is a drastic change in the view on the construction industry. The supplying party will proactively approach the market in stead of reactive on demand. The contractor develops products in advance of the demand of the client. Therefore it needs to do investigation in de market and on past and expected future demand. These highly standardised products can possibly be applied in more projects. The product systems are compiled to a client specific solution, and are fine-tuned in cooperation with the client (see figure 2.4-d). Because the contractor develops project independent subsystems that are applied in a variety of projects, the building process builds up certainty of outcome and at the same time fulfils clients' specific needs. The Living Building Concept has been applied to a couple of pilot projects⁸ and the construction market is increasingly putting emphasis on innovation⁹, however these contracts are not regularly applied yet. In public road construction projects, these procurement procedures have not been applied yet.

Parameter	Application
Demand specification	Demand is specified in minimal performance requirements and additional wishes. Thereby the final solution outcome has been framed in a solution space. Performance output is not fixed at tender.
Contractor selection	Selection on value / price.
Reimbursement, compensation	Continuous price development. Value added by a better performing solution is rewarded by a better price.

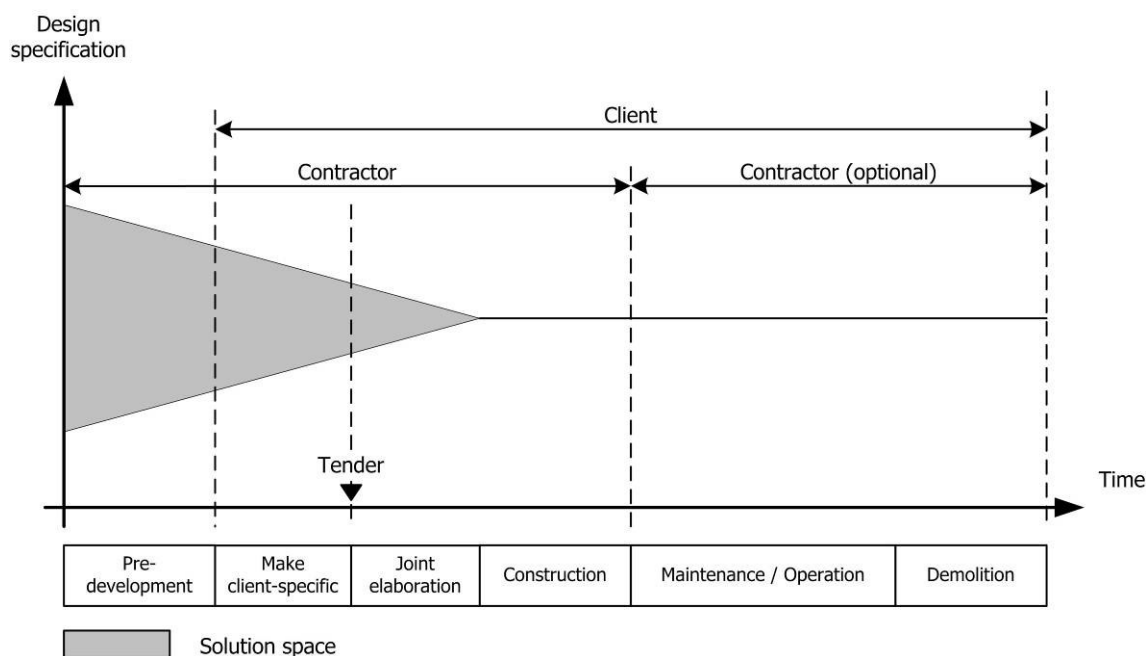


figure 2.4-d: construction processes, supply-driven approach, from Bijl (2008) adapted by the author

⁸ See www.livingbuildingconcept.nl

⁹ See the report "van aannemen naar ondernemen" (from contracting to entrepreneurship) on www.thebridge.nl

2.5 Innovation in Dutch road construction

Innovation has been deemed one of the key factors that can help the construction market in changing to a healthy profitable market. The rate of innovation seems to come of at a slower pace than in other industries, this especially accounts for the road construction market. This paragraph explores the current status of innovation in the Dutch road construction market and the difficulties that are encountered in the innovation of the road construction market.

2.5.1 Recent developments

Ooms Avenhorn Group, of which Ooms Construction is part of, has always had a strong focus on innovation. A separate R&D department is constantly doing research on asphalt products and innovative application of asphalt-related products.¹⁰ Besides that Ooms Construction is currently doing research on reduction of CO₂-emissions of their asphalt factories. Ooms Avenhorn group is attaining much value to their innovative reputation and therefore is eager to continually expand their supply of possibilities to the client.

The need for innovation was also noticed within Rijkswaterstaat and in 1998, they started an innovation program called "Wegen naar de toekomst" (Roads into the future), to brainstorm about possible innovations in road construction. The aim of the brainstorm was to generate creative solution to the problem encountered nowadays. Several of these new ideas have resulted in pilot projects¹¹ all over the Netherlands.

It is clear that in the Netherlands clients as well as suppliers recognise the need for development of the road construction market. However there are several complicating factors that are generally identified.

2.5.2 Complicating factors

It seems contradictory, but the innovation platform of Rijkswaterstaat does not erase the complicating factors of innovation, it reveals them. The contractor or supplying party isn't given the opportunity to apply innovative solutions due to fixed specification of demand and strict regulations implied by the same governmental organisation. In case these walls are broken down it is seen that there are possibilities and opportunities for innovative road construction. The traditional specification process results in the current situation of an innovation only providing competitive advantage if it is adopted by the client as the standard. The client will prescribe the product in its project specifications and the contractor benefits very well by the innovation. For instance in stead of asking for a certain performance of an asphalt layer, the Sealoflex-asphalt developed by Ooms has been adopted as the standard and has resulted in securing a lot of work.

Secondly as innovations are becoming more complex, there is need to use the often unknown expertise of other companies. This asks for more organisation, management and trust. The innovator needs to collaborate with other parties and the good partner has to be chosen. While companies are not used to collaborate on this level a lot of problems are encountered. This has resulted in little interdisciplinary innovations. Again with help of a subsidising government project come off the ground more easily.

Finally there is the problem of visibility and protection of the product innovations. The products that are developed in road construction as well as the construction processes on site are out in the open or at least the execution is done outdoors. Therefore innovations in construction are less protected against competitors that look over the contractor's shoulder. There is no guarantee system in construction and since traditionally the

¹⁰ For a total review on Ooms' innovative products see appendix A

¹¹ See www.wegennaardetoekomst.nl/toolbox

client is responsible for maintenance, the solution is given in drawings to the client. Therefore the contractor is less protected against copying than companies in other industries. Besides that the client in road construction wants to have as much competition between contractors as possible, at least it is obliged by laws and regulations to give multiple contractors the opportunity to tender for a road construction project. The client is therefore inclined to prescribe traditional methods instead of innovative products.

2.5.3 Conclusion

Innovation has been identified as a very important means of improving performance of the road construction sector. The complicating factors mentioned above have led to project-based innovations mainly on element level. It is a challenge for the industry to develop new solutions in the interdisciplinary field that can be applied project independently. The client can be very helpful to feed the innovation process by giving more room to the development of new ideas.

2.6 Characteristics of Ooms Construction's situation

This research focuses on the situation Ooms Construction is in particularly. This situation can be characterised as a medium-sized contractor company that is willing to participate in tendering for large scale construction projects. This has a few implications on the approach of the supply driven Living Building Concept market approach.

2.6.1 Need for partnering

As put forward in chapter 2 the medium-sized contractor companies in the Netherlands are specialised in one or two of the various expertises needed to tender for large scale road construction projects. While the demand of the government is too comprehensive to cope with alone, the medium-sized contractors are forced to act together. On one hand this is caused by lack of expertise in all fields, and on the other hand there are problems to generate enough capacity for the complete project. Moreover current pre-qualification requirements for large scale road construction projects prescribe an amount of experience in past project in all disciplines. This makes the need for partnering even more necessary.

The contractors can decide to collaborate as partners or in a client-subcontractor relation. The main difference between these two relations is that in the partnering situation the parties collaborate on the basis of equality and in the subcontracting situation the main contractor is a demander to the subcontractor, the supplier. Within both relations value management between different parties is important.

2.6.2 Joint product development

In the supply driven approach the supplying party is actively conquering market share with their pre-developed products. Therefore they should deliver products standardised at a high aggregation level. The standardised product has to be developed in collaboration with partners, because different expertises are combined to meet the needs and expectations of the client. Moreover the configuration of products and processes with each other will provide for a more efficient and profitable project delivery. The collaborating parties therefore have to compose products, product families and/or product systems together. This product development needs collaborative design and engineering on level of the product itself, as well as good agreements on the interface of the different expertises.

2.7 Conclusion

The figures in paragraph 2.1 show, that the construction market is heavily fragmented in terms of size and number of companies, and that it shows relatively low average profitability in comparison with other industries. The problems that are encountered are caused by the peculiarities of the industry and the traditional structure that is a result of these peculiarities.

The most important peculiarities encountered in construction industry are:

- One-of-a-kind approach of projects
- On-site production
- Temporary organisation
- Heavy price competition, focus on price instead of performance
- Fragmented in terms of number of specialised enterprises and integration of different actors in project phases (at the supply as well as demand side)

These peculiarities have led to the current traditional business structure within contractor companies and subsequently lead to the bad performance of construction industry. Therefore the peculiarities should be tackled in the proposed alternative supply-driven market strategy. This should lead to higher levels of performance and better customer value.

The main client in road construction industry has developed new procurement strategies to improve the performance output of projects. The development has inserted contractor knowledge in the design phase and tries to connect execution with design, maintenance and operation. These developments have not yet resulted in satisfactory outcome. The trends in procurement strategy of the road construction client points in the direction of a supply-driven market approach.

Ooms Construction's particular situation can be typified by three characteristics:

- Ambition to be a player in large scale road construction (national level / RWS client)
- Medium-sized contractor company specialised in mainly road paving and ground works
- Historically focused on R&D

This particular situation implies that medium sized contractor companies such as Ooms Construction don't have the wide range of disciplines in-house to take on a large scale road construction project independently. Therefore it needs to collaborate with partners to be able to do so. The challenge for Ooms Construction, as well as her partners, lies in aligning the supply chain from top till bottom.

3 Theories and concepts for a supply-driven market strategy

In this chapter the outcome of a literature study is presented about concepts encountered in general supply-driven industries. In accordance with the philosophy that the construction industry should be regarded as a normal consumer market, concepts that have been generally applied to normal markets are studied. In the next chapter the concepts are put into operation in a framework for the road construction industry.

3.1 Supply-driven market strategy

De Ridder and Vrijhoef (2007) propose a supply-driven push market for construction industry. In this new market strategy for both clients and suppliers, a responsive pull market with a high level of client interference is replaced by a proactive push market with less client interference. From a conceptual perspective, a supply-driven construction industry contains that concepts or designs are less client-specific and more pre-developed. figure 3.1-a depicts the path from the traditional demand-driven industry towards a supply-driven industry. The right triangle in the figure indicates that only a small share of pre-contractual tender work is needed in an early project phase. Contractors already have virtually pre-engineered product families which can be made client-specific in accordance with specific wishes and requirements. Several variables could be altered in order to customize conceptually standardized products.

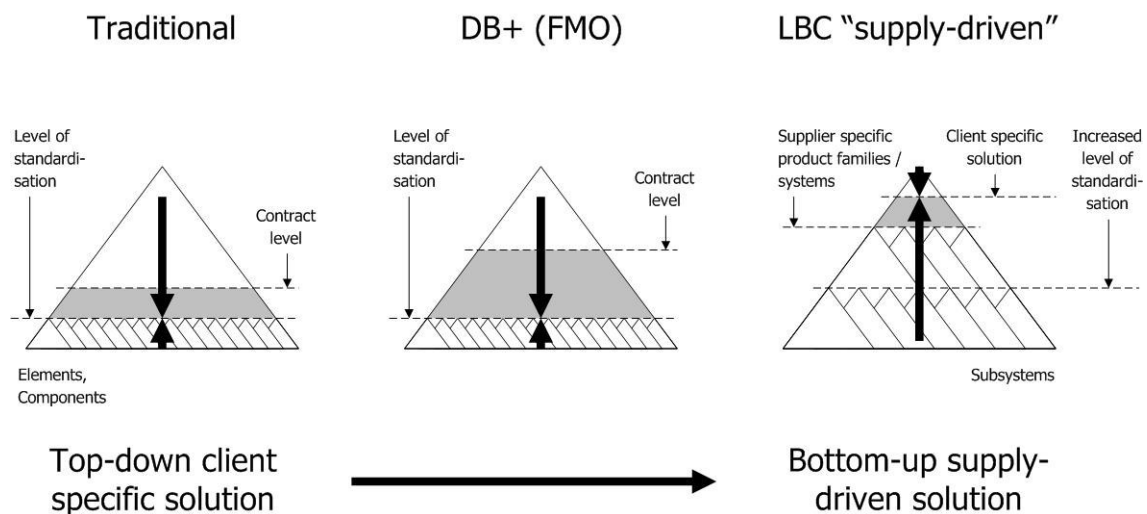


figure 3.1-a: path towards a supply-driven market approach in construction (Ridder and Vrijhoef 2007)

From the contractor's perspective the main objectives in the supply-driven construction process is (1) to develop a product that serves the client's demand and (2) to organise the product delivery process in the most effective and efficient manner. The change in approach of the construction assignment has great implications on the business processes within the contractor company as well as their collaboration with the companies in their business environment, such as suppliers and clients. The contractor company is no longer confronted with a highly specified demand, but it should develop products for the market. The initial task for the contractor is therefore to identify the demand in the market. Along this demand the contractor should also on its own initiative create a supply chain that succeeds in fulfilling the needs of the client.

In the preceding chapter a couple of peculiarities of construction have been identified, that have led to the current business structure within contractor companies and the entire industry, and subsequently to have lead to the shortfall in performance of construction. The supply-driven market approach on the other hand strives for a more stable production environment for construction contractors and therefore better value delivery to the client. The characteristics of the traditional approach and characteristics of the alternative supply-driven approach are depicted in table 3.1. The one-of-a-kind approach in construction projects in a supply-driven market is replaced by developing project independent solutions (in product designs, execution processes and arrangements) that can be made specific to the client's wishes. This approach increases repetition and provides the advantage of economies of scale and a learning opportunity. By focusing on construction site logistics the contractor can in the development of products reduce the negative effects of on-site production environment. The stable production environment is associated with project-independent collaborating suppliers, the temporary organisation and the fragmented character of the construction supply chain should therefore be replaced by an integrated collaborative one.

Traditional approach	Supply-driven market strategy
One-of-a-kind approach of projects	Repetition and project-independent solutions
On-site production	Product development focused on construction logistics
Temporary organisation	Long-term project-independent collaboration
Client interference and resulting focus on price	Supplier specific products, value and client focus
Fragmented / lack of integration	Integrated supply chain with share goals

table 3.1-a: peculiarities traditional approach and supply-driven market strategy characteristics

The hypothesis is that a supply-driven market strategy is better able to tackle the peculiarities of construction industry than the traditional approach. In the following paragraph theoretical concepts that are used in general consumers industries are investigated to come to a desired alternative business structure that matches the supply-driven market strategy and along with that resolves, reduces or better manages construction's peculiarities.

3.2 Marketing

In traditional construction industry there has been paid little attention to the concept of marketing. This certainly accounts for contractor companies. One could in fact argue that there has never been any need to (Caniels, 2007), because the product delivered is not developed by the contractor company itself and the contractor is mainly selected based on price. In a supply-driven construction market however the marketing concepts become important since the contractor should develop products for the market, and therefore gain insight in the client's wishes.

The concept of marketing is described by Kotler and Anderson (1994) as a social and managerial process by which individuals and groups obtain what they need and want through creating and exchanging products and value with others. In other words marketing is about all business activities that bring together the buyers and sellers.

3.2.1 Core marketing concepts

In marketing literature (Kotler and Anderson, 1994) the market is described through the five core marketing concepts as depicted in figure 3.2-a. In needs and wants the felt of deprivation by people is captured. Since people have limited resources, they choose products that provide the most satisfaction for their money. When backed by buying power wants become demands. People satisfy their needs and wants with products. The concept of product is not limited to physical objects, anything capable of satisfying a need can be called a product, i.e. physical objects, services, persons, places, organisations, activities and ideas. In road construction for example not only the constructed works itself is a product, the additional maintenance, operation, financial and other services are considered to be part of the product as well.

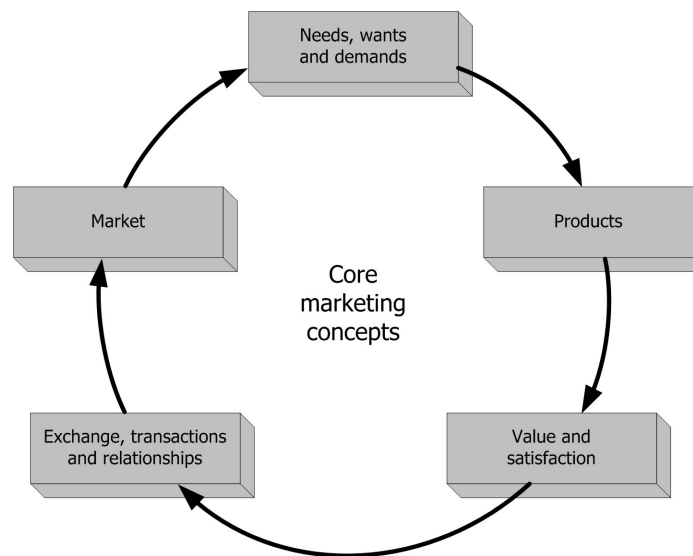


figure 3.2-a: core marketing concepts (Kotler and Anderson, 1994)

Customers usually face a broad array of products that might satisfy a given need. The guiding concept in this choice is customer value. Value is a measure of the capacity of a product to satisfy a customer's need. The customer will therefore always choose the product with the most value. Marketing occurs when people decide to satisfy needs and wants through exchange. An exchange is measured in transactions. A transaction involves at least two things of value, conditions that are agreed upon, a time of agreement, and a place of agreement. Transaction marketing is part of the larger idea of relationship marketing. Smart marketers work at building long-term relationships with valued customers, distributors, dealers and suppliers.

3.2.2 Marketing management philosophies

Through time marketers have developed several marketing management philosophies. The marketing management philosophies describe the possible basic thoughts underlying a marketing strategy of a firm. The three most interesting to construction are the following:

The **product concept** holds that consumers will favour products that offer the most quality, performance, and innovative features, and that an organisation should thus devote energy to making continuous product improvements.

The **marketing concept** holds that achieving organisational goals depend on determining the needs and wants of target markets and delivering the desired satisfactions more effectively and efficiently than competitors do.

The **societal marketing concept** holds that the organisation should determine the needs, wants and interest of target markets as in the marketing concept. Additionally it should then deliver the desired satisfactions more effectively and efficiently than competitors in a way that maintains or improves the consumer's and the society's well-being.

3.2.3 Marketing strategy and the marketing mix

The strategic plan defines the company's overall mission and objectives. Within each business unit, marketing plays a role in helping to accomplish the overall strategic objectives. Marketing's role and activities in the organisation are shown in figure 3.2-b, which summarises the entire marketing process and forces influencing company marketing strategy.

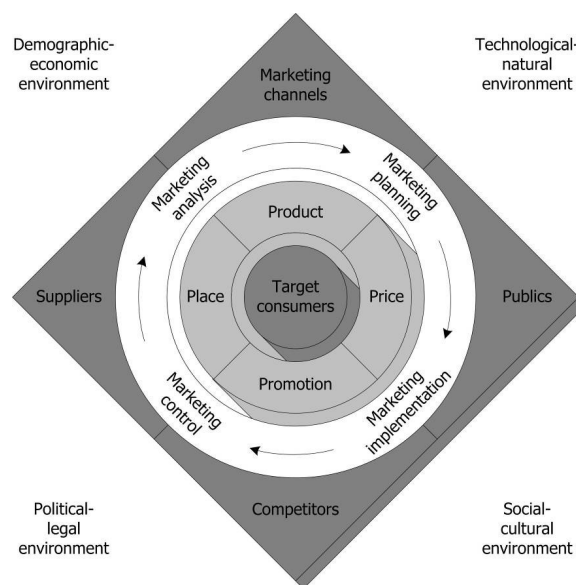


figure 3.2-b: factors influencing company marketing strategy (Kotler and Anderson, 1994)

Once the company has decided on its overall competitive marketing strategy, it is ready to begin planning the details of the marketing mix. Marketers have defined a set of tactical tools that companies have at their disposal to establish strong position target market. These tools are referred to as the marketing mix and are grouped in the "four P's": product, price, place and promotion (figure 3.2-c). The marketing mix is one of the major concepts in modern marketing.

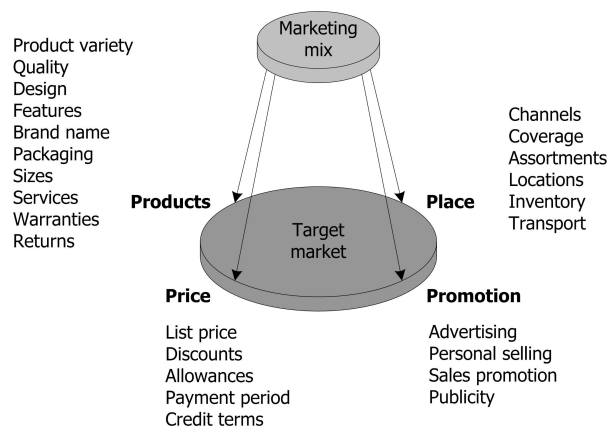


figure 3.2-c: the four P's of the marketing mix (Kotler and Anderson, 1994)

Product means the “goods-and-service” combination the company offers to the target market. Price is the amount of money customers have to pay to obtain the product. Place include the activities that make the product available to target customers. Finally promotion means the activities that communicate the merits of the product and persuade target customers to buy it. An effective marketing program blends all of the marketing mix elements into a coordinated program designed to achieve the company’s marketing objectives.

3.2.4 Conclusion

A substantial change in the way of thinking should be implemented in the contractor’s, client’s and supplier’s attitude. In stead of a supplier surprised with the demand, the client should be surprised by the supply. The most important issue to be learned from marketing in this perspective is that the main objective of the contractor company should be to create value for the customer. The contractor should therefore focus on customer satisfaction to distinguish from competitors in the market. The distinct value-adding capacity of a company puts it in competitive advantage and therefore to higher profitability of the company. In the next chapter is described how integration of the organisation’s activities as well as integration of the entire supply chain should be focused on value delivery.

3.3 Supply chain management

In accordance with the marketing principles of the preceding chapter a contractor adapting a supply-driven strategy should consider itself to be a value delivering entity. Together with the supplying partners a contractor forms a value delivery system, i.e. the supply chain. This value delivery system competes with other value delivery systems and therefore competitive advantage stems from the optimisation of value creating capacity of the entire delivery system.

3.3.1 Porter’s value chain

The value chain is a concept from business management that was first described and popularised by Porter (1985). Porter describes a firm as a collection of activities that are performed to design, produce, market deliver and support its product. All these activities can be represented using a value chain, depicted in figure 3.3-a.

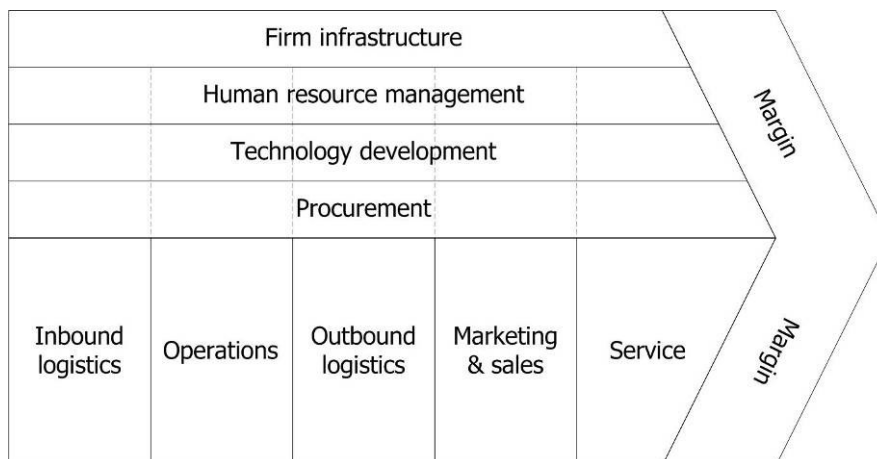


figure 3.3-a: Porter's (1985) value chain

The value chain disaggregates a firm into its strategically relevant activities in order to understand the behaviour of costs and the existing and potential sources of differentiation and thus competitive advantage. Porter categorises the generic value-adding activities of an organisation in two main categories; the primary activities and support activities. Primary activities are involved in the physical creation of the product and its sale and transfer to the buyer as well as after sales assistance. The primary activities include inbound logistics, operations, outbound logistics, marketing and sales, and services. Support activities support the primary activities and each other by providing purchased inputs, technology, human resources, and various firm wide functions.

All business activities are aimed at delivering value and a firm's competitive advantage stems from the ability to perform the activities more efficiently than its competitors. Competitive advantage frequently derives from linkages among activities just as it does from the individual activities themselves. Although value activities are the building blocks of competitive advantage the value chain is not a collection of independent activities but a system of interdependent activities. For example, purchasing high quality, pre-cut steel sheets can simplify manufacturing and reduce scrap.

3.3.2 Value system

A firm's value chain is embedded in a larger stream of activities that Porter (1985) terms the value system, illustrated in figure 3.3-b.

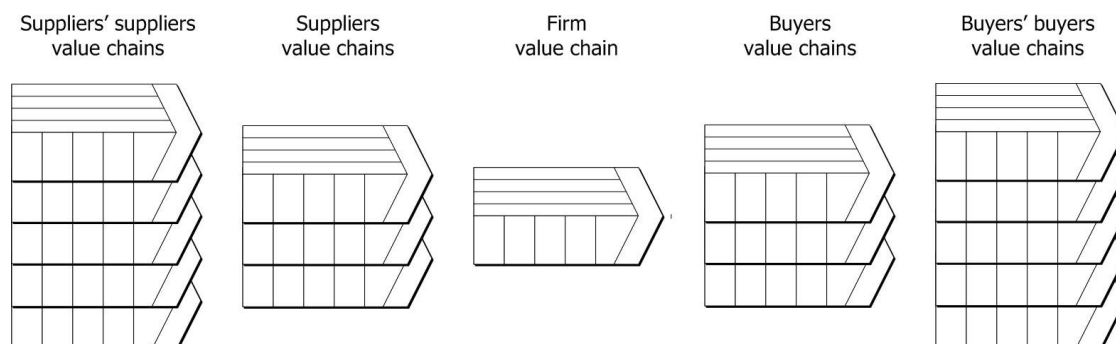


figure 3.3-b: Value system(s), (Porter 1985), adapted by the author

Suppliers have value chains that create and deliver the purchased input in a firm's chain. Suppliers not only deliver a product but also can influence a firm's performance in many other ways. In addition, many products pass through the value chains of channels on their way to the buyer. Channels perform additional activities that affect the buyer, as well as influence the firm's own activities. A firm's product eventually becomes part of its buyer's value chain. The ultimate basis of for differentiation is a firm and its product's role in the buyer's value chain, which determines buyer's needs. Gaining and sustaining competitive advantage depends on understanding not only a firm's value chain but how the firm fits in the overall value system.`

3.3.3 Supply chain management

One of the most significant paradigm shifts of modern business management is that individual businesses no longer compete as solely autonomous entities, but rather as supply chains. (Lambert and Cooper, 2000) Supply chain management has therefore become an important tool in current business practice. There is no explicit description of supply chain management or its activities in the literature, but for this research the following definition of Harland (1996) is adapted.

"Supply chain management is the management of business activities and relationships (1) internally within an organisation, (2) with immediate suppliers, (3) with first and second-tier suppliers and customers along the supply chain, and (4) with the entire supply chain. Supply chain management is the management of a network of interconnected businesses involved in the ultimate provision of product and service packages required by end customers."

Ludema (2003) stresses that within the new business environment the company is not the central issue anymore. It is obvious that only the right supply chain can fulfil the customer's need for a product or service. A company as such is only one of many in a supply chain or supply system. It is not the company but the supply chain that makes a difference in succeeding to fulfil the needs of the customer in an effective and efficient way. The ultimate consumer judges product or service appreciation only in respect to the products and services he or she eventually receives, and is not at all interested in malfunctions in the communication between suppliers and retailers. This means that only the extent in which a total supply chain succeeds in fulfilling the needs of the customer determines the competitiveness and profitability of all within the chain partitioning companies. This means that before the ultimate goal of satisfying the customer can be reached, all processes within a supply chain have to be aligned and coordinated.

3.3.4 Supply chain models for construction

The supply chain in production industries is often modelled as depicted in figure 3.3-c. The material flows through the supply chain from left to right, from raw material suppliers to part manufacturers that supply product assembly value chains. At last via sales companies the product enters the user of consumers value chain. The information flow consisting of demands, orders and forecast goes through the supply chain the other way. The information flow goes back and forth and thereby demand and supply are geared to each other. This model is geared to manufacturing industries and obviously complies with the material and information flows in normal production industries, where products are transported from supply chain member to supply chain member.

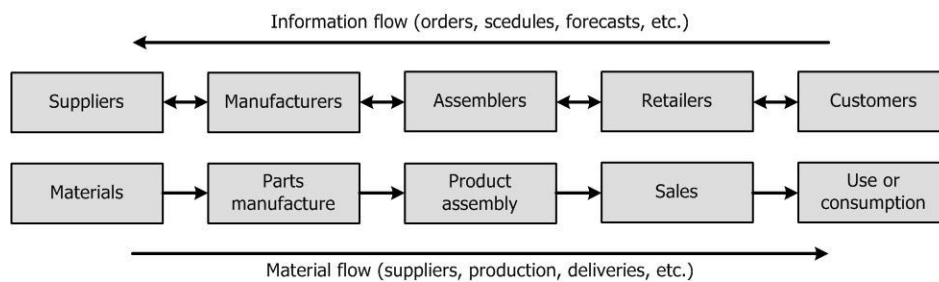


figure 3.3-c: Generic configuration of a supply chain in manufacturing (Vrijhoef and Koskela 2000)

Construction supply chains, especially in the traditional approach tend to be construction in another way. Vrijhoef and Koskela depict the construction supply chain as in figure 3.3-d. In the development phase the information flows from right to left through the supply chain. In this phase there is distinction between the definition and design phase that is executed by the principal and its consultants and the planning and price development of the main contractor. When the construction starts a supply chain arises that executes the designed works. The construction supply chain incline to be relatively fragmented and it does not give feedback on supply until the constructed works are handed over to the principal (or client) information flows only.

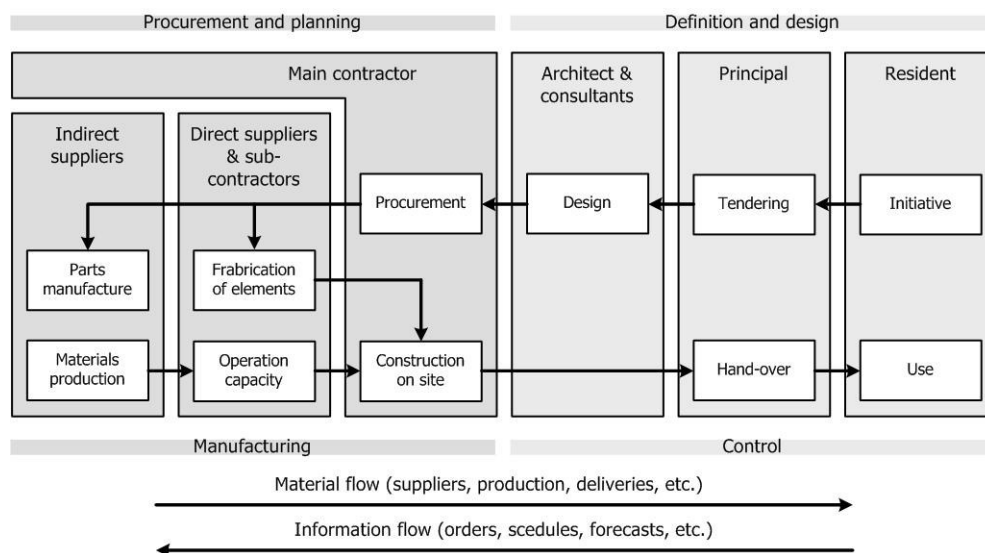


figure 3.3-d: Vrijhoef & Koskela (2000), edited by the author

3.3.5 Conclusion

Since the supply-driven market strategy implies less client interference in the development process of road construction industry the contractor, subcontractor and supplier companies are themselves responsible for the design of project delivery process. These parties should therefore broaden their scope from solely executing a design in order of a client of main contractor to value delivery in the construction supply chain. The contracting companies thereby become interdependent supply chain members and should put effort in supply chain management aimed at value delivery for the ultimate client in the most efficient way. Integration and coordination of their activities therefore become of the greatest importance.

3.4 Complex product systems and systems integrator

In the preceding paragraph is shown that the entire supply chain should be regarded if one studies the project delivery process in construction. Construction supply chains tend to be relatively fragmented and disintegrated. A lot of specialised parties are involved in the delivery process of large infrastructure projects. Therefore the integration and configuration of actors' activities is an important and comprehensive task. Vrijhoef and de Ridder (2007) assign this task in the project delivery process to the supply system integrator. This corresponds with scientific literature about the role of system integrator in other 'normal' production industries. (Miller, 1995; Hobday et al., 2005; Rutten et al., 2007; Davies et al., 2007). This paragraph describes the system integrator role in detail.

3.4.1 Origin and definition

The term system integrator originates from the military industry in the United States of America (Hobday et al., 2005). Because of new weapon systems becoming increasingly complex, the configuration of the different components of the weapon system became a difficult task in the development process. The role of the system integrator was born. Its main task was to integrate the various components into a functioning system. Nowadays several industries (e.g. aerospace industry, maritime engineering and IT) have adopted the system integrator in their project delivery system. In construction there are still no contractors that explicitly present themselves as a system integrator role. Contractors should get involved in the system integrator's task, because the large scale projects ask for it. Davies et al. (2007) define a system integrator as:

"A prime contractor organisation responsible for designing and integrating product and service components supplied by a variety of external suppliers into a functioning system for an individual customer"

From this definition the three following main characteristics of a system integrator can be deduced:

- The system integrator has responsibility to the client for designing and producing a functional system. This responsibility is drawn up in a contractual agreement between client and system integrator;
- The organisation composes the system out of components delivered by several external parties. Apart from physical components, this can also apply for services;
- The organisation develops the system for an individual specific client.

The system integrator role as described by Miller (1995) and Hobday et al. (2005) is similar to the supply system integrator role in Vrijhoef and de Ridder (2007). Whereas Vrijhoef and the Ridder describe a system integrator role at the demand side as well, this is not described in the other literature. This is depicted in figure 3.4-a. This research is focused on the supply side of the construction process, so further investigation in the demand system integrator role is not in the scope of this research. It should also be noted here that the system integrator role in construction can be undertaken by a contractor, as well as an architect or engineering firm.

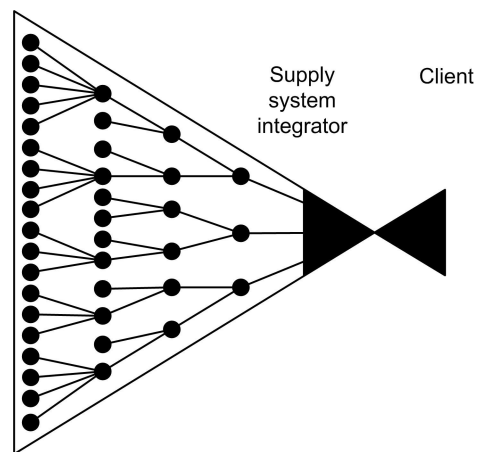


figure 3.4-a: client and supply system integrator (Vrijhoef and de Ridder 2007), edited by the author

3.4.2 Complex product systems (CoPS)

The role of system integrator is allied to what Miller (1995) calls complex product systems. These products exist of a large number of components and subsystems. The complexity of the product system is not only caused by the difference in kind and variety, but also they belong to different and often distant technological fields. Among other industries such as industry such as aerospace industry, maritime engineering and IT, construction is called a complex product systems industry.

CoPSs are distinguished by the following characteristics:

- The product is existing of a relatively large number of components/elements;
- These are interconnected and customised components/elements organised in a hierarchical way;
- The components are produced by a large number of specialised companies/manufacturers;
- Nonlinear and continuously emerging properties where small changes to one element of the system can lead to changes elsewhere in the system;
- A high degree of user involvement in the development process.

During the development of a CoPS a lot of different disciplines, specialities and actors are working together. Consequently the configuration of the different activities is a difficult and comprehensive task. The risk of problems with gearing activities to each other is relatively large. Therefore the system integrator task should be regarded as a separate task in the product delivery process.

CoPS industries deliver client specific products. This means that the product is tuned to one client's specific needs and wishes and is produced in one-off projects or small highly tailored batches. So for each product the collaborating supply chain of disciplines and specialists should be configured to a specific solution. Therefore it is impossible for complex product systems industries to deliver products from stock.

3.4.3 System integrator activities

In CoPS industries the product is established by a large number of mostly specialised firms. The system integrator is responsible for delivering a product that serves the clients needs and therefore it should perform a

couple of basic activities. Two main activities of the system integrator come forward in scientific literature. (Hobday et al., 2005)

1) Establish a network of suppliers and partners

System integrators compose a network of firms that develop the system for the client. It is responsible for starting the supply network, the contractual arrangements within the network and the distributing of tasks and responsibilities. He also determined the character of mutual arrangements.

2) Coordination of the activities in the supply network

After establishing the network the system integrator coordinates the activities within the project delivery process. The coordination of the delivery process mainly contains of tuning and configuration of different activities to assure consistency and coherence of the system.

As issued earlier the components are organised in a hierarchical way and customised to client's specific demand. Therefore the coordination is taking place between elements suppliers, component suppliers, subsystem aggregators and at system level in the project delivery process. Therefore coordination is needed throughout the complete supply chain with constant focus on the client's demand. Therefore it is possible that next to the main system integrator there can be component integrators and subsystem integrators as well.

System configuration

On the system configuration level the system integrator is coordinating and configuration the design and production of a system for a single client. While the greater part of the needed components is supplied by external parties, the system integrator configures the system as a whole. This is done on a project basis. The goal is to meet the requirements and wishes of the client and that the project delivery is within time and budget constraints. This form of system integration is driven by single client orders.

Innovation of the system

Innovation of the system considers improving the system performance for future customers. Innovation of the system can be divided into two types of system innovation (Henderson and Clark, 1990);

- Integration of new products into the system (modular innovation)
- The development of an entirely new combination of existing components

In this case the goal of the system integrator is of more long term strategic character: improving competitive position in the market and therefore advantage over the competitors. This is done by distinguishing from other competitors in the market. This type of system integration is driven by future client requirements or changing regulations.

3.4.4 Conclusion

As argued in the introduction of this paragraph (road) construction can be regarded to be a complex product system industry. In a road infrastructure project numerous specialised contractor companies collectively have to provide for the complete product, i.e. the constructed works and services (maintenance, operation, etc.). The supply-driven market strategy implies that the contractor company by itself provides for a supply chain able to deliver this complete company. Whereas in a demand-driven market the principal contractor organises the supply

chain along a prescriptive design, the integration of activities, products and processes has already been provided for when the contractor enters the construction process.

If the preceding concept of system integrator is translated to the building practice it put the following criteria to the construction system integrator; The system integrator takes full contractual responsibility for the design and execution of the project. It guarantees the quality, performance and price of the entire project. Secondly it purchases the greater part of the components and labour at external suppliers and contractor companies. This can also hold for services in the field of maintenance, operation and finance. Furthermore it configures the constructed works to specific client's needs.

3.5 Production processes

Previously in this research it is argued that the production process (the process of project delivery) in supply-driven construction should resemble the production process in normal manufacturing industries. In this paragraph the regular manufacturing processes of normal production industries is analysed to give insight in alternative production processes for the alternative approach to construction.

An important distinction to make is the fact that in normal production systems the design is already 'in place' and production can only start when a design is finished. In construction, when a client traditionally places an order, this is first a design-order for the consulting engineer after which the production-order is directed to a supplier (contractor). Now, in a situation where design and construction (production) is the responsibility of only one party, in which that party also has the freedom to use its own creativeness and standardize up to a certain level, more understanding of design and production orders is needed.

3.5.1 Construction process as a manufacturing process

According to Winch (2003) all products produced by discrete assembly industries, including construction, go through a distinctive life-cycle of:

- concept: the functionality of the product needs to be defined in relation to a particular market demand.
- design: the product needs to be engineered, and detailed. This information is typically captured in an engineering drawing.
- planning and control: the process of manufacture needs to be planned and then controlled against the plans.
- manufacture: the discrete components and sub-assemblies which make up the final product must be transformed from raw materials into their final form.
- Assembly: the discrete components must be assembled to create the finished product.

Now a new categorisation can be developed, defined in terms of where the customer entered the production information flow. Rudberg and Wikner (2004) describe a similar distinction of strategies in production and logistics industries. They argue that now a decision has to be made at which point the customer order enters the production process. Hence, tradeoffs must be made and customers have to choose one before the other; low price (productivity) or specific needs (flexibility).

In manufacturing five generic production strategies are identified (see figure 3.5-a):

Concept-to-order (CtO), where the client enters at the start of the information flow – nothing happens until the client initiates production.

Design-to-order (DtO), where the firm has already a basic product concept, but significant engineering design work is performed for that particular client both pre-bid and pre-contract.

Make-to-order (MtO), where there is a fully detailed design which can be configured to suit a client's particular requirements (MtO/C), this is known as mass customisation – or where no additional design work needs to be done, but the materials flow does not start until the client places an order.

Make-to-forecast/stock (MtF), where the product is produced for stock and sold after it is manufactured or, sometimes, during manufacture.

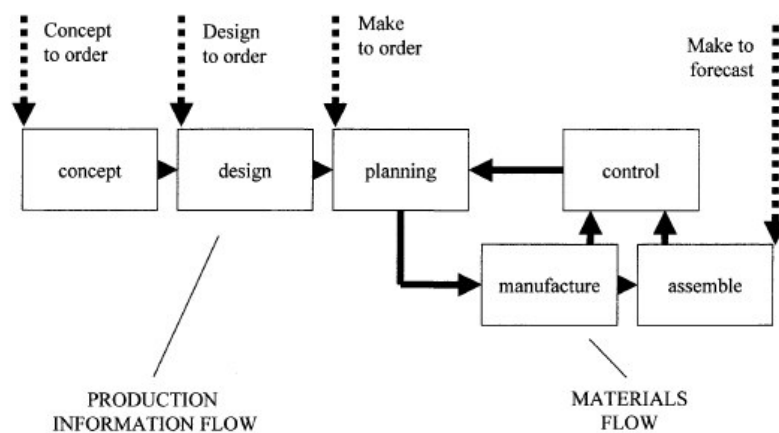


figure 3.5-a: production strategies and process flows, adopted from Winch (2003)

3.5.2 Conclusion

In attaining a more stable production environment by contractor companies it is expected that their production strategies are changing accordingly. Throughout the entire supply chain pre-engineered products are developed and offered to the market. Similar to other manufacturing industries, companies in construction will change their production strategy from concept-to-order (one-of-a-kind approach) to more repetitive production environments (design-to-order and make-to-order). These production strategies will be an important basis for acquiring a more stable and repetitive production environment, with opportunities in learning and economies of scale.

The authors in the scientific literature mostly elaborate on the production strategies as being characteristic for a certain production line. This research however presumes that different supply chain members can attain different production strategies. This division is further put into operation for road construction in paragraph 4.3.

3.6 Lean manufacturing principles

It was argued earlier in the research that contractor companies should aim to develop a stable production system that at the same time is able to cope with specific client needs. This asks for a adaptable supply chain with focus on time, flexibility and responsiveness of to survive or create competitive advantage. As a reaction to a similar situation in the Japanese automotive industry, Toyota developed the Toyota Production System, with according lean principals. Womack et al. (1990) have exhaustively investigated these principles that are the reaction of

Toyota to mass production techniques used in manufacturing Ford automobiles. In this paragraph the aspects interesting to construction are discussed.

3.6.1 *Aim of lean manufacturing*

Lean manufacturing is a production practice that considers the expenditure of resources for any goal other than the creation of value for the end customer to be wasteful, and thus a target for elimination. That way a highly flexible and efficient supply chain will develop. In order to establish a context for lean manufacturing principles two techniques of manufacturing are interesting to discuss; craft production and mass production. Before the industrialisation skilled craftsmen with general tools made products to exact customer standards. The results were low efficient production systems and therefore customer goods were not available to a large public. The industrialised mass production systems on the other hand have been identified as much more efficient, but highly inflexible and therefore not able to cope with contemporary changing market requirements and wishes.

If a parallel is made to construction the traditional construction process is similar to that of craft production. Each project is entirely customise to a certain unique situation. The repetition is low and therefore the production process is a case of re-inventing the wheel over and over again. The production system should however develop to a highly flexible, adaptable and still industrialised process.

3.6.2 *Lean manufacturing principles*

The lean manufacturing aims to reduce wasteful aspects of production, and thereby deliver customer value efficiently. A stable production environment is created and from there a process of continuous improvement and adaptation to customer needs is strived for. To reach this process of continuous improvement the following lean principles can be distinguished:

- continuous improvement, flexible production system
- integration of process and therefore optimising flow
- Cooperative relationships with suppliers
- Free information flow through the supply chain
- Long term relationships with suppliers, partners and customers

In construction these principles can replace the current fixed and rigid production environment with adversarial relationships and large amounts of rework and waste.

3.6.3 *Collaboration in lean manufacturing*

The lean model of supply-chain integration draws from the evolution of Japanese sub-contracting relationships, and the reversal of adversarial supply chain policies towards patterns of integration (Nishiguchi, 1987 form Hines and Rich, 1997). The manifestation of these collaborative strategies has been a highly structured and tiered supply chain. The focal purchasing organization of the supply chain (for instance Toyota in the automotive industry) is supplied by a comparatively small number of direct suppliers, who provide entire sub-assemblies rather than component parts. The traditional parts suppliers, who no longer service the material requirements of the focal organisation, instead provide parts to the direct suppliers. This new elongated supply-chain structure allows the externally integrated organization to evolve and maintain the control associated with vertical integration but without committing the organization to in-house technologies. figure 3.6-a demonstrates the tiered approach to the supply chain.

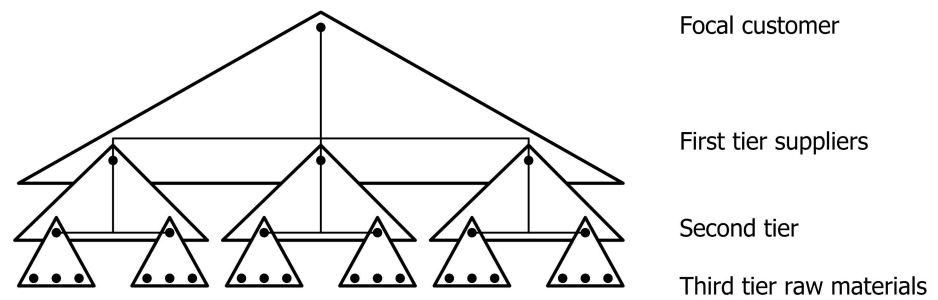


figure 3.6-a: tiered supply chain approach (Rich and Hines, 1997)

A couple of benefits of collaborative, rather than adversarial, working relationships within and beyond the organisation in the tiered supply chain approach are identified by Rich and Hines (1997):

- preference for dealing with a limited number of firms when placing or filling orders
- preference for long-term, ongoing relationships;
- preference for close relationships between core firm and sub-contractor, which allow extensive exchange of information;
- close attention by the core firm to the quality of management when selecting sub-contractors;
- sharing in the fruits of growth

The first tier suppliers are associated with a mutually benefiting group of a company's most important subcontractors, brought together on a regular basis for the purpose of co-ordination and co-operation as well as to assist all the members to benefit from the type of development.

The strategy recognizes the limitations of a price-oriented approach and attempts to create a system which is focused on the timely exchange of materials and information. As such, collaborative strategies focus on the quality, total acquisition cost, and delivery of products which ensures the operational efficiency of the purchasing organization as well as attempting to create new capabilities, such as rapid design processes, which will enhance the effectiveness of new products in the consumer market.

3.6.4 Conclusion

The road construction supply chain and project delivery process should be designed that it can provide customised solutions to different client specific wishes. A stable, but flexible

3.7 Living Building concept

The Living Building Concept is the description of a totally new view on construction market strategy developed by de Ridder in collaboration with the Delft University of Technology. It has been at the basis of the supply-driven market strategy approach that is elaborated in this research. It presents an alternative approach to the delivery and life cycle of built products. The starting point is to regard construction as any normal market and apply the market principles accordingly. Within this market strategy the supply chain needs to develop activities like marketing, research, product development and branding in order to stay in touch with the consumers (Ridder & Vrijhoef 2003). In stead of the current top-down reactive a bottom-up proactive approach is proposed. This way the earlier identified problems of fragmented character, lack of innovation, focus on lowest cost in stead of

quality, gap between design and construction and the distance between client and end-user should make place for collaboration, innovation and focus on performance.

3.7.1 The dynamic transaction model

The basic thought behind the Living Building Concept is that construction problems have to be treated as dynamic processes in stead of the current static view. De Ridder and Vrijhoef (2007) argue that for many reasons there is always a need for some kind of change during the development process of a built object, the same accounts for the whole life cycle of a building. Firstly at the start of a project demand specification is basically always incorrect or incomplete, because it is impossible to demand before knowing what is available and possible. Moreover demand is logically subject to change during the lengthy life cycle of the built facility, because of changing requirements over time. Living Building Concept aims to increase the benefit for both demanding and supplying party, by focusing on the maximisation of the gap between value and costs of the built object (see figure 3.7-a).

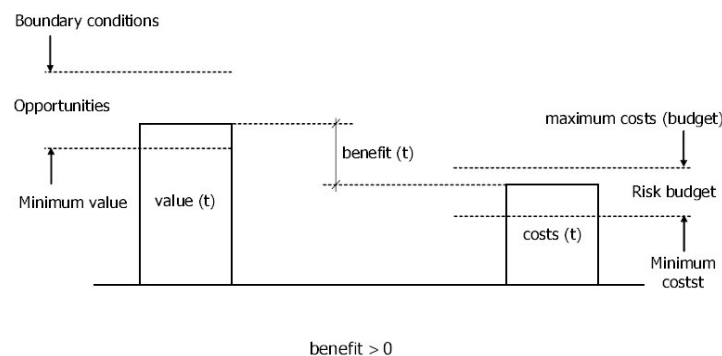


figure 3.7-a: The essence of delivering value in the build environment (Ridder & Vrijhoef 2007)

This is regarded to be a dynamical process and therefore the value and cost have to be considered changing variables over time. At the start of the building process the client has determined the maximum costs (budget) and the minimum value and costs by drawing up minimum requirements. The boundary conditions determine maximum possible value. This way a risk budget is created that enables the contractor to create additional value by meeting additional wished of the client or surprising him with extra value that can possibly be created. The basic transaction model enables the supplying and demanding party to collaborate and achieve the highest possible benefit to the mutual advantage of both (see figure 3.7-b).

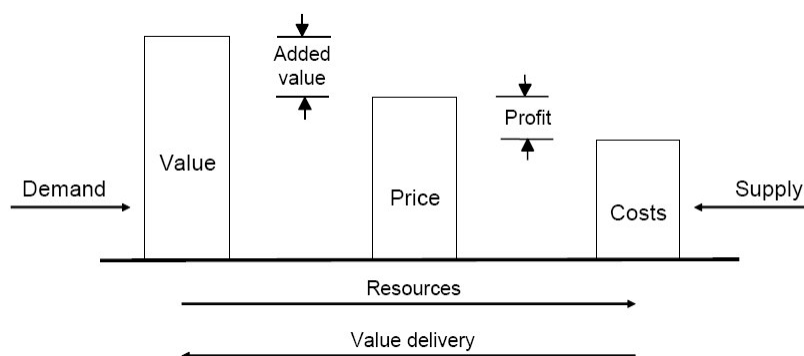


figure 3.7-b: basis transaction model between demanding and supplying parties (Ridder & Vrijhoef 2007)

3.7.2 Demand and supply strategy

In contrary to the current fixed price procurement strategies Living Building Concept proposes a procurement process based on a dynamic continued process of price development: it starts with an initial price for initial design, through a final price for actually measured additional output at the moment of delivery, and next constant measurement of delivery of life cycle value. In this process the demanding party constantly aims for maximum 'value for money'. Hence lowest price is not necessarily the client's main criterion and driver.

The supplying contractor has to deliver the client a best value offer, for a premium price. This is only the case when they have full insight in the behaviour of and the costs of their competitive offer. Therefore the contractor should proactively pre-develop its supply for the construction market. This bottom-up product development results in an increased level of standardisation (see figure 3.7-c). In collaboration partnering suppliers use joint research and development to create further aggregated products, i.e. supplier specific product families. These supply chains use branding and marketing in order to know the consumers' wishes and satisfy their demands proactively, so the development of product families and product modules is a result of market research and technical research.

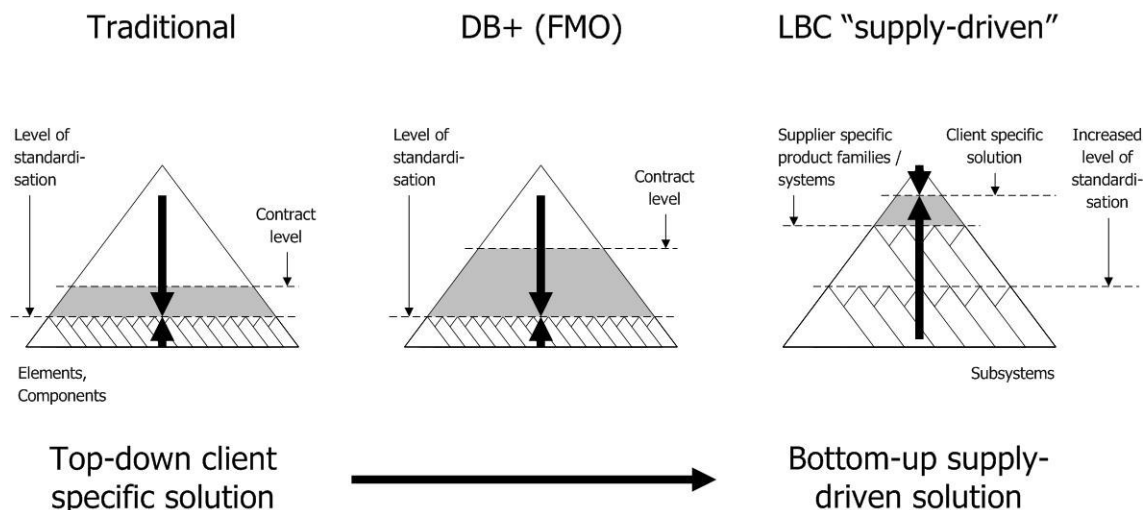


figure 3.7-c: Path toward push market in construction (Ridder and Vrijhoef 2007)

A higher level of standardisation will not only lead to better and cheaper solutions but also to significantly lower transaction costs when compared to the traditional situation. The difference is that the supplier will offer his own product, and possesses all related knowledge needed to supply the product.

3.7.3 Changing role for the contractor

De Ridder (2006 and 2006a) takes departure from the idea that the traditional three party system in construction will change into a separation of parties demanding value for money and supplying parties who receive money for value. (see figure 3.7-d) In construction, production system and the supply chain in particular have been identified to be relatively disintegrated. Construction as such is a less structured industry compared to other industries, with a vast network of actors of different kinds and with different interests around a project, i.e. the development and construction of a built object. A more integrated approach to construction has often been identified as a solution for the many problems and deficiencies existing in construction.

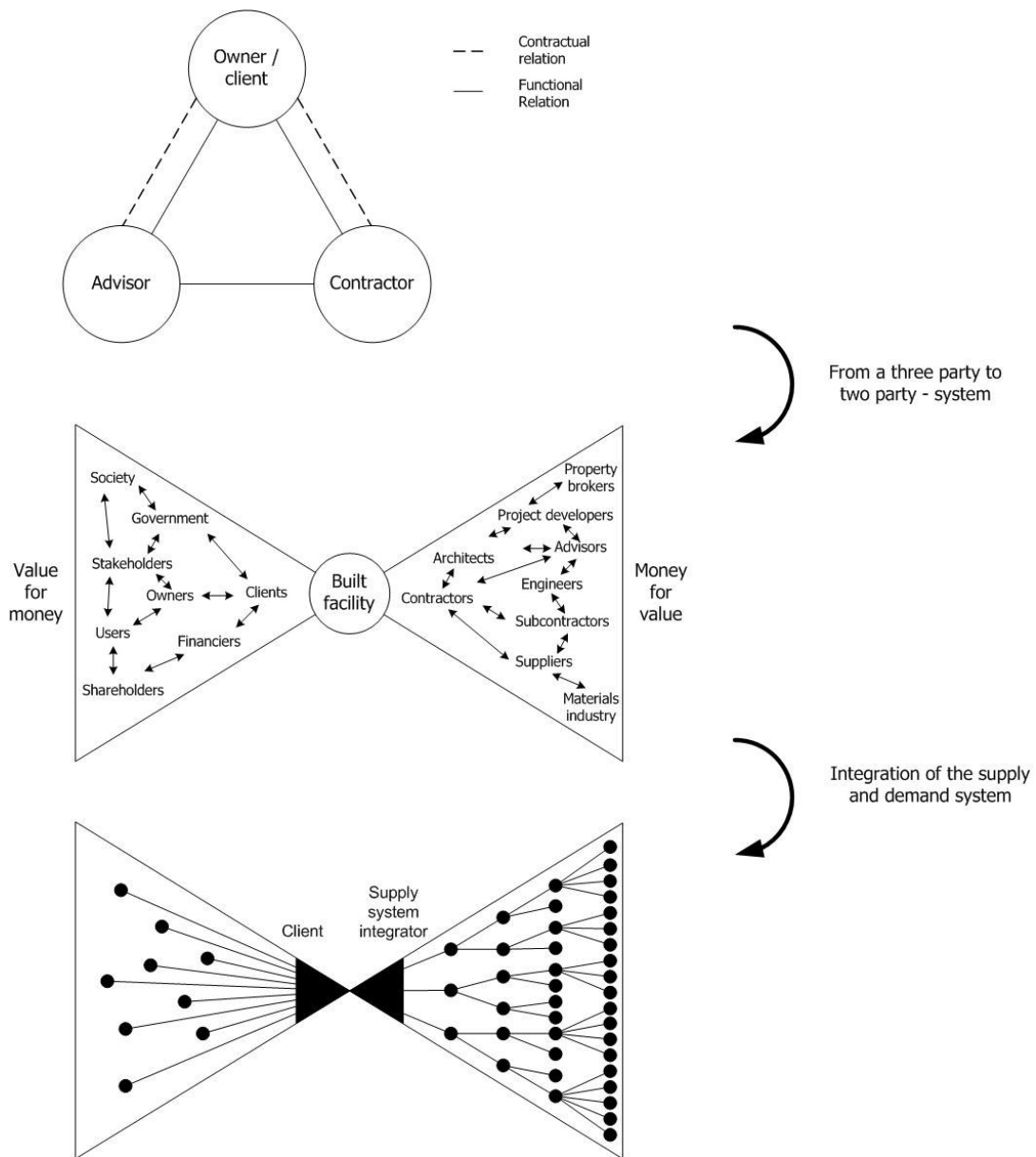


figure 3.7-d: the change from the traditional three party system to demand and supply systems in construction (Ridder, 2006 & Ridder, 2006a).

Vrijhoef and de Ridder (2007) however argue that a production system like the supply chain that is delivering a single product should not be fragmented, nor consist of distributed functions. Instead supply chain integration must lead to improvement by developing a more stable, repetitive production environment, similar to that what is common in other industries. Therefore they view the construction supply chain as a system and apply systems engineering to increase coherence of the supply system. This way the supply chain in construction is aligned and the way of working in the construction supply chain are structured.

3.7.4 Partnering versus outsourcing

A construction project is always involving collaboration between multiple parties. According to the Living Building Concept theory there are basically two kinds of agreements in construction industry: partnering and outsourcing. A partnering agreement is applied when collaboration between the parties can provide more value against a lower cost than the parties could provide if they work independently (see figure 3.7-e). In case of an outsourcing agreement this is not the case, however the agreement is focused on the division of the total benefit – that is the difference between value and costs – by the price. The difference between value and price is benefit for the client and the difference between the price and the costs is profit for the supplier. Partnering and outsourcing agreements are used in all levels of the construction process.

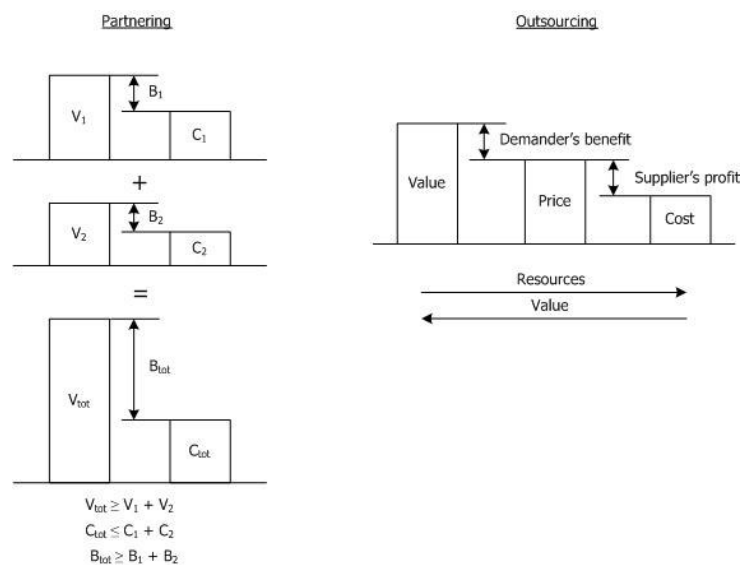


figure 3.7-e: Integrated partnering and outsourcing

3.7.5 Summary Living Building Concept

The Living Building Concept provides the construction industry with a new and comprehensive approach to demand and delivery of built services, keeping in mind the dynamic character of the construction processes and the entire life cycle. It distinguishes from current building practice in the way that all parties pursue a common goal and therefore it offers large possible advantage to delivering parties (contractors, suppliers) as well as demanding parties (clients, users).

The Living Building Concept facilitates a framework describing a supply-driven market strategy for contractors. Bottom-up organised supply chains consist of partners, who use research and development to generate supplier specific systems. These supply chains use branding and marketing in order to know the consumers' wishes and satisfy their demands proactively. The supply chains are formed by partnering and outsourcing agreements focuses on maximisation of total benefit. The task of bringing together all the different parties on the supply side of a construction project is attributed to a so-called supply system integrator.

3.8 Conclusion

In the introduction was pointed out that this chapter should give an insight in general theory on supply-driven business concepts that can be helpful in reaching the research objectives by tackling the problems resulting from

the peculiarities in construction. Several theories have been treated and are used in a theoretical model for the medium-sized contractor companies in large scale road construction.

Introducing marketing concepts of value and associated customer satisfaction provide the construction industry with a view on customer focus, which is essential in developing a supply to the market. The competitive position of a company is determined by the value adding capacity of the entire supply chain. It is therefore important to contractor companies to fundamentally change their focus to the entire value delivery system and the relations between the various actors in the supply chain. The integration of their activities should create a common goal; customer value.

In complex product environments the comprehensive task of managing the supply chain of numerous specialised companies, has been taken by a separate role: the system integrator. Its task is to be the single contact with the client for the entire supply chain and translate client specific demand into configuration of the activities in the supply chain. The principles of a highly adaptable, continuous improving, tiered supply chain found in lean production theories can be exemplary for construction industry.

The preceding theory does for the greater part coincide with the underlying thoughts of the Living Building Concept and are a further direction for the elaboration of the supply chain structure and corresponding business processes. This concept underlines that construction serves a continuously changing customer market. Therefore it proposes to dynamically steer the construction process throughout the entire lifecycle with constant focus on client satisfaction.

If the theoretical concepts as elaborated in this chapter are applied to the construction market the following alternative building practice will develop. Contractor companies offer integrated products and solutions to the market if desired supplemented with services in maintenance, operation and financing. They no longer attain a reactive, but rather a proactive attitude in direction of their client. Via marketing management opportunities in the market are identified and contractors will jump on demand developments by offering them integrated solutions to their problem. The standardisation in construction will increase and if there are no standardised solutions yet the product is optimised in a structural interaction between client and contractor.

A more repetitive approach to the construction development process will open up the potential of optimisation of the integrated solutions. The focus of contractor companies is shifted towards development of products and services. Each client specific solution in a project should be built on the knowledge, experience and the supply network of preceding projects and it should contribute to the development of a next project. Learning and improvement are incorporated in the construction processes; thereby there is a constant renewal of products and technology.

The contractor companies should recognise that they gain competitive advantage through the ability to record knowledge, and that the complete construction supply chain is more successful in fulfilling client's needs if the network of supplier is able to share the knowledge effectively. The system integrator role is essential in this process of improving the supply chain. This party takes full responsibility towards the client for the project delivery and is thereby responsible for coordination and configuration of the entire supply chain. The system integrator should therefore have a key role in both identifying developments in the market (i.e. client's needs, requirements and wishes), as well as the possibilities in their supply network (new product developments).

It is argued that the alternative approach to construction only has a chance of success, if the contractor is working with a stable supply chain of collaborating contractor companies. The contractor companies should

therefore enter into durable strategic collaborations and partnerships with other contractor companies. That way they are secured of supply of key knowledge and capacities for the project delivery.

In the next chapter a framework for road construction project delivery is created with help of the theoretical concepts relevant to this subject. The framework is a conceptual view on the supply chain structure in which (medium-sized) contractor companies can offer integrated solutions to the large-scale road construction market. It consists of that structure with according hypothesis on how the coherence in the supply chain should be secured aimed at a project delivery according to the supply-driven market strategy.

4 Conceptual framework for a supply-driven market strategy

This chapter gives a conceptual framework for the supply chain in supply-driven road construction industry and is based on the combination and integration of the relevant theories and concepts as presented in the preceding chapter. The framework outlines a possibly desired future market approach for road construction contractors.

4.1 Supply-driven road construction industry

4.1.1 *Supply strategy*

As described in the preceding chapter in road construction industry a bottom-up supply-driven buyers market replaces the traditional top-down demand-driven market. The change into a supply-driven market strategy has a couple of important implications on the organisation of the supply chain. In stead of reactive to a certain project specification the supplying parties should create a structure for the supply chain in which they can proactively develop products with a multi-project focus for the road construction market. The client specific offers then consist of the provision of tailored combinations of products and services as high-value integrated solutions to customer needs.

4.1.2 *Demand strategy*

To give the supplying companies the opportunity to do so, the clients should specify a solution space based on requirements and wishes in stead of specify their demand in advance and in a prescriptive way. Products thereby are no longer fully specified by the client, but instead for a large share specified by the suppliers who developed it. This means that in the new situation the suppliers surprise the clients, whereas in the demand driven situation the suppliers were surprised by the demand of the clients. To make the change from a principally executing party into a contractor able to act as a supplying and developing contractor company this research proposes a couple of alternative following changes have to be made.

4.1.3 *Supply strategy characteristics*

This new market strategy is associated with a project independent market approach for supplying construction companies. Basically these companies have two goals; 1) to develop products that are able to satisfy the demand in the market and 2) to organise the product delivery process in the most effective and efficient manner. A multi-project approach enables the introduction of more stable types of production organisation and project delivery, leading to higher levels of performance and better value. Since the supply strategy is extended beyond single project delivery and the client will still require a highly client specific solution, the supply chain should represent a flexible and highly adaptable production environment.

The alternative supply-driven market strategy aims to show different characteristics than the traditional approach of construction industry. The proposed alternative approach will therefore need to show other characteristics in stead. These are presented as 'pure forms' to highlight the distinctiveness of each approach in table 4.1-a and to help compare and define emerging characteristics of the alternative market approach. These characteristics coincide with the characteristics presented in chapter 2.

Traditional approach	Supply-driven market strategy
One-of-a-kind approach of projects	Repetition and project-independent solutions
On-site production	Product development focused on construction logistics
Temporary organisation	Long-term project-independent collaboration
Client interference and resulting focus on price	Supplier specific products, value and client focus
Fragmented / lack of integration	Integrated supply chain with shared goals

table 4.1-a: characteristics of traditional construction and the supply-driven market strategy

The framework sketches an alternative approach for the desired future of supply-driven supply chains for large scale road construction. In a set of prescriptive rules it outlines how contractor companies should design their product delivery process in accordance with the characteristics of a supply-driven market. For that reason in this chapter rules are stated, these rules represent the application of the supply-driven market strategy to their business. The contractor companies and their entire supply chain should apply these rules to the road construction business to adopt the alternative approach. The supply strategy for contractor companies is recapitulated in the following first rule:

Rule I:

Contractor companies should adopt a multi-project approach to enable the introduction of more stable types of production organisation and project delivery.

4.1.4 Supply chain competition

The supply chain management theory describes that road contractor companies should not compete as solely autonomous entities, but rather as supply chains. The road contractor therefore should not regard itself as a supplier of its own product but rather as a network of contractor companies that deliver road infrastructure projects in a stable collaborative and integrated process. Thereby in a supply-driven business environment the company does not regard itself the central issue anymore.

In adopting a supply-driven market strategy the following change in competition will be encountered; In general the industry moves from a delivery system within a price-based environment towards higher levels of performance-based competition. The disintegrated and fragmented supply chain based on adversarial relationships and price-based competition will be replaced with an integrated and aligned supply chain based on long-term collaborative relationships between supply chain members. There will be a transformation from traditional 'horizontal' and 'vertical' competition within the supply chain to 'horizontal' competition between supply chains or high adaptive networks of strategically collaborating supplying companies. figure 4.1-a represents this change. This approach opens up the opportunity to differentiate and compete on performance and value-adding ability of the entire supply chain as is encountered in normal consumer markets.

Rule II:

Contractor's should regard their entire supply chain competing as a vertically integrated whole against other contractor's supply chain.

Demand-driven construction industry:
'horizontal' and 'vertical' competition
within the supply chain

Supply-driven construction industry:
'horizontal' competition between 'vertically'
integrated supply chains

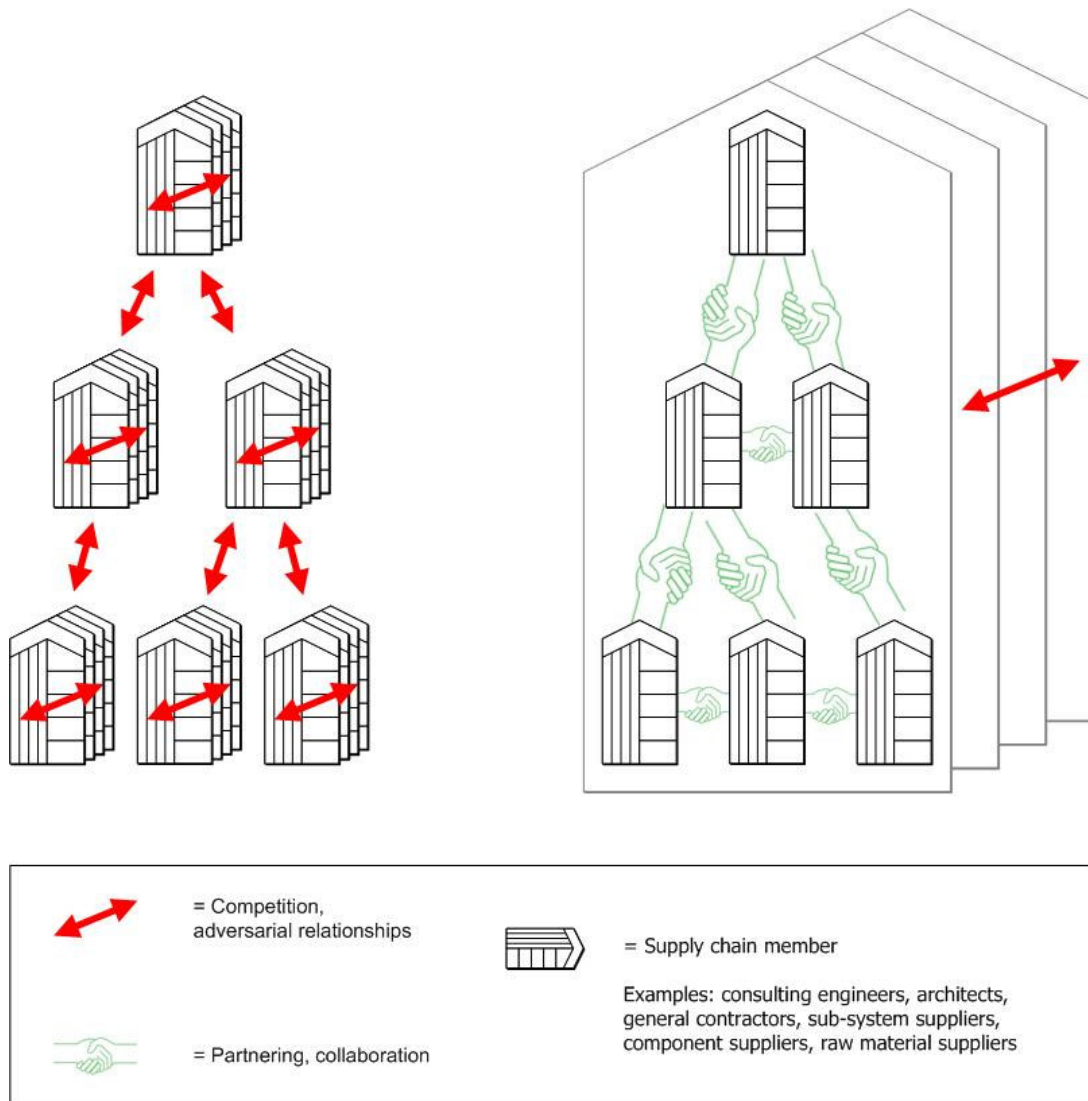


figure 4.1-a: Competition within the construction supply chain versus competition between construction supply chains

4.2 Road construction supply chain structure

It has been emphasized earlier that the contractor companies should proactively set up the supplier network of contractors by them selves. Besides that the supply chain structure should be in accordance with the supply strategy characteristics as named in section 4.1.3. Only this way the supply chain structure reflects this strategy. In a supply-driven market strategy the contractor company no longer regards itself as an autonomous entity, but rather as a member of a supply chain. Besides management of its own business activities and relationships internally it therefore focuses on relations with its immediate suppliers, second tier suppliers, clients and end customers and the entire supply chain. A supply-driven market strategy has important implications on the entire supply chain, which are described in this paragraph.

Rule III:

Contractor companies should concentrate more on relations within their company and between the entities of the entire supply chain.

4.2.1 Conceptual framework

This research aims to provide for a supply chain structure for stable project delivery strategies in road construction. In figure 4.2-a the proposed supply chain organisation of supply-driven road construction industry is depicted. In the following paragraphs the framework is elaborated more extensively. The model takes its departure from the idea that the entire supply chain is working bottom-up and supply-driven, i.e. contractor companies are pre-developing their supply to a great extent and deliver their solution from highly standardised products that are adapted to a specific solution in dialogue with their client. The responsibility of project delivery to the client is taken by a system integrator. The supply system integrator is supplied by a relatively small number of direct suppliers that provide for entire product systems rather than component parts. The system integrator's task is to configure and coordinate the network of its direct suppliers. This way a tiered structure for the supply network develops. The system integrators at the various tiers all act as clients to the lower order of suppliers.

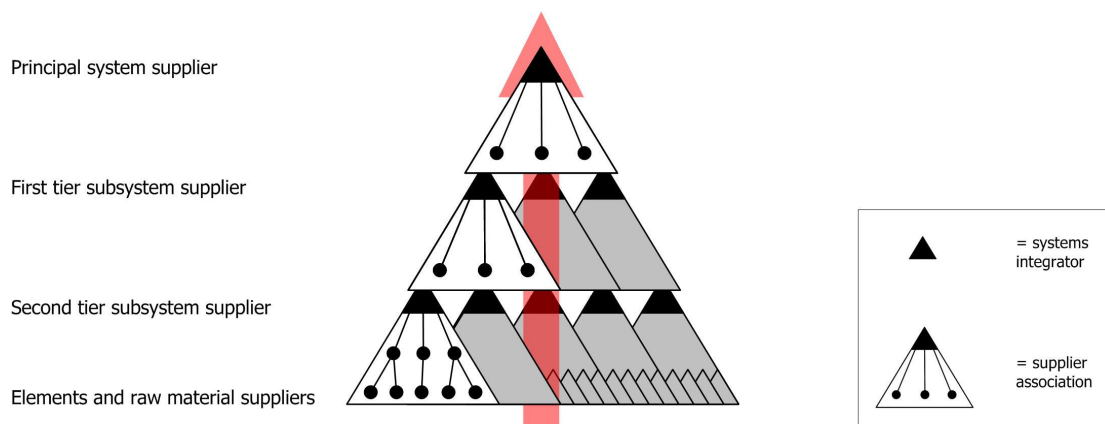


figure 4.2-a: the supply chain organisation of system integrators in supply-driven road construction industry

4.2.2 Supply-driven supply chain

To fulfil the client's needs effectively it has been argued that the demanding party should not prescribe the solution to the contractor in detail. This reasoning is based on the following assumptions:

- 1) suppliers are better informed about what innovative solutions there are available in the market that they can offer to their client, then the client himself.
- 2) suppliers are able to and therefore should identify the demand in the market and adapt their supply to this demand.
- 3) suppliers themselves are better capable of developing solutions in a way that design, execution, maintenance and operation processes are arranged in the most efficient and effective manner.

In the traditional approach to the construction process, the supply is mobilised just to meet initially settled requirements. In an early stage these are fixed in prescriptive design. This results in a supplier with no opportunity to create added value to its client. Added value is not asked and there is no space for the supplying party to perform better than asked. This way the prescriptive specifications erect a wall between a product developing, innovative supplier and its demander (figure 4.2-b).

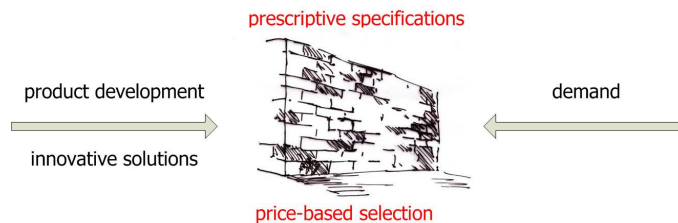


figure 4.2-b: wall between demand and product development

In fact, if the delivery system of a road construction project is regarded as a supply chain of each other supplying and demanding value chains, it is obvious that the entire supply chain should work with a supply-driven approach to optimally utilize the advantages of the supply-driven. If this is not done, but in a link in the supply chain there is opted for a prescriptive demand and thereby a block for product development and innovation, that will serve a 'weakest link' in the supply chain between value chains. This phenomena can be encountered in current projects with design and build contracts¹². The principal contractor is provided with a possibility to take a part of the design to optimise the construction process. The focus of the principal contractor however is still primarily on its own business processes and the possibilities of supplier performance optimisation is neglected. In stead of providing the lower level suppliers with the possibility to perform better as well, the principal contractor put it demand in prescriptive designs and selects suppliers based on price. Thereby the suppliers lower in the supply are blocked. What the contractors should do however is provide the entire supply chain with possibilities to optimise, develop products and innovate (see figure 4.2-c).

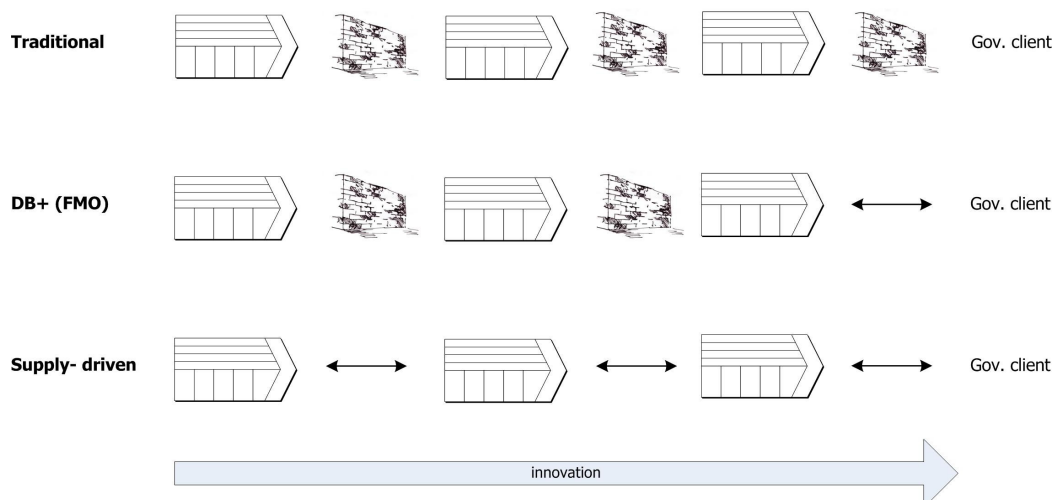


figure 4.2-c: supply chains in traditional, DB+(FMO) and supply driven strategy

¹² This statement is based on experience of Ir. I. Oost at Ooms Construction

Hereby it is an important precondition for a supply-driven market approach to give the entire supply chain the opportunity to adopt a supply-driven approach, select supply chain members eager to develop products and to innovate and give every party the incentive to do so.

Rule IV:

All contractors in the supply chain should be given the opportunity and incentives to adopt a supply-driven market strategy to stimulate product development and innovation.

4.2.3 Integration of the supply chain members

The clients in current large scale road construction market, i.e. Rijkswaterstaat and the provincial authorities, put out to tender projects to a single company. Consequently there has to be one main contracting party that acts as the principal supplier of the entire complex product system. This principal supplier provides the contact with the client and is ultimately responsible for the project delivery and thereby the focal point of the supply chain. The complex product system of road construction contractors however is supplied by a large number of specialised product suppliers that collectively have to deliver a joint product.

Now in the ideal situation the road construction industry consists of a variety of product developing contractor companies. These companies act in all kinds of different disciplines, the product however is still a relatively self-contained product, with a separate supply chain. The next step in the process of constructing a complete supply chain for road construction projects is to assemble the smaller products into larger product families and road concepts. Thereby the products have to be integrated into a greater whole.

In a reactive strategy the main contractor task is to organise a supply chain among the fixed design. The offer to the market is thereby determined for him. It is therefore rather a task of dividing the work to be executed, since the interfaces between the parties are yet elaborated in the design. In a supply-driven market the principal supplier determines what he offers to the market his supply himself. Since road infrastructure is a product highly adapted to client specific needs and the suppliers want to adopt a multi-project approach, it is the task of the system integrator to design its delivery process in such a way that it is highly adaptable, flexible and repeatedly applicable at the same time.

In a supply-driven supply chain the system integrator is confronted with several component suppliers and it is his task to aggregate these components into a functioning system. In fact, the system integrator aggregates products which together form his product. The responsibility of the suppliers is to optimise their product developed in-house. The system integrator should create the opportunity for the component suppliers to do so and to manage the integration of the various components into each other. This way the component suppliers can concentrate on their core capabilities and at the same time be part of a greater whole.

Rule V-a:

A single party should take the ultimate responsibility to his client for the product delivery and therefore integration of the system.

Rule V-b:

The party should also adopt the task of setting up an project independent and integrated supply chain for project delivery, it thereby ultimately determines the product of the supply chain.

It is striking to see that mainly companies with a history as supplier of construction execution capacity (contractors) are acting as a supplier of integrated solutions to the Dutch construction market (Rutten, 2007). From perspective of the prescriptive framework this role could also be taken by an engineering company or any third party able to take care of integration.

4.2.4 Tiered supply chain

As it is described in the previous section the supply-driven delivery system will be an integrated supply chain. Integration is therefore taking place at every level of the supply chain. The integration at system level however differs from the integration on sub-system level, which again differs from integration on other levels. This research therefore proposes to regard the supply chain to be divided in a number of tiers that are managed by a system integrator at that particular tier.

At system level the integration aims for a more generic approach and serves for the functional integration of the components. In these markets, firms build their businesses on the provision of specialized management skills and resources, which often rely upon expertise accumulated over many years. The system itself is more client specific than the products on lower levels, that are more standardised and of more specialised and technical character. In spite of the fact that integration differs on various levels, it is important to notice that systems integration should take place at all levels. (see figure 4.2-d)

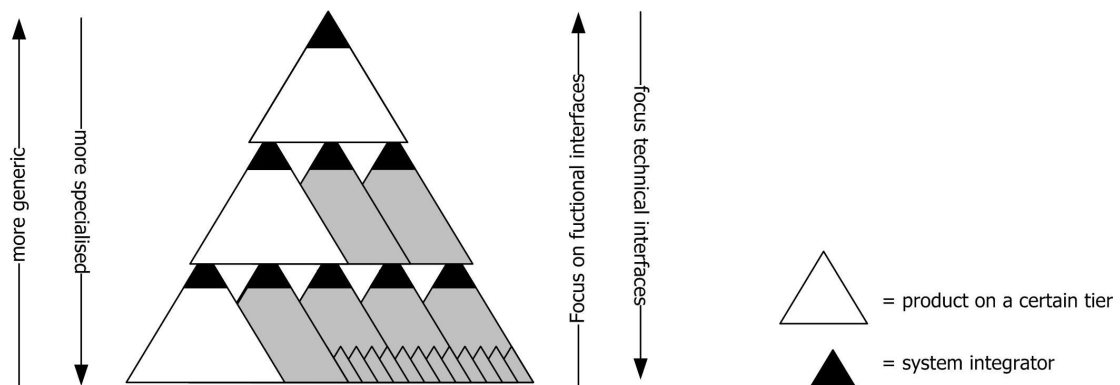


figure 4.2-d: tiered supply chain with system integrators

The system integrators at different tiers are direct suppliers to their clients one level higher in the supply chain and clients themselves to their suppliers. The system integrator at a certain tier is supplied by a comparatively small number of direct suppliers. The system integrator is therefore primarily interfering in his direct first tier suppliers' business. Less interference is needed in his second tier suppliers' business because this responsibility is given to the first tier suppliers.

Rule VI:

Integration should take place throughout the entire supply chain. On various tiers principal suppliers take the system integrator role and serve for the product development and client specific configuration at that particular level.

4.3 Production strategies for strategic positions

The framework proposes to regard the supply chain to be tiered in product suppliers on various levels. As was noted in the previous chapter the products delivered by the various tiers differ from each other to what extent they are client specific. In paragraph 3.5 there has been made a distinction between possible production strategies for contractors, i.e. concept-to-order, design-to-order, and make-to-order. The product suppliers on the various tiers are expected to adopt different production strategies. The product suppliers higher in the supply chain are offering a more client-specific solution and therefore the product offer is designed in less detail. The larger, more complex and more tailored construction activities become, the more they require coordination of inputs from a wide variety of sources to produce customized products. The client-specific nature of the product implies that there are still a lot of parameters to be filled in before the en solution to the customer can be made complete. The focal supplier at project level therefore adopts other production strategies that at the lower tiers of the supply chain.

The suppliers lower in the supply chain are more specialised to one particular component or element and have a higher volume output and therefore can approach the market with a more detailed design. At these tiers the client interference is almost none and the product is completely supplier specific.

In the current building practice for every project from the concept phase to the execution phase is seen as a unique product and therefore most production processes can be typified as a concept-to-order strategy. If a large scale road construction project is broken down into various tiers and for every tier a product, that is typical for Ooms Construction's supply chain is selected the table 4.3-a represents these exemplary products and the production strategies that are desired in a supply-driven road construction market. Since there has been no exhaustive research on the potential of the production strategies in road construction, these should only be regarded as an example of the possibilities that attaining other production strategies has.

Level	Product example	Product properties	Production system	Design work
Project / system	road infrastructure, incl DTM, crossing constructions. DB(+FMO, legal issues)	Concepts – functional properties	DtO	Links client-specific demand to functional design, interfaces subsystems
Subsystem 1 st tier	road incl. lineation, static constructions (signalling, crash barriers)	Pre-engineered concept – preliminary design - functional properties	Between DtO and MtO-C	
Subsystem 2 nd tier	Road paving construction, superstructure and substructure.	Highly engineered design – technical and functional properties	MtO-C	Preliminary design – applied subsystems
Subsystem 3 rd tier	Invisible joint transition	Adaptable design – technical properties	Between MtO-C and MtO	Fill in design parameters based on specific location
Element	Asphaltic concrete	Design – technical properties	MtO	none

table 4.3-a: proposed production strategies on various tiers of a large scale road construction project

If one goes through the proposed supply chain structure the contractor companies have to make a decision on what tier they will perform. In one goes top-down through the supply chain the following strategic positions are come across;

4.3.1 *The system supplier*

The product of a system supplier in road construction could be product families of road infrastructure including road paving, dynamic traffic management systems, crossing constructions and surrounding nature adjustment. The supplying contractor in this position is the direct supplier of the complete road infrastructure project to the client. Since the demand of the client is rather client-specific, the project-independent product can contain of road infrastructure concepts, which reflect the possibilities of the combined offers of the subsystem suppliers. Thereby the system supplier offers integrated conceptual solutions and integrates subsystems into a system and provide services to operate, maintain and finance the system during its life cycle. Based on the concept product the supplier can make rough estimations of costs, construction duration, financing, maintenance and operational costs.

In current road construction industry medium-sized companies do take this role, mostly in a project. In supply-driven approach probably a partnership of the sub system suppliers is taking this role. Possibility to change from concept-to-order to design-to-order production strategy.

4.3.2 *The first tier subsystem supplier*

The product of a subsystem supplier in road construction could be product families of roads, including asphalt paving, road foundation, and road-bound constructions, such as static signalling, safety measures, lineation. This supplying contractor is a first tier supplier to the principal contractor. The supply is a little less client-specific that that of the system supplier, but this has still substantial influence on the product. The project-independent product can contain of pre-engineered road concepts, these are preliminary designs that together with client-specific parameters and some engineering will result in the definite design.

4.3.3 *The second tier subsystem supplier*

The product of a second tier subsystem supplier could be the road paving construction including super and substructure (foundation). This supplying contractor is a second tier supplier to the principal contractor. The supply is supplier-specific product with options to configure to a project/client specific solution. The engineering work has been done for the greater part in advance. The project-independent product can contain of configurable design. In very specific cases some engineering work is done as well.

4.3.4 *The third tier subsystem supplier*

The product of a third tier subsystem supplier could be a joint transition in the road paving construction. The supplying contractor is a third tier supplier to the principal contractor. The supply is a supplier specific product that is configured by filling in a few parameters in the design. There is no need to perform any design work besides filling in these parameters, so no engineering work is performed. The properties of the product are entirely clear from the start.

4.3.5 *The element supplier*

The product of an element supplier could be asphalt concrete. The product of the element supplier is designed in detail. Some element suppliers make to forecast, e.g. sheet pile walls or paving tiles. Asphaltic concrete is not apt for production on stock because it is processed at high temperature. Elements do not need additional design work in advance; the product is therefore completely supplier specific. The properties of elements are exactly known.

Rule VII:

Contractor companies at various tiers strive to develop from Concept-to-Order towards Design-to-Order, Make-to-Order/Customisation and Make-to-Order production strategies by adding more standardisation in their product designs.

4.4 Relationships within the supply chain

The road construction supply chain is held together by relationships between the supply chain members. From a supply chain perspective the principal client is part of the supply chain. Since the relations between this governmental client and the supply chain differ considerably from the relationships between the supplying parties these relationships are elaborated in the next paragraph.

If the road construction industry is to adapt to a more project-independent collaboration and solutions, stable production and shared goals and performance competition, the relationships and arrangements in the supply chain should reflect this desired change. The deliberate strategy to align and integrate the external productive resources, and the strategies of suppliers through the development of collaborative relationships, explicitly recognises the dependency between the organisation and its sub-contracting network.

If for example the contractor and its direct supplier want to build a more stable, long term relationship in the supply chain this implies that the contractor is getting more dependent on its direct suppliers, while and since the development asks for investment of the direct supplier. The direct supplier should also takes more responsibility for the product it supplies.

Thus client and suppliers go into a relation of more commitment. They will get mutually increasingly dependent on each other. The relationships are therefore important to put the supply chain framework in operation in everyday contractor practice. From a lean perspective the alternative approach implies that the supply chain members will:

- prefer dealing with a limited number of firms when placing or filling orders
- prefer long-term, ongoing relationships;
- prefer close relationships between core firm and sub-contractor, which allow extensive exchange of information;
- pay close attention to the quality of management when selecting sub-contractors as focal point firms
- share in the fruits of growth

The focus on price as the predominant metric of supplier performance ignores the need to maintain high quality and delivery performance and any other benefits associated with supplier collaboration. This way the relationships will change from fragmented, adversarial relations to stable, collaborative relationships.

4.4.1 Relationship characteristics

The relationships between a client and its direct suppliers have certain characteristics. Here the client is not limited to the complete project client, a supply chain member and direct supplier also have a client-supplier relation.

Clients should specify their demand in a functional way

In the client-supplier relationship the client should formulate the demand in functional requirements and leave technical solutions as much as possible to the supplier. This will open up the possibility for technical innovation.

This on the other hand implies that the supplier should:

- give certain guarantee on the product
- will have to proof that product meets the functionally drawn requirements

Benefits: Client gives opportunity to optimise through alternatives/innovations

Clients transfer responsibilities for design, finance, maintenance and operation to the supplier

The underlying thought for this transfer of responsibilities that suppliers themselves are able to deliver a product that they have the knowledge of. This is not limited to the design, but is it desirable that a supplier configures its own product to optimise in operation and maintenance procedures. There could also be the opportunity to even finance the product. This way the client and demander consider how the complete product can be delivered with focus on the entire life cycle.

Benefits: separation of tasks is broken down. Processes of complete life-cycle is regarded and configured.

Clients should give incentives to perform better, i.e. performance is rewarded by a (monetary) award.

One of the most important advantages of a supply-driven market strategy is that the product delivered to the client should deliver better client value than in the client-driven market strategy. Contrarily to the traditional approach, where the client can only receive a cheaper product with probably worse quality. It is however important to stimulate the supplier to perform better with incentives. These incentives should be proportional to the value added. This is further elaborated through the solution space concept.

On the various tiers there are client-supplier relations in the supply chain. This accounts for the principal client and principal contractor, in road construction this is the governmental client (Rijkswaterstaat or a provincial authority). It has been stressed in a previous part, that the demand strategy should create an opportunity for the suppliers to provide extra added value by providing a better solution. In a conceptual perspective this implies that the demanding party should create a solution space. This is depicted in figure 4.4-a.

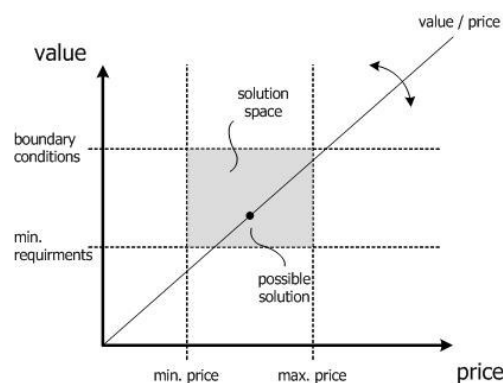


figure 4.4-a: solution space (de Ridder, 2006)

The value at the vertical axis is circumscribed by the minimum requirements and the boundary conditions. The demanding party defines the minimum requirements that the project needs to comply with and additional wishes to provide the opportunity to optimise the product. The budgetary circumstances create a maximum price that is

to be paid for the product. This way the client create a selection criterion for itself and besides that a tool for comparing alternative solutions that are provided to him.

The basic transaction model as presented in figure 4.4-b depict the way in which total benefit (value-cost) can be divided in a benefit for the demander and a profit for the supplier. This way the delivery of additional value becomes beneficial to both client and demander.

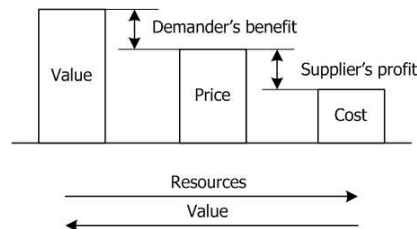


figure 4.4-b: basic transaction model as a coupling between value and cost through price. (de Ridder and Vrijhoef, 2007)

The collaboration between partners can also be regarded as a transaction agreement as described in the Living Building Concept (see figure 4.4-c). Mostly construction is a joint activity involving multiple parties. This model stimulates parties to find ways to maximize the collective benefit, i.e. the gap between value and costs. All parties are challenged to find solutions to either increase the value and/or decrease the costs. Ideally, the collective contributions of parties to do so must lead to a total value that exceeds the sum of values, and a total costs that is lower than the sum of all costs.

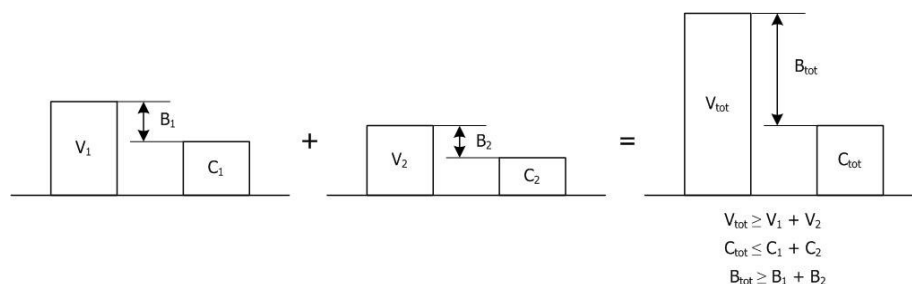


figure 4.4-c: basic transaction model in partnering agreements. (de Ridder and Vrijhoef, 2007)

Clients and suppliers should prefer long term, ongoing relationships

The most important advantages related to ongoing relationships are:

- intensive sharing of knowledge
- opens up opportunity of a learning environment
- relationships between supply chain members don't have to be regulated through numerous contracts

Intensive knowledge sharing serves for the integration of various components of a road construction project. The various designs and construction processes can be adapted to each other. This leads to the holistic effect; the value of the integrated components together is larger than the sum of the components independently. This means more added value.

In a long-term relationship there will come repetitiveness in the collaboration. This means that people will find each other better every time. Besides that the supply chain members will profit from the possibility to continuously improve the integration of the designs and construction processes. It pays off to improve because in the next delivery of the product the partners will find each other again.

In the traditional construction process a lot of arrangements are set in contractual agreements. Mostly this urge to fix every agreement is because of distrust. Since in ongoing long-term relationships trust is built up every time the collaboration is successful, the need and urge for numerous contracts will fade. The transaction costs associated with all the contracts will decrease and therefore the collaboration becomes more profitable every time.

4.4.2 Attitudinal change between supply chain members

The relationships in the supply chain should not only change in a formal way. The formal relationship changes should come along with attitudinal changes. This is often underestimated and not stressed enough, this should however been taken in consideration. The main attitudinal attributes that are considered important for successful partnering in the supply chain are described here.

Between the supply chain members the emphasis should be on full and open communication with a need to work together, rather than in opposition. There is a need to share information and knowledge and often this will involve the exchange of electronic data and possible the use of shared IT systems. If the supply chain members want to act as an integrated whole there is no room for hidden agendas and the deliberate withholding of key information to try to take advantage of the partner organisation. The emphasis is on enabling the partner to perform to maximum efficiency and this means a willingness to provide ready responses to requests for help and information. The partners' interests are interdependent and they need to work as a team, rather than as independent organisations, often with completely opposed objectives. The objectives of the supply chain as a whole should therefore be guiding. Individual employees will need to change their approach towards the partnered organisation and they must learn to co-operate as fully as possible, if longer-term gains are to be realised. Senior management will need to become much less secretive and they may well need to use open book accounts to demonstrate their willingness towards cooperation.

It often easy for supply chain members to recognise the advantages as stated earlier in this paragraph. The construction industry however has a great history of traditional adversarial relationships. It is therefore essential that the attitude toward each other changes and that this is promoted throughout the entire company and supply chain.

Rule VIII: In the alternative supply-driven approach the relationships in the supply chain should undergo a formal change and more important an attitudinal change to accomplish performance improvement of the supply chain

4.5 Relationships with clients

If it is presumed that the construction market will attain a supply-driven market strategy, then this has also implications on the demand strategy. This should change along with the supply strategy, these are interrelated anyhow. In large scale road construction the contractor supplies to a governmental client. This governmental client has a couple of tools to influence the outcome of a tender procedure and thus the demand strategy. In using these tools it is important for the government that the tender procedure is set up without inclination to a certain contractor company. This is not allowed in the legislation in Europe and the Netherlands. It is therefore important to use the tools in an impartial way.

4.5.1 Demand specification

It was mentioned earlier that the client should formulate functional requirements and leave technical solutions as much as possible to the market; this way the clients opens up the market for technical innovation. In the traditional way there is a prescriptive design that describes the exact parts in the solution. This approach should change to a performance specification that described the functional attributes on the solution (see figure 4.5-a). This way the contractor can choose it own solution that meets the clients performance requirements. The client also includes maintenance, operation, (demolition) and finance. These two factors open up the opportunity to add additional functionality to the solution by accompanying the minimal requirements by additional wishes. Besides that the freedom to choose one of several possible means to achieve the required performance and therefore provides for flexibility and innovation.

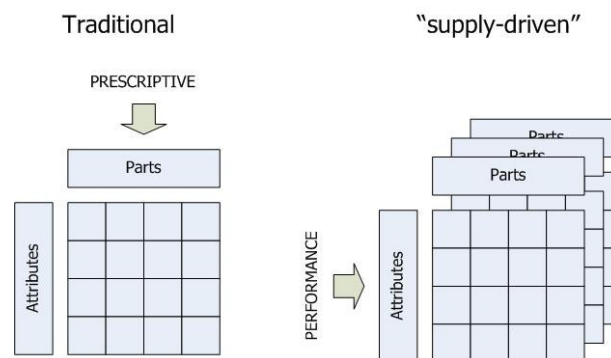


figure 4.5-a: prescriptive and performance approach to demand specification (Sexton and Barrett, 2005), edited by author

4.5.2 Pre-selection criteria

Suppliers in road construction develop a stable production environment and are therefore capable of defining the specifications of their product themselves. Along with that the client will therefore require guarantee of product/project performance output. The suppliers of the projects are thereby forced to proof that not only their solution is capable to meet the specifications, but also to proof that their organisation is capable and sufficiently stable to deliver the project.

4.5.3 Reward criteria

The contractor companies in a supply-driven market deliberately seek for opportunities to differentiate on product performance and not only on price. To stimulate this development the client should add more reward criteria in the procurement strategy. Recently construction time and traffic hindrance have been added to give the contractors the opportunity to excel on these fields. Principally there is a wide variety of reward criteria that can be added to this to steer the project outcome further. One can think of noise reduction, CO₂-emission.

4.6 Marketing

In a supply-driven market the contractor company is not provided with an in detail specified demand, in stead it determines it own supply. The new situation for the contractor company can be typified by not knowing exactly what to supply to the market, and not knowing what to ask exactly from its suppliers. In a marketing perspective this has the following implications on its organisation; it has to proactively identify the clients' needs and wishes, and it has to get acquainted with the possibilities the market provides him from its suppliers. Besides that it

should make the client aware of what the possibilities are that it can provide to him and should inform the suppliers with the need in the market. If contractor companies are capable to incorporate these processes in their business and utilize them in a good way, they will be able to surprise the market with their products in the future.

Rule IX:

A contractor company should incorporate a marketing function in their business to keep informed about the need, wishes and possibilities in the market, and to inform the market about the possibilities within the contractor company and the desired direction of innovation.

4.7 Summary

In the previous chapter general theory on supply-driven business a couple concepts have been investigated, that are regarded helpful in tackling the research problem and the peculiarities in construction. In this chapter the relevant theory has come together in a framework for the supply chain structure for large scale road construction project delivery. The framework outlines a possibly desired future market approach in a set of nine framework rules (see table 4.7-a on the next page) and figure 4.2-a.

The framework describes a hierarchically structured supply chain with system and subsystem suppliers on multiple tiers. A systems integrator role has been identified to serve as principal supplier on the various tiers. This role can be taken by a separate organisation, one of the subsystem contractors or by an alliance of contractors. On every tier a principal supplier acts as the systems integrator at that particular tier and is supplied by a small number of direct suppliers which provide for entire subassemblies rather than component parts. Separate supply chains headed by a system integrator can develop and deliver their integrated products together as well as independently and separately. The framework enables contractors to develop a delivery process with a multi-project strategy in a stable, repetitive, highly flexible, and cooperative way. The framework elaborates on multiple dimensions of the project delivery process, i.e. supply chain structure, products and production strategies and the associated relationships in the supply chain. Furthermore the framework provides insight in possible strategic positions in the project delivery supply chain.

In the next chapter a field research is performed to reflect the framework to Ooms Construction's situation in practice.

Supply chain rules

Rule I: Contractor companies should adopt a multi-project approach to enable the introduction of more stable types of production organisation and project delivery.
Rule II: Contractor's should regard their entire supply chain competing as a vertically integrated whole against other contractor's supply chain.
Rule III: Contractor companies should concentrate more on relations within their company and between the entities of the entire supply chain.
Rule IV: All contractors in the supply chain should be given the opportunity and incentives to adopt a supply-driven market strategy to stimulate product development and innovation.
Rule V-a: A single party should take the ultimate responsibility to his client for the product delivery and therefore integration of the system.
Rule V-b: The party should also adopt the task of setting up an project independent and integrated supply chain for project delivery, it thereby ultimately determines the product of the supply chain.
Rule VI: Integration should take place throughout the entire supply chain. On various tiers principal suppliers take the system integrator role and serve for the product development and client specific configuration at that particular level.
Rule VII: Contractor companies at various tiers strive to develop from Concept-to-Order towards Design-to-Order, Make-to-Order/Customisation and Make-to-Order production strategies by adding more standardisation in their product designs.
Rule VIII: In the alternative supply-driven approach the relationships in the supply chain should undergo a formal change and more important an attitudinal change to accomplish performance improvement of the supply chain
Rule IX: A contractor company should incorporate a marketing function in their business to keep informed about the need, wishes and possibilities in the market, and to inform the market about the possibilities within the contractor company and the desired direction of innovation.

table 4.7-a: the framework rules for application of the theory in road construction practice

5 Field research at Ooms Construction

The theoretical framework as elaborated in chapter 4 describes an optimal situation for the organisation of the supply chain of medium-sized contractor companies in large scale road construction. In this chapter the outcome of a field research at Ooms Construction is elaborated. It describes the current situation of Ooms Construction and the opportunities and threats that are associated with attaining a supply-driven market strategy in practice according to the theoretical framework.

5.1 Introduction

To provide the investigation with empirical data, Ooms Construction has been studied through a field research. Whereas collaboration with other contractor companies is regarded to be a success factor in large scale road construction the field research also involves partners and clients of the supply chain of Ooms Construction. The situation Ooms Construction is in, is considered to be representative for medium-sized contractor companies in general. The data for the research was collected by two means. A set of managers in Ooms Construction's supply chain have been interviewed and the product portfolio has been studied.

5.1.1 Interviews

Eight semi-structured interviews have been taken with people on management positions in Ooms Construction's supply chain. The respondents are working at Ooms Construction, working with Ooms Construction and are clients in the large scale road construction market (see figure 5.1-a and table 5.1-a). The fact that various collaborating parties are interviewed can provide a comparison between the expectations from each other.

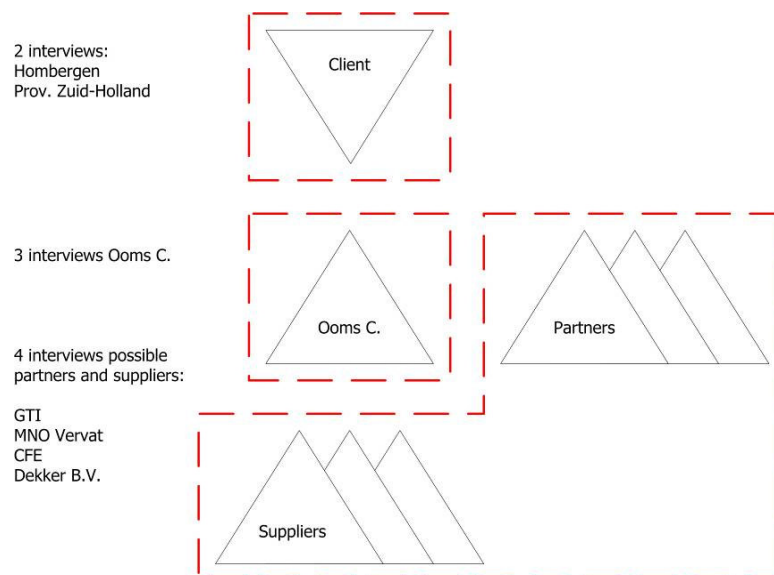


figure 5.1-a: respondent groups

Interview respondents at Ooms Construction			
Company	Name	Function	Date
Ooms Construction	Klaas Terpstra	Managing director	14-04-'09
Ooms Construction	Ide Oost	Contract manager	16-04-'09
Ooms Construction	Arian de Bondt	Manager R&D	29-04-'09
Interview respondents at possible partners			
Company	Name	Function	Date
CFE Nederland BV	Andre de Koning	Managing director	15-04-'09
Dekker	Marcel Stoop	Managing director civil engineering	21-04-'09
GTI	Raymond de Klerk	Manager technical sales	22-04-'09
Interview respondents public clients			
Government agency	Name	Function	Date
Province Zuid-Holland	Jos Hendriks	Directing infrastructure client	06-05-'09
Rijkswaterstaat	Leon Hombergen	Knowledge manager	13-05-'09

table 5.1-a: interview respondents for the field research in Ooms Construction's supply chain

The interviews are elaborated in detail in appendix C. The form of semi-structured interviews was chosen to have the freedom to tailor questions to the interview context, i.e. various roles of the respondents in Ooms Construction's supply chain. In the interviews a set of three main subjects were investigated:

- 1) Opportunities and threats of attaining a supply-driven strategy as proposed in the framework
- 2) The strengths and weaknesses of Ooms Construction at various positions in the a supply chain
- 3) Opportunities and threats of changing supply chain relations and the expectations of the parties towards each other.

5.1.2 Product portfolio

In chapter 4 there has been made a distinction between various tiers on which Ooms Construction supplies products at the moment. In table 5.1-b the exemplary products in Ooms Construction's portfolio that have been investigated are shown. The products Ooms Construction are investigated through 4 themes; product supplier, production strategy, supply chain structure and product development (see appendix D). The exemplary products reflect the products on various possible strategic positions of Ooms Construction. The outcome of this part of the field research can be found in paragraph 5.3.4, because it shows the capabilities of Ooms Construction at the moment in perspective of the proposed framework for road construction industry.

Level	Exemplary product
Project / system	road infrastructure, incl DTM, crossing constructions.
Subsystem 1 st tier	road incl. lineation, static constructions (signalling, crash barriers)
Subsystem 2 nd tier	Road paving construction, superstructure and substructure.
Subsystem 3 rd tier	Joint transition
Element	Asphaltic concrete

table 5.1-b: the exemplary products in Ooms Construction product portfolio

5.2 Assessment of the framework for road construction industry

In the interviews the respondents have been invited to give their opinion on the framework for the road construction industry. Thereby the framework is assessed by the respondents based on their experience of the building practice. The opportunities and threats that are associated with several framework components have been drawn here. First the respondents were invited to judge a supply-driven for medium-sized contractors in general. In the next questions it was emphasized that medium-sized contractor companies can, in collaboration, develop multi-project strategies. The latter question was about the proposed supply chain structure as sketched in paragraph 4.2. Each section of the following paragraphs is concluded with a summary table in on the SWOTs.

5.2.1 *Opportunities and threats for a supply-driven approach for medium-sized contractors*

Respondents at the contractor companies judged a supply-driven market strategy, and the accompanying product development as an opportunity to distinguish from competitors in the market. There are several advantages acknowledged that are associated with product development and supply-driven market approach. The added value provided to the client, that stems from the innovative solutions creates the possibility to make a more profitable business. The contractor can actively optimise its business processes and as construction methods become more standardised and repetitive the quality of work can increase and therefore it puts the contractor in the position to give guarantees. Product innovations also give the contractor the opportunity to obtain a unique position in the market that from perspective of the size does not fit the company. Medium-sized contractor companies often lack capacity to execute a project all by themselves, thus they seek collaboration with other contractor companies. An innovative reputation is making the company attractive to choose as a partner to collaborate with. Product development and the name of a proactive player in the market are therefore important in acquiring work. Finally the opportunity was cited that the change of a reactive attitude towards a proactive attitude will have to change the adversarial relationships between parties in construction. This will lead to a pleasant working environment between collaborating parties.

Generally it can be said that product development asks for capital investment. The main threat associated with product development therefore is the risk of spending money on something that for some reason does not pay off. The interview respondents with the contractor companies mentioned multiple reasons why the investment possibly will not pay off. First the protection of innovations in road construction is almost nil. The governmental client is eager to utilize the competition in the market and therefore tries to make as much information as possible publicly available to all contractors. Some contractors respond to this by developing badly functioning substitutes. Because these substitutes do not perform as well as the 'inventor's' solution, these spoil the market for the product developing contractor. Consequently the innovation gets a bad reputation and it is not asked for again. It was stated that competing designs are not forced to proof functionality themselves.

According to the contractor respondents the public clients, such as provinces and Rijkswaterstaat are subject to stringent budgetary control from other public authorities. Since these authorities ask for justifications of the budgets, it is complicated to choose not for the cheapest solution. The contractor also regard the stringent pre-qualification criteria a major threat. If a medium-sized contractor company has developed a product for the large scale road construction market and because of the criteria is not allowed to tender for projects in this market the product development is worthless.

If a contractor opts for a supply-driven market strategy there will be a process of change. Equally to the product development the change involves a large investment and has to pay off. The supply-driven market strategy also contains a change in business culture. This needs people with vision that lead the way.

As is stated in the framework the complete supply chain needs to adopt the supply-driven market strategy and therefore suppliers need to engage in the change too. A possible threat is therefore that suppliers are not eager and not willing to accept greater responsibility or suppliers are not ready to act proactively in a multi-project approach.

Both respondents from the client side indicated that an important threat to the supply-driven approach is that of backwards compatibility. This is the phenomena that operator of the constructed works has a set of maintenance and operation procedures. If the new designs from the supplier are not compatible with these procedures this asks for trouble. Besides that the public client respondents recognised opportunities of product development as well, but they note that the contractors should not make its product too unique. Public clients are in their procurement restrained by rules and laws. They stress that the demand specification should be put in such a way that there is a free market system. This means that the specifications should give the opportunity to multiple suppliers to tender for the project.

Supply-driven market strategy for medium-sized contractor companies	
Opportunities	Threats
O1: Distinguish from competitors in the market	T1: Development asks for capital investment and implies risk
O2: Position in the road construction market is secured	T2: Lack of protection of innovative products
O3: Quality assurance in proven construction methods and designs	T3: Suppliers are not eager to engage a supply-driven strategy
O4: Make the company an attractive partner for collaboration	T4: The contractor is set aside through stringent selection criteria
	T5: Products have to be compatible with the existing maintenance and operation procedures

Table 5.2-a: opportunities and threats for medium-sized contractor companies to attain a supply-driven market strategy

5.2.2 Supply-driven market strategy in collaboration with partners

The product development and multi-project approach to the project delivery process can be taken up by the contractors in collaboration with partners. This strategy will open up several opportunities and is also associated with certain threats.

The contractor companies do see various opportunities in joint product development. In comparison with the traditional approach the contractor companies try to collaborate on an multi-project basis. The continuation of cooperation is therefore safeguarded. This is an important difference from the current situation in which contractors are for each project independently seek for collaboration. Since the investments for product development can be divided between the collaborating contractors the risk will be less if it shared. The commitment that stems from working with partners is indicated to give the opportunity for mutual adaptation and integration of business processes of the collaborating partners through intensive sharing of knowledge. If these processes are managed well this should lead to further product development on a higher level and better integration of the disciplines.

In the current situation it is questionable if medium-sized contractor companies can survive. Structural collaboration therefore creates the possibility to be active in a market which both partners independently are not capable to survive. Thereby the medium-sized contractor companies jointly can compete with the large-sized contractor companies. Moreover partners are together capable of identifying more opportunities in the market than each independently.

The clients in road construction industry support the medium-sized contractor companies in taking up a supply-driven strategy in cooperation. They expect that the product that is offered to them is more a unity of components that separately compiled components.

The most important threat that was indicated by the contractor respondents is the regional character of medium-sized contractor companies. The companies are historically located at a certain geographical positions and these regions often do not match. If companies want to engage in joint product development, the product should probably be deployable at places where one of the contractors is not positioned. The same problem is indicated with suppliers and subcontractors of subsystems. Mostly these companies have even smaller areas where they are active. One respondent indicated that medium-sized contractor companies that share discipline, e.g. road paving, and do not share geographical position should work together. Thereby they can deploy innovative products and at the same time share development costs. Since the target regions of the contractors do not conflict, they do not compete and in fact they make the technology better known in the market.

Joint product development and a multi-project approach imply intensive collaboration and knowledge sharing with other contractor companies. Both parties must have a proactive attitude towards their partner, otherwise there will develop inequalities in the partnership. The selection of strategic partners is very important because there is the risk of getting stuck with a partner that is only passively trying to piggyback on the success of innovation of the other.

Supply-driven market strategy in collaborative partnership	
Opportunities	Threats
O1: Secure long-term relationships with partners	T1: Differences in target area of the collaborating companies
O2: Share the risk of product development	T2: Passive attitude of possible partners
O3: Only change to survive in the large scale road construction market	
O4: Integration of business processes through extensive knowledge sharing	
O5: Collaboration and knowledge sharing with road construction contractors in other regions	

table 5.2-b: opportunities and threats for a supply-driven market strategy in collaborative partnership

5.2.3 Framework for supply-driven road construction industry

From both client as well as contractor side the respondents recognize that the framework provides a structured way of supply chain thinking for road construction industry. It provides for logical coherence in the supply chain and corresponds to a technical way of working. It gives a good indication of dividing responsibilities along the actors in the project delivery process. The supply chain structure clarifies the mutual relations between the contractor parties. The contractor companies are more and more frequently asked to proof that their organization is suitable for a certain project delivery. The framework for supply chain structure can be used to answer this desire.

The role of system integration and the system integrator is subscribed to by the respondents, yet they are not sure if systems integrations should be regarded as a separate task in the construction process. The respondent at Rijkswaterstaat stressed that the contractor company should proof that their organization can guarantee the promised performance output. If the principal supplier would only interfere in the processes of the first tier direct suppliers then he cannot provide this guarantee. Therefore he should meddle in the supply chain further.

Framework for road construction supply chain structure	
Opportunities	Threats
O1: Clarity of the supply chain structure, division of responsibilities	T1: Principal contractor should control multiple tiers of the supply chain to guarantee quality of the offer
O2: Answer to the client's desire to proof the supply chain organisation	

table 5.2-c: opportunities and threats for contractors by applying the proposed supply chain structure of the framework

5.3 Position of Ooms Construction in the supply chain

Ooms Construction and other contractor companies have to position themselves in the road construction market en therefore in the road construction supply chain. To investigate Ooms Construction's possible positions in the supply chain there have been two types of research. In the interviews the respondents have been asked what strategic position Ooms Construction should take in a supply-driven market strategy, what they regard to be the strengths and weaknesses in that position and what capacities are important if Ooms wants to keep or acquire a certain position. Secondly Ooms Construction's project portfolio is reflected against the proposed production strategies that have been elaborated in paragraph 4.3.

5.3.1 Assessment of Ooms Construction as a principal supplier of projects

The possible positions in the road construction supply chain have been explored through interview questions on the subject. The aim of the questions was to explore Ooms Construction on various positions in a supply-driven market. The respondents have reacted mainly on the question if Ooms Construction is either capable of taking a leading position as principal supplier of large scale road construction projects or capable of taking this position in a strategic partnership together with other medium-sized contractor companies.

Both the respondents at the possible partners and public clients in road construction think Ooms Construction is strong in collaborating with other contractor companies. Whereas for reasons of available capacity and in-house technology Ooms Construction has always been forced to work together with contractors in concrete

constructions such as Dekker and CFE, and electro technical installations such as GTI, the collaboration with other parties is part of daily practice. The historical focus on research and development has given Ooms Construction the reputation of an innovative player and they have gained a lot of experience with project development trajectories in collaboration with other disciplines in the past, e.g. Road Energy Systems (see appendix A). Ooms Construction and other medium-sized contractor companies not forced to obligatory collaboration with other departments, as is normal practice in large contractor companies. The spontaneous, unforced collaborations does often generate more incentives to perform. There were also respondents that trivialised this statement because for instance GTI is in practice the only possible partner for electro technical installations for Ooms Construction. These strengths are cited by the respondent at province Zuid-Holland as well.

Generally medium-sized contractor companies are considered to be flexible and quickly reactive organisations. Whereas there is direct contact between departments and short communication lines possible, the connections between theory and practice (execution) are therefore shorter and more easily adaptable.

Within Ooms Construction the respondents indicated that in medium-sized contractor companies there is more room for innovation because developments get more time to crystallise out. Large company's management is putting more pressure on short term cost recovery. On the other hand a long term scope is needed for good product developments. Besides that there is consciousness about a need for change and Ooms Construction is therefore yet one step ahead contractors that are not realising that.

The traditional structure of Ooms Construction's organisation is also associated with weaknesses concerning adopting a supply-driven market strategy. A typical career path within Ooms Construction starts at the construction site. The personnel are therefore focused on practical project execution. Besides that a lot of work is done and problems are solved ad hoc on the construction site. The work preparation before execution starts is therefore not elaborated in detail. A supply-driven market strategy will increase complexity of the contractor's task and more engineering work 'in the office'. The respondents therefore express that they think Ooms Construction lacks management capacity for a supply-driven market strategy. One respondent within Ooms added to that, that the organisation is based on security and therefore it does not have a result-oriented culture. The respondents cite that these characteristics are typical for all the medium-sized contractor companies.

If Ooms Construction wants to adopt a supply-driven market strategy in large scale road construction projects it has a big disadvantage of being only capable of providing capacity in the West of the Netherlands. Besides that Ooms Construction has no regular partner in road operation.

Multiple respondents argued that a complete swing in contractor culture is needed if a supply-driven market approach is attained. This needs major investments and therefore a decision to make the change should be supported by people with vision and drive to do so. The upper management should think well about the direction to take. These major changes do not happen without resistance and it is important that it is propagated throughout the entire organisation. Respondents indicated that a separate department in the organisation could be a possibility to take the responsibility of the needed management skills, these people should combine feeling for technical solutions and execution issue with a mercantile spirit towards marketing, product development and client satisfaction.

Ooms Construction as principal supplier of road construction projects	
Strengths	Weaknesses
S1: Knowledge throughout the entire supply chain	W1: Lack of management capacity
S2: Experienced and skilled in cross-company collaboration	W2: Financial security that can be provided to the client
S3: Flexible and reactive organisation	W3: Bound to of the West-Netherlands
S4: Conscious about the need for change	

table 5.3-a: strengths and weaknesses of Ooms C. as a principal supplier in a supply-driven market

5.3.2 Assessment of Ooms Construction as a supplier at lower tiers

In the current building practice the distinction between different tiers is not made. Next to the role of principal supplier there can be roughly two other situations be distinguished.

If the project is containing a small part of road construction works, e.g. a tunnel with electrical installations and concrete work, Ooms Construction takes a subcontractor role. In this situation the project is carried by another company and the project management is done by the principal contractor. In this situation it is a lot easier to adopt a supply-driven market strategy because at that level the complexity is regarded to be a lot easier. It was proposed to the respondents that Ooms Construction should also possibly work as a road construction first tier direct supplier to one of the "big 5" contractors in Dutch construction, this was however regarded unconceivable because these companies are not willing to do that, even in case it would provide a cheaper or better solution.

The second role is specialised subcontractor. For instance in the construction of invisible joint transitions in highways Ooms Construction executes these in order from large-sized road construction companies. At this level Ooms Construction can exploit their specialised knowledge on a particular field very well.

5.3.3 Preferred position Ooms Construction

In the interviews with managers of Ooms Construction the preferred position in a supply-driven market was explored. At the moment Ooms Construction is capable of executing road infrastructure projects till around €50 million in partnership with other medium-sized contractor companies. Examples of these projects are widening of a highway for 20 kilometres including reconstruction of dynamic traffic management and maintenance on concrete constructions or construction of a new highway exit including flyovers. A project like reconstruction of a complete ring way around a Dutch city is too large anyhow. Ooms Construction can act in the € 50M projects as the principal contractor. In a gentlemen's agreement with the possible partners they have agreed upon alternately taking the responsibility of principal contractor in project where the work to divide is around 50-50%. If one company is executing most of the work In the past Ooms Construction has always preferred the principal contractor position and has been able to attain this position ever since.

5.3.4 *Ooms Construction's product portfolio*

In perspective of the theoretical framework Ooms Construction currently supplies products for the road construction market on various tiers (in a demand-driven market). The investigated production strategies on these various tiers have shown that on lower tiers Ooms Construction has the capacities to work supply-driven. On project level this is both not existent nor feasible at the moment.

5.4 Supply chain relationships

5.4.1 *Collaboration between Ooms Construction and partners*

The most important issue in long term multi-project approach to collaboration is that all different parties have to be made aware of the advantages and ultimate goal of the cooperation. In the contracts has to be made clear to what extend suppliers are provided with exclusiveness in product developments. The mutual expectations should be aligned. Besides that it is important for the contractor to explore the market at the client side as well as the market at the side of its suppliers.

The respondents indicated that at the projects in large scale road construction are unique in sense of size, location and time span. If suppliers in the construction industry opt for a project-independent collaboration it is important that they can collaborate on an equal basis. If this equality is reached this will develop incentives to cooperate and after a couple of successful collaborations the trust will increase with time. If supplying parties in construction will collaborate on a project-independent basis they are able to integrate their business processes and will consequently open up the opportunity of a learning environment between the organisations. The collaboration of the partnering parties will grow and the product of their collaboration will improve overtime.

One of the respondents indicated that the problem of location constraints can be tackled by collaboration with other innovative road construction contractors in the Netherlands. He stated that Ooms Construction can for instance explore the possibilities to cooperate on a regular basis with Janssen en de Jong. This is a road construction contractor in the south of the Netherlands. If Ooms Construction and such a contractor engage in a collaboration they can share knowledge about their product, do joint R&D-activities, share risks and at the same time they will not hamper both their competitive position.

In several interviews the advantage of performance selection of suppliers was brought up. If two partners join in development of products for the road construction market they will only have a good incentive to improve if the improvement is rewarded somehow. This reward can be a monetary award, but it can also be exclusivity of being a supplier for the project. This form of collaboration asks again for trust and also for an open book communication between the collaborating parties.

A couple of threats associated with project-independent collaboration are somehow related to the opportunities. Basically if the collaborating parties do not manage to create a stable relationship, the opportunities of project-independent collaboration can become threats. If a supplier is adopted in the supply chain and this suppliers is not eager to cooperate due to lack of incentives, the situation can arise that because of increased dependency it is hard to change suppliers in the supply chain. There is concern at the various contractor respondents that suppliers, primarily those in lower tiers of the supply chain, will not be eager to attain a supply-driven strategy and thus will not be suitable partners in the supply chain. These parties will only try to profit from the innovative power of their partner, but will not engage in putting effort in making the result of the collaboration better.

There are some possible partners of Ooms Construction in large scale road construction that have some sort of monopolistic position. For instance Ooms Construction simply is reliant on GTI in projects including dynamic traffic management systems. Since GTI also collaborates with other (larger) contractor companies a project-independent collaboration can be less attractive to them.

As was mentioned earlier the location constraint of Ooms Construction can be a threat to the proposed framework strategy. Besides that it can also be a threat that lower tier suppliers which only cover Ooms Construction's area partly cannot engage in project outside their working area.

Project independent collaboration between Ooms Construction and partners	
Opportunities	Threats
O1: Collaboration based on equality leads to trust, incentive to cooperate, improvement	T1: Possible partners prefer to collaborate with large-sized contractor companies (e.g. GTI electro technical)
O2: Cover the entire country/market by collaboration with contractors in other geographical dispersion (divide development costs)	T2: Location restraints of partners and suppliers
O3: Selection of suppliers on performance/price, mutual incentives to innovate	T3: No mutual incentive to innovate

table 5.4-a: opportunities and threats associated with project-independent collaboration between contractors

5.4.2 Relationships between Ooms Construction and clients

In the interviews came forward that an essential difference between client to supplier relations in the supply chain, and principal client to principal supplier relation, is that the choice for a certain supplier does always have to be transparent. Besides that the client always has to choose for the lowest price of lowest weighed price (through weighed reward criteria). Both governmental respondents agreed upon the fact that at the moment pre selection, reward criteria and demand specification are the tools to steer the procurement process. They expected that in the future (of the supply-driven market) guarantees, quality and maintenance aftercare are becoming increasingly important. It was indicated that it is important that more reward criteria are added to give the contractors the opportunity to supply more added-value to their client. Generally the respondents at the contractor companies agreed, but from both sides the respondents expressed that they there will be difficulty in a good system to score and weigh all the criteria.

In a marketing perspective from both sides there are opportunities in more communication between the governmental client and supplying contractors. The contractors and clients expressed that their should come a dialogue between one another. One respondent proposed to have a project-independent platform for contractors and clients to exchange the market demands and wishes on one side and the possible supply on the other hand. For example via conferences that are accessible for all contractors and clients in the market this could happen. There is the expectation that innovative contractors can sell their product developments there and that clients can express the expected demand and the expected product developments by contractors.

Besides that contractors that are able to deliver new product developments should be incited to provide governmental clients with additional properties to their products. For instance Ooms Construction is able to make joint less transitions in a tunnel. Now, when they are tendering for a tunnel project, they should express that additional to the project the transitions can be supplied. This way the client is given the opportunity to add a separate contract solely for the transitions and this way make use of this product innovation.

From both side there is the recognition that the market is still falling back to trying to fix project outcome in an early stage. For example it is a threat to the supply-driven market strategy that Rijkswaterstaat and provincial authorities are themselves judged by a budgetary control department, the urge to receive a fixed price from that departments makes it harder to include all kinds of awards for better quality. The respondents at the governmental clients on the other side are concerned about contractors not accepting their loss based on quality measures. There is a phenomenon in the market that contractors go to court to fight client's decisions to choose for a contractor that does not ask the lowest price. From both sides are pointing to each other in that sense.

Project independent collaboration between Ooms Construction and clients	
Opportunities	Threats
O1: Define value through more weighed reward criteria	T1: Rules and laws that promote competition between contractors
O2: Contractor is better aware of the market demand	T2: The budgetary departments ask fixed financial control
O3: Proactive marketing of products at road operators	
O4: A dialogue between all contractors on one side and all clients at the other side	

table 5.4-b: opportunities and threats associated with changing relationships between contractors and clients

5.5 Summary

The field research in Ooms Construction's business exists of 1) interviews within Ooms Construction's management and managers at possible partners and clients in the road construction market and 2) research in Ooms Construction's product portfolio.

The most important strengths, weaknesses, opportunities and threats for medium-sized contractor companies attaining a supply-driven market strategy and developing products for the large scale road construction market are summarized in table 5.5-a on the next page.

In perspective of the theoretical framework Ooms Construction currently supplies products for the road construction market on various tiers (in a demand-driven market). The investigated production strategies on these various tiers have shown that on lower tiers Ooms Construction has the capacities to work supply-driven. On higher levels and project level this is both not existent and feasible at the moment.

Strengths	Weaknesses
4) Knowledge throughout the entire road construction supply chain 5) Flexible and responsive organisation 6) Experienced and skilled in collaboration with partners	4) Production capacity is bound to the West of the Netherlands 5) Lack of management capacity 6) Guarantee of available financial resources
Opportunities	Threats
4) Increase attractiveness for collaboration with potential partners 5) Possibility to remain a player in the large scale road construction market, in spite of relatively small size 6) Distinguish from market competitors and give product guarantees	4) Risk of non-profitable investment in product development and organisation 5) Compatibility of product developments with existing maintenance and operation procedures 6) Suppliers that are reluctant to attain a supply driven strategy and take responsibility

table 5.5-a: the most important strengths, weaknesses, opportunities and treats resulting from the interviews

6 Applicability of the framework in practice

In chapter 5 the framework for road construction industry is tested against practical experience of managers at Ooms Construction, her possible suppliers or partners, and her clients. This has given a picture of how the different actors in Ooms Construction's business environment assess the opportunities and threats of attaining a supply-driven market strategy according to the framework. In this chapter the results of this research are reflected against the framework in theory. It will thereby lead to a view on how the framework can be applied in practice.

6.1 Introduction

In this introductory paragraph the outline of this paragraph is sketched (see figure 6.1-a). From the theoretical part of the research a framework for road construction has come forward. The framework consists of a conceptual description of the supply chain structure for middle-sized contractor companies in large scale road construction through a couple of framework rules. Theoretically the supply chain should be organised that way. In the empirical part of the research the proposed approach is presented to a number of different actors in the supply chain of Ooms Construction (including the client). By means of semi-structured interviews they have been invited to indicate the opportunities and threats of approaching the road construction market according to the framework. Besides that they were invited to assess Ooms Construction as a player in the market on various strategic positions in the road construction supply chain.

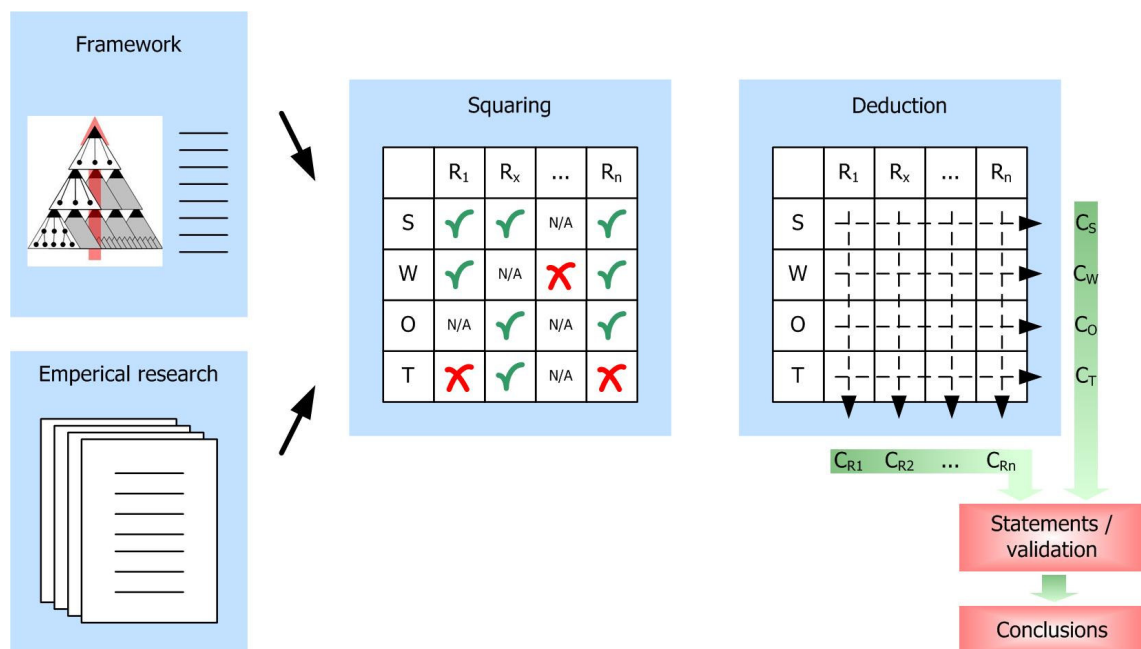


figure 6.1-a: outline of confrontation in chapter 6

In this chapter the results of the empirical research are reflected against the rules of the theoretical framework. For this purpose the empirical results are squared in a matrix with the framework rules (see figure 6.1-a). This

confrontation is discussed in the following paragraphs and lead to conclusions about on one hand the strengths, weaknesses, opportunities and threats (depicted as C_S , C_W , C_O and C_T in figure 6.1-a) and on the other hand on the framework rules (depicted as C_{R1} to C_{Rn} in figure 6.1-a). Thereby this chapter shows the applicability of the framework in practice and how the framework rules should be applied to use and profit from the strengths, improve weaknesses, exploit the opportunities and mitigate the threats. The conclusions about the strengths, weaknesses, opportunities and threats can be found in paragraphs 6.3 to 6.6 implicitly and the conclusions about the framework rules are described in paragraph 6.7.

The confrontation outcome has been validated through a management meeting at Ooms Construction. The management meeting aimed to check if the confrontation results are in compliance with the expectations of these "experts" about a supply-driven market for large scale road construction. For that purpose 6 statements were put forward to the management meeting respondents. These statements reflect the outcome of the confrontation, yet they were put in a somewhat more severe manner to provoke a firm discussion amongst the participants.

In the next chapter the main conclusions of this research are drawn and some recommendations are made for the next steps for Ooms Construction as well as further investigation in general.

6.2 Framework rules

In the next paragraphs the framework is reflected against the strength, weaknesses, opportunities and threats as found in the field research. Therefore the framework rules from chapter 4 and most important strengths, weaknesses, opportunities and threats from chapter 5 are recapitulated here in table 6.2-a and table 6.2-b respectively.

Framework rules:

Rule I: Contractor companies should adopt a multi-project approach to enable the introduction of more stable types of production organisation and project delivery.
Rule II: Contractor's should regard their entire supply chain competing as a vertically integrated whole against other contractor's supply chain.
Rule III: Contractor companies should concentrate more on relations within their company and between the entities of the entire supply chain.
Rule IV: All contractors in the supply chain should be given the opportunity and incentives to adopt a supply-driven market strategy to stimulate product development and innovation.
Rule V-a: A single party should take the ultimate responsibility to his client for the product delivery and therefore integration of the system.
Rule V-b: The party should also adopt the task of setting up a project independent and integrated supply chain for project delivery, it thereby ultimately determines the product of the supply chain.
Rule VI: Integration should take place throughout the entire supply chain. On various tiers principal suppliers take the system integrator role and serve for the product development and client specific configuration at that particular level.
Rule VII: Contractor companies at various tiers strive to develop from Concept-to-Order towards Design-to-Order, Make-to-Order/Customisation and Make-to-Order production strategies by adding more standardisation in their product designs.
Rule VIII: In the alternative supply-driven approach the relationships in the supply chain should undergo a formal change and more important an attitudinal change to accomplish performance improvement of the supply chain
Rule IX: A contractor company should incorporate a marketing function in their business to keep informed about the need, wishes and possibilities in the market, and to inform the market about the possibilities within the contractor company and the desired direction of innovation.

table 6.2-a: the supply chain rules resulting from chapter 4; framework for road construction industry

Strengths, weaknesses, opportunities and threats for medium-sized contractor companies attaining a supply-driven market strategy and developing products for the large scale road construction market:

Strengths	Weaknesses
7) Knowledge throughout the entire road construction supply chain 8) Flexible and responsive organisation 9) Experienced and skilled in collaboration with partners	7) Production capacity is bound to the West of the Netherlands 8) Lack of management capacity 9) Guarantee of available financial resources
Opportunities	Threats
7) Increase attractiveness for collaboration with potential partners 8) Possibility to remain a player in the large scale road construction market, in spite of relatively small size 9) Distinguish from market competitors and give product guarantees	7) Risk of non-profitable investment in product development and organisation 8) Compatibility of product developments with existing maintenance and operation procedures 9) Suppliers that are reluctant to attain a supply driven strategy and take responsibility

table 6.2-b: SWOT associated with a supply-driven market approach

6.3 Opportunities vs. framework rules

	R ₁	R _x	...	R _n
O	N/A	✓	N/A	✓

	R ₁	R _x	...	R _n
O	---	---	---	---

C₀

6.3.1 Opportunities for a supply-driven market strategy for middle-sized contractors

The respondents indicated that the product development in a supply-driven market enables them to remain a player in the large scale road construction market, in spite of the fact that they do not fit this market in respect of their relatively small size. On one hand the middle-sized contractor can position itself pro-actively as a niche player (as a component supplier to mostly larger contractor companies) with a specific product, on the other hand the contractor gains competitive advantage in their own projects in comparison to their competitors that have to contract out the component. If one reflects this against rule V and VI that state that the supplier should take full responsibility for the product functionality and configuration, it is therefore that the opportunities in a supply-driven market lie at taking a first step by being a niche player with their product developments. This can be extended further if more experience is gained with the supply-driven strategy.

The opportunity to standardise designs, construction methods and relations with partners, and thereby guarantee product performance and increase reputation was addressed by multiple actors in Ooms Construction's business environment. The possibility of acquiring a reputation of a product can only happen if it is recorded and reused according to more stable production strategies of framework rule VII. Ooms Construction product development should therefore be aimed at standardising supplier-specific standard concepts and designs. The concepts and designs have to be captured project-independently. From a marketing perspective (rule IX) these can be used to guarantee product specifications to the client, being able to resolve the client's problems quicker and be proactive in providing solutions to the market.

According to the respondent a supply-driven market strategy adds to the attractiveness of a contractor for collaboration in projects. The reputation of the product developing company is of vital importance in seeking for

parties to collaborate with. Other (middle-sized) contractors will more likely choose for collaboration with a contractor known for this proactive attitude. This is again interesting from a marketing perspective. It also makes clear the importance of rule IV, that possibly collaborating partners should stimulate each other to engage in the development process in order that contractors with the same attitude can come to terms.

6.3.2 *Opportunities for a supply-driven market strategy for collaborating suppliers*

Contractors see opportunity in joint development of products for the road construction market. Especially for middle-sized contractor companies it is important to ensure themselves of partners in projects. Due to their dependence on partners they see the opportunity in joint development of products to fight the competition together. They thereby underline the importance of rule I and II to regard their supply chain as one entity and the significance introducing more stable types of production organisation in stead of changing collaboration per project. If Ooms Construction is aiming at being a supplier in the high tiers of the supply chain they should seek for closer collaboration with other middle-sized contractor companies to remain competitive against larger players in the market.

The respondents indicated that closer collaboration opens up the opportunity to configure their business processes to each other and thereby integrating their businesses by jointly mobilising knowledge and configuring their products according to rule II and III. The contractors should concentrate on the relations between each others disciplines. Thereby they confirm the need for integration and profile themselves as one supplier. To reach this intensified collaboration the contractors should first change their attitude towards each other (rule VIII) before this is possible.

One of the respondent came with the idea to share knowledge with other middle-sized contractor companies and integrate their R&D activities. This opportunity is present if the collaborating companies are no competitors, because their geographical dispersion is different. There could be the opportunity to improve their position in the market if they regard the supply chain to be a group of contractors that dependent on the geographical location of the project work together. This integrated supply chain is thereby able to be a player in the entire country.

6.3.3 *Opportunities of the proposed supply chain structure*

The structure of the proposed hierarchically structured supply chain with suppliers on various supply chain tiers (rule VI) is associated with a clear division of responsibilities through the supply chain. It describes the necessary coherence between collaborating (middle-sized) contractor companies. According to framework rule VI subsystem suppliers throughout the entire supply chain should develop their own products and receive the responsibility of quality guarantee. It is thereby helpful to the principal contractor to divide responsibility along the supply chain.

Both respondents at the governmental clients in large scale road construction express the intention to retreat as much as possible from the construction process. To realise this retreat, they expect that the contractors will themselves guarantee performance of their products. To secure quality of the product they ask justification of their entire supply chain. If a contractor is engaging in a more stable production organisation according to rule I and is able to divide responsibility in a good way along the supply chain (rule V), this will increase trust in their quality standards and assurance of value-adding capability. The reliability of the supply chain will increase if the supply chain members are more dependent on each other and are thereby less inclined to abandon their partners.

6.4 Threats vs. framework rules

	R_1	R_x	...	R_n
T			N/A	

	R_1	R_x	...	R_n
T	--	--	--	--

C_T

6.4.1 Threats of a supply-driven market strategy for middle-sized contractors in road construction

The respondents indicated that an important threat of the supply-driven market strategy is, that there has to be made a substantial investment to develop project-independent products for the road construction market. The risk that it involved in there, could be larger than the profit that is involved. Than the investment would not be profitable and should not be made at all. In the framework this threat is mitigated in two ways. On one hand a good marketing function should provide for the fact that products are geared to market demand (rule IX) and thereby the risk of investment is decreased. On the other hand product should be developed in such a way that these are employable project-independently. The project-independent development aims for spreading the risk over more project and therefore the risk per project is decreased. It is however true that the initial investment is larger than in a demand-driven market, but if a long term scope is regarded the investment will yield profit.

The contractors consider it a threat for product development that innovative products are not protected in the road construction market. The client wants and is obliged to always to maintain competition between contractors and therefore should always choose for products that can be supplied by various parties. It is therefore not only important to innovate in terms of new product departure, but also to innovate in optimisation of the product. It is therefore probably sensible to focus product development on increasing efficiency of the production process and services that are delivered along with the product such as maintenance and operation(al costs). In this analysis the importance of sharing knowledge about innovation and product improvement is stressed. The collaboration in joint product development should be focused on optimisation and improving added-value by integrating the partners products.

Rule 4 states that all parties involved in the supply chain should be stimulated by means of incentive to attain a supply-driven market strategy. The respondents do underline that this is desirable, but they indicated that it can be a threat to the contractor that necessary suppliers and partners are not willing to attain a supply-driven strategy and engage in the development process. According to the framework the contractor should mitigate this threat in two ways. Firstly the contractor should first make an inventory of potential supply chain members and after that he should make the supply chain members conscious of the fact that they are expected to adopt a proactive approach and that the collaboration is set with a long term and project-independent focus. They will receive more responsibility, but together with that they will receive the opportunity to profit from the collaboration. The attitudinal change is very important in this process and is should set by Ooms Construction in advance. This counts for every position Ooms Construction wants to adopt in the supply chain.

The respondents at the governmental clients an one respondent at the contractor's side indicated that there is the threat to product development of backwards compatibility, this means that a product is not compatible with the current maintenance and operations procedures of the client. This threat is only present if the client will remain responsible for maintenance and operation if the project is completed. This requirement of the client conflicts with rule IV that all contractors will give each other the freedom in providing a self-developed technical solution. According to the framework the contractor can arm himself via two ways against the threat of backwards compatibility. On one hand he should make himself acquainted with the current standards and

requirements of his clients through marketing and thereby adopt his product development or make it configurable. On the other hand the client could contract out more responsibility in once and make the contractor responsible for maintenance and operation as well.

A threat for middle-sized contractor companies is that product development does not pay off, because the company cannot utilize the product in the market while the contractor is restrained by too stringent selection criteria of the client. According to the framework Ooms Construction should make a choice between roles in the supply chain. Either Ooms Construction will position itself as a 1st tier direct supplier of the road construction part of the project and they will not be confronted with the selection criteria directly, or if they do not tolerate another party to be principal supplier, they have to take the principal supplier in collaboration with another contractor company. Ooms Construction in their current size, with the current available knowledge and their current core capacities seems to be more fit for the first role. If the second option is chosen these parties will have to find out a way to be severally liable for the project.

6.4.2 *Threats for a supply-driven market strategy in partnership with other suppliers*

Differences in size and geographical dispersion are regarded to be the main threats for collaborating medium-sized contractor companies and their suppliers. The problem about the difference in working area results in the fact that they can do joint product development, but that subsequently the products cannot be deployed because one of the parties is not active in that region. The project-independent and so the stability of the supply chain is therefore threatened. This threat can however be fought by engaging more parties in the supply chain and making good arrangements about the mobilisation of the product developments. The challenge is to create such a collaboration that arrangements are made to divide the work among their capacity. A similar threat is recognised in the capacity differences of collaborating parties. If for instance Ooms Construction is the smaller partner regarded capacity, it could happen that they are more dependent on a particular project and therefore they cannot take another project at the same time, while the partnering party does have this capacity. In both cases the challenge is to make the right arrangements and a cooperative attitude is of vital importance.

Another threat was identified in closer collaboration between supplying parties. If one of the partnering parties over time doesn't comply to the expectations or doesn't live up to the promise they made, the collaboration is in danger. Because there is invested in the integrated collaboration and the parties have become increasingly interdependent it is both not desirable and not sensible to break up the collaboration. The framework has described in rule IV and VIII the tools to prevent this from happening; giving incentives to one another to attain a proactive approach and to build up trust and willingness to cooperate through attitudinal change. The selection of partners for intensive collaboration should therefore be executed carefully. It is advisable to experiment with smaller product developments and less essential parties in the supply chain to start with and later extend and intensify the collaboration with partners of more importance.

6.4.3 *Threats to the proposed supply chain structure*

The respondents at the contractor companies agreed that the proposed supply chain structure could be helpful in introducing a more supply-driven approach to their business and that it was in conformance with their expectations of future developments in the market. The respondent at Rijkswaterstaat indicated that in his opinion the responsibility for product was too easily transferred to lower tier suppliers and therefore it is a threat that the principal supplier tries to get rid of its responsibilities. He stated that Rijkswaterstaat wouldn't accept it and expected that the principal supplier should still guarantee the entire supply chain and therefore should

supervise the supply chain very intensively. This would imply that framework rule VI, that suppliers on lower tiers will take considerable responsibility, should be softened a bit. In my opinion the client's interference by asking justification of the supply chain is a tool to resolve the lack of confidence in the contractor with more control and thus hamper the contractor's freedom in determining its own solution. I think this inclination to control the contractor will decrease in time if there is gained more experience with a supply-driven market. The trust in the supply chain stability and the capability of contractors to serve for their product themselves will increase with every successful project.

6.5 Strengths vs. framework rules

	R ₁	R _x	...	R _n
S	✓	✓	N/A	✓

	R ₁	R _x	...	R _n
S	---	---	---	---

C_S

In the interviews a couple of strengths are identified in Ooms Construction's organisation that are helpful in adopting a supply-driven market strategy according to the framework for road construction industry. The most important strengths of Ooms Construction are:

- Knowledge throughout the entire road construction supply chain
- Flexible and responsive organization
- Experienced and skilled in and accustomed to collaboration and product development with partners
- Conscious about the need for change

According to the framework the collaborating parties should integrate their products and business processes in order that the supply chain acts a whole. Ooms Construction has knowledge and is familiar with the suppliers on all tiers of the supply chain, consequently they can utilize this knowledge to promote the intensification of and form the collaboration on all tiers. In this process Ooms Construction has the advantage that they have always had the necessity to collaborate with a wide range of different parties. In innovative product developments they have experience in taking the principal systems integrator role, e.g. in the development of the Road Energy Systems®. Through this forced need to collaborate with partners to settle a complete project, they have experience in assessing these parties. It was state multiple times in the interviews that larger contractor companies are hampered by the fact that they need to collaborate with parts of the mother organization that do not perform the best.

The framework underlines that it is important to record the knowledge that Ooms Construction has gained over the years in development trajectories and that is should be passed through the organization. This information will prove to be of vital importance in a supply-driven market because there will be an increased degree of collaboration and joint product development. The proactive developments for the market have till now just been a small part of complete projects.

Multiple respondents at their own company, at possible partnering companies and at the client's side described Ooms Construction as a highly flexible organisation, that due to their small size are able to respond quickly to adaptations or problems and break into new market demand or special client's wishes. This strength in combination with recording of predefined concepts and designs in their supply according to rule VII should put them in the position to live up and exceed the client's expectations. Moreover in the supply-driven market the

various business functions of the different departments of the organisation have to be better configured to each other. The fact that Ooms Construction's departments are in close contact with each other should put them in a advantageous position in contrast with their competitors that are slow and less responsive.

The management within Ooms Construction indicates that they consider themselves one step ahead of their competitors, because they recognise the need for change, if they want to maintain or expand their position in the market. The management within Ooms Construction admitted that the proactive attitude mainly exist in the upper layers of the organisation. They should therefore realise that it is a challenge for them to promote the proactive approach company wide. Historically Ooms Construction is involved in this attitude so this should be regarded feasible if effort is put in it.

6.6 Weaknesses vs. framework rules

	R_1	R_x	...	R_n
W	✓	N/A	✗	✓

	R_1	R_x	...	R_n
W	---	---	---	---

C_W

In the interviews a couple of weaknesses are identified in Ooms Construction's organisation that have to be improve to make it possible to adopt a supply-driven market strategy according to the framework for road construction industry. The most important weaknesses associated with Ooms Construction's organisation are:

- Lack of management capacity and in-depth knowledge about the other disciplines associated with large scale road construction projects
- Guarantee of available financial resources is relatively low
- Production capacity is bound to the West of the Netherlands mainly

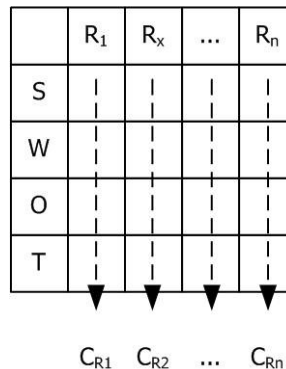
The managers at Ooms Construction and their possible partners pointed out that the management capacity within Ooms Construction's organisation is relatively weak. If Ooms Construction wants to position themselves as a principal supplier in a supply-driven large scale road construction market, they will not have the in-depth knowledge in the other disciplines in their current organisation. Even in the current demand-driven market the management layer in their organisation is relatively thin, in spite of the fact that it is easy to pass through the client's requirements in the current market. According to the framework it is better to position themselves as a 1st tier direct supplier of the principal supplier that takes the full responsibility of the whole project. In that position they will be able to strengthen their knowledge about a supply-driven approach and probably grow to a higher position. Ooms Construction's organisation, similar to almost all contractor companies, is mainly focused on technology, while in a supply-driven market strategy knowledge about clients demands (through marketing) should be integrated with in-house knowledge and the knowledge shared by partnering suppliers. The organisation should therefore be expanded with a new "systems integrator" discipline that focuses on these subject.

Being a relatively small organisation Ooms Construction has little ownership equity compared to the size of large scale road construction projects. This condition has not been taken into account in the framework for road construction industry. The possibility of involving banks in the supply chain should therefore be taken into consideration to improve the financial status that is needed to be a player in this market in the future.

The weakness of Ooms Construction being only capable of providing production capacity in the West of the Netherlands has been discussed in paragraph 6.4. This weakness can be improved by closer collaboration with contractor companies in other regions to make them both more interesting for collaboration.

6.7 Conclusions on the framework rules

Based on the preceding chapter about confrontation outcome the following conclusions can be drawn about the framework rules and their applicability in road construction practice:



Framework rule I: Contractor companies should adopt a multi-project approach to enable the introduction of more stable types of production organisation and project delivery.

This rule essentially summarizes the key issue for contractors in a supply-driven market strategy. The advantages and opportunities of attaining more stable production are underlined by all actors. Besides that it can be helpful in tackling the threats associated with a supply-driven strategy. The conditions implied on the medium-sized contractor company by the client and the relatively small size to the size of the projects hamper changes towards this strategy at the moment.

Framework rule II: Contractor's should regard their entire supply chain competing as a vertically integrated whole against other contractor's supply chain.

The idea to regard the complete supply chain as a whole is not regularly applied by contractor companies. In perspective of a supply-driven market strategy the actors in Ooms Construction's supply chain do confirm the necessity of doing so. The change towards a vertically integrated supply chain is rather a matter of attitude than not being advantageous. It does not however necessarily mean that the supply chain can't change in the course of time, when other better substitute suppliers arise.

Rule III: Contractor companies should concentrate more on relations within their company and between the entities of the entire supply chain.

This rule generally applies to the relation between suppliers in the supply chain and between the principal supplier and the client. The relations should reflect the stability of the supply chain from raw material supplier till client. The most important issue is that currently the various parties do not go into dialogue with each other. Therefore the importance of knowing how they can be useful to one another and what they expect from each other is not addressed. The trust among the parties in the industry will grow with time.

Framework rule IV: All contractors in the supply chain should be given the opportunity and incentives to adopt a supply-driven market strategy to stimulate product development and innovation.

The incentives for contractors can be sharing development risks and increased attractiveness for collaboration. A monetary incentive should be used to fight passive attitude of supply chain members. This can be done by reward of added value by a higher price.

Framework rule V-a and V-b: A single party should take the ultimate responsibility to his client for the product delivery and therefore integration of the system. The party should also adopt the task of setting up a project independent and integrated supply chain for project delivery, it thereby ultimately determines the product of the supply chain.

These framework rules are recognised by the governmental client and it holds with respect to the supply-driven market. In perspective of Ooms Construction's situation it is not able to take the responsibility for large scale road construction projects individually. According to this rule they should therefore retreat to a position of road specialist or intensify collaboration with partners to jointly take this responsibility.

Rule VI: Integration should take place throughout the entire supply chain. On various tiers principal suppliers take the system integrator role and serve for the product development and client specific configuration at that particular level.

This way principal contractors should partly shift the responsibilities towards direct and indirect suppliers in the supply chain. This is a powerful tool to give specialist suppliers opportunities in the market. The principal supplier should however take ultimate responsibility and therefore control the entire supply chain, without interfering to a great extend.

Framework rule VII: Contractor companies at various tiers strive to develop from Concept-to-Order towards Design-to-Order, Make-to-Order/Customisation and Make-to-Order production strategies by adding more standardisation in their product designs.

The opportunities of this change are recognised by the respondents. More standardisation is associated with a greater opportunity to quality guarantees. The research has concentrated on organisational issues, rather than on the technical interpretation. This should be investigated further.

Framework rule VIII: In the alternative supply-driven approach the relationships in the supply chain should undergo a formal change and more important an attitudinal change to accomplish performance improvement of the supply chain.

This framework rule is recognised throughout the entire supply chain by various parties. At the same time all respondents are inclined towards concentration on the current situation and on the short term profit of the individual firm. This culture change will take at least a generation to be fully changed and needs great investments of the management and other personnel.

Framework rule IX: A contractor company should incorporate a marketing function in their business to keep informed about the need, wishes and possibilities in the market, and to inform the market about the possibilities within the contractor company and the desired direction of innovation.

In the application of this rule the conditions of the large scale road construction market ask for open communication between client and suppliers. The contractor should therefore in collaboration with other contractors and the client create a platform for demand and supply communication.

6.8 Validation

Finally the practical application of the framework is presented to three managers¹³ within Ooms Construction in a management meeting. The management meeting aimed to check if the confrontation results are in compliance with the expectations of these “experts” about a supply-driven market for large scale road construction. The meeting at the Ooms Construction office has been introduced with a presentation of the framework and the outcome of the field research. After that the practical application has been put forward. To guide the discussion of the research results a set of statements have been discussed. These statements reflect the outcome of the confrontation, yet they were put in a somewhat more severe manner to provoke a firm discussion amongst the participants.

First every respondent has been given the opportunity to react on the statement individually, after that the statement was discussed in the group. The results of the management meeting can be found in appendix E. This paragraph represents the conclusions from the management meeting.

Statement 1a¹⁴:

Ooms Construction individually has the capacity and knowledge to act as principal contractor in a supply-driven market for large scale road construction

or

Statement 1b:

Ooms Construction individually has the capacity and the knowledge to take full contractual responsibility in a supply-driven market for large scale road construction.

The respondents indicate that statement 1a describes the situation in the current demand-driven market, statement 1b resembles the situation of a supply-driven market. All three respondent indicate that the first statement describes the situation of Ooms Construction best. With the current size Ooms Construction is individually capable of being a principal supplier in road construction projects till around € 40M. This is regarded the condition that the requirements are specified quite detailed. In larger projects the responsibility should be shared in collaboration with partners. Because of limited management capacity and limited knowledge in other disciplines than road construction larger projects are not feasible to supply individually.

It is indicated that it could be attractive to Ooms Construction to acquire more know-how in the disciplines concrete construction and electro technical systems to enable Ooms Construction to assess the solutions of partnering contractors and thereby enable the organization to use other disciplines as direct suppliers in stead of partners. There is not 100% of the time necessity for these disciplines and therefore the capacity utilisation of this knowledge could be a problem.

¹³ The three managers are ing. K. Terpstra (managing director), ir. I. Oost (contract manager) and dr. ir. A. de Bondt (manager research and development). The management meeting was held on 17th of June 2009

¹⁴ The respondents were invited to choose one of the two options that is best describing their opinion.

Statement 2:

The role of 1st tier direct supplier of the subsystem 'road' (including road-bound construction) of a large scale road construction project better fits the size and capacities of Ooms Construction, and therefore they should try to position themselves more as a niche player in the market. - (probably with the intention to grow to the principal supplier position).¹⁵

The respondents agree that this is the position that fits Ooms Construction's current size the best. In road construction Ooms Construction is considered to be an advanced specialist. The remark however is made that in the current building practice this position cannot be taken because large size contractor companies do not adopt Ooms Construction in this role. Besides that companies do want to profile themselves to the market as principal supplier from reputation point of view and if the role of niche player is attained the threat of a shortage of work is there.

Strukton is considered to be in a similar situation, but they do not have road construction in the West of the Netherlands. In the news paper article there was also referred to supply-driven like market approach. The respondent therefore see the article as a unsolicited application for a take-over by Strukton.

There are also competitors that have widened their target disciplines. This will however ask for major investments and will take a considerable amount of time

Statement 3:

Ooms Construction should strive for project independent collaboration with the same suppliers on every tier of the supply chain.

Two respondents agree with the statement if a future supply-driven market is considered. One respondent indicated that this is not necessary. The advantage of a project-independent supply chain is that collaborating suppliers can adapt their businesses and product to each other more easily. Because of that the transaction costs and the risk of failure costs will decrease considerably. It was noted, that an evaluation should be made on a regular basis to allow suppliers with a better product to enter Ooms Construction's supply chain.

Statement 4:

Ooms Construction should concentrate more on the standardization of designs and executions processes of existing products and road concepts, in order to enable themselves to offer the client product guarantees.

All the respondents agreed to the statement and indicated that it is desirable to do so. Some remarks were made on the practical applicability. First the demand specification should be adapted a lot. There is still no possibility to provide the market with supplier specific products and concepts, and unsolicited proposals because the rules and regulations are not fit to that. It is considered though to be feasible to make standard cross-sections for roads, standard roundabouts, standard types of crash barriers et cetera. This can be very useful in speeding up the

¹⁵ To this statement the following news fact was noticed: In the same week of the management meeting Strukton (one of the large sized contractor companies in the Netherlands) announced in a newspaper for the construction industry that they seek a road construction partner in the West of the Netherlands. Basically this could be seen as an invitation to Ooms Construction.

process of realising reliable cost and time estimates, surely when ICT tools are used in this process. It does not suffice though to put all your past designs in a database, the requirements that were the basis of these designs should also be taken in consideration.

In fact, Ooms Construction offers the market the invisible joint transition in a similar way. The calculation department for instance does not have a lot of work to do in contrary to the considerable work in the calculation of the other projects.

Statement 5:

If Ooms Construction wants to stay involved in the large road construction market, then a separate project department has to be established. This 'systems integration' department should concentrate on the client demands, communication, supply chain integration and evaluation and optimization of the entire construction process.

The respondent agree with the statement and add to it that this is certainly desirable in the changing road construction industry. In the recent years they indicate that large improvement is made in the system integrator discipline. For instance the configuration design, work preparation, calculation and execution has improved considerably in the recent years. When there is less occupancy of management capacity due to less running projects, there is already spend more time on this subject. Certainly when these processes are structurally taking place, this would improve the business.

Again the problem in the needed investments in resources is hampering this development. Ooms Construction is in a circle of being too small to make large investments and consequently the growth hampers, which again prevents Ooms Construction from making progressing in this field. One respondent proposed that Ooms Construction should try it out for a couple of years and do an evaluation if the investment has paid off.

Statement 6:

The application of a supply-driven market strategy in road construction, in which the contractor develops highway concepts in advance, is desirable in practice.

All respondents indicated that is statement is true. A condition for this change is that the client will adapt the description of their requirements to make differentiation in solutions possible. Besides that he should make his desires and expectations better known in the market.

If these aspects are accounted for Ooms Construction sees the opportunities to standardise system components and supplying maintenance and expansion packages to the road construction market.

6.9 Conclusions

In this chapter the framework is confronted against the field research outcome. The opportunities and threats associated with a supply-driven market strategy for medium-sized contractors in large scale road construction projects have been confronted with the framework rules from chapter 4. The framework rules have shown helpful in exploiting the opportunities and mitigating the threats of a supply-driven approach. Intensification of the collaboration between suppliers throughout the supply chain is the main factor on which the contractors can improve their business and arm themselves against threats. The framework rules also prove to be helpful in

determining how middle-sized contractor companies can benefit from their strengths and what weaknesses should be improved in which way to be able to work according to a supply-driven approach. The conclusions on the framework rules has been drawn that the rules give a good reflection how to introduce a supply-driven market strategy in the contractor's future practice.

The role of 1st tier direct suppliers has been identified to be the strategic position in the supply chain that fits Ooms Construction best. If Ooms Construction want to maintain active a principal supplier it should seek for very intensive collaboration with other contractor companies. A new separate discipline in the contractor's organisation is needed in to serve for investigation in client's demand, display the possibilities to the market (marketing) and supply chain integration.

The desired changes and improvements have been summarized in this chapter, now only the contractors and clients in the market should dare to take the challenge. In the next chapter the main conclusions of the research are drawn and some recommendations are done for further research by Ooms Construction and the road construction market in general.

7 Conclusions and recommendations

This chapter elaborated on the results of this research. It thereby gives feedback on the objectives of the research stated in paragraph 1.3. The objectives of the research were:

To investigate a supply-driven driven market approach for medium-sized contractor companies such as Ooms Construction that might lead to improvement of their competitive position in the changing large scale road construction market.

To develop an alternative view on the future business structure in a supply driven road construction market for contractor companies like Ooms Construction and the corresponding possible strategic positions in the supply chain.

To deliver the client in civil engineering industry a view on the desired demand specification within large scale road construction projects from the contractor's perspective.

First in paragraph 7.1 the conclusion are made based on the results of the research. In paragraph 7.2 a couple of recommendations are made on possible and desirable further research.

7.1 Conclusions

7.1.1 Conclusions regarding the road construction market for medium-sized road construction in general

Conclusion 1: The application of a supply-driven market strategy in road construction, in which the contractor develops highway concepts in advance, is desirable in practice.

This conclusion is based on the following findings:

- Contractors expect to be able to make large improvements in product performance if the market would attain a supply-driven strategy. The market will receive better value for money and the contractors can distinguish themselves from competitors and make a more profitable business. Besides that standardisation of road construction concepts enables the contractors to give product guarantees to their clients.
- The client still expresses the intention to retreat further from the construction process in the future. The respondents at the governmental authorities underlined the advantages of contractors developing their own products and indicated that within the government there is willingness to extend the possibilities for supplier specific products.

Conclusion 2: Before the application of a supply-driven market strategy can be put into practice in the current road construction industry, considerable changes and efforts have to be made at both the client's demand specification and the road contractor's business.

This conclusion is based on the following findings:

- From both demand and supply side there is consciousness about the need for change. The advantages of alternative approaches like a supply-driven market are recognized, but the focus is still on the ad hoc situation. The challenge to contractor companies is to make considerable investment in changing towards better market organisation. This way the attractiveness and performance of the industry is improved
- A comparison of the clients' and contractors' opinions shows a circular reasoning. The contractors indicate that the current demand specification is still holding back their improvement of performance. The client on the other side is reluctant to give the contractors more freedom until they improve on their performance. If the contractors and clients are going into dialogue more this deadlock can be bent to a upward movement of change.
- The client's demand is still not formulated in a functional way. Therefore there is no possibility for the contractor to offer their supplier specific technical solution. This hampers the development of existing products and innovation in the market. Contractors can persuade the client to have more trust in them by displaying their capacities and possibilities.
- There is little standardization in the general requirements for a large scale road construction project. From the contractor's side there is a demand for exchange of information on the expected general demand and requirements of the client and for clients it can be useful to be aware of the possibilities in the market. There is an opportunity to create a platform for road construction clients and suppliers to enable them to give direction to the developments from the contractor's side.
- Contractors in large scale road construction do not have integrated and standardised their processes sufficiently to be able to adopt a supply-driven market strategy. The traditional nature of the industry restrains the willingness to invest in radical changes. Besides that the threat of investment is indicated with the medium-sized contractor companies. A long term scope and collaborative attitude does open up the opportunities to innovate profitably.

Conclusion 3: The framework for road construction developed in this research is a helpful tool for medium-sized contractor companies to improve their competitive position in the market.

This conclusion is based on the following findings:

- The rules in the framework for road construction industry match the opportunities that are associated with a supply-driven market strategy and are helpful to tackle the threats. The core capabilities of supply-driven working contractors have been identified in the analysis of the framework.
- The framework represents the changes in tasks and responsibilities that are associated with attaining a supply-driven market strategy and the possibilities for collaboration between contractor companies in the supply chain.

- In the interviews the respondent judged the framework to be complete. It clarifies the supply chain structure and provides a basis on which suppliers in the road construction supply chain can divide responsibilities among each other.

Conclusion 4: The research provides a rough outline of the desired demand specification for large scale road construction projects. Yet it cannot be regarded to be detailed enough to be applicable directly into

- The research has concentrated on the organisation of contractors in the possible supply-driven market future. The research has shown that the demand specification should be drawn up in such a way that it leaves the opportunity to contractors to provide their own technical solution to functional specifications. It should thereby describe the performance attributes in stead of prescriptive technical solutions.
- The research does only sketch these rough conditions. It however did not manage to give a concrete interpretation of these conditions. The research does have noted that it is important to determine the desired demand specification in dialogue.

7.1.2 Conclusions regarding Ooms Construction

Conclusion 5: The role of 1st tier direct supplier of the subsystem 'road' (including road-bound construction) of a large scale road construction project fits the size and capacities of Ooms Construction best, and therefore they should try to position themselves more as a niche player in the market.

This conclusion is based on the following findings:

- In the interviews at both Ooms Construction and her possible partners, the respondents indicated that in Ooms Construction's organization there is only just sufficient management capacity to take responsibility for complete project delivery in a demand-driven market. So with increasing responsibility and tasks in a supply-driven market Ooms Construction cannot maintain that position.
- Within Ooms Construction it is a difficult issue to invest considerably in increasing management capacity because of the size of the organisation and the risk of the investment.
- In this role Ooms Construction is expected to excel more than in the position of principal supplier because it can display their core capabilities the better.

Conclusion 6: If Ooms Construction wants to stay involved in the large road construction market, then a separate project department has to be established. This 'systems integration' department should concentrate on the client demands, communication, supply chain integration and evaluation and optimization of the entire construction process.

This conclusion is based on the following findings:

- Whereas the market is changing toward a supply-driven situation with more responsibility for the principal contractor in delivering large scale road construction projects, it is increasingly important that Ooms Construction improves on the discipline of systems integration.

- The knowledge and capabilities needed to perform systems integration differ considerably from the normal engineer's work at contractor companies and therefore a separate department is needed. These people need to combine knowledge of road construction technology with softer skills like marketing, communication and collaboration.
- In the management meeting at Ooms Construction the participants endorsed to this viewpoint. At the moment there is no structural evaluation and optimization system, whereas this is considered to be desirable. Ooms Construction will by structurally tackling these processes largely improve their business and the company will be prepared better to the future.

7.2 Recommendations

This master thesis research can be regarded to be a good first start for Ooms Construction as a proactive player in a supply-driven large scale road construction market and it gives an overview on the issues that are of importance in doing so . This research is however not complete and therefore the following research issues can be recommended to Ooms Construction and the road construction market in general:

- Even in the current road construction market, and surely in a future supply-driven market Ooms Construction feels the urge to get involved in closer collaboration with other middle-sized contractor companies and suppliers of components of their product. Ooms Construction should examine the willingness of companies in their business environment to attain a supply-driven market strategy as well and intensify their collaboration. From the investigation in all these companies they can conclude if it is feasible to consider a supply-driven market strategy as an integrated supply chain.
- A key issue in a learning organisation is the recording, evaluation and reusing of knowledge about the delivered product. Contractors nowadays are still swayed in the issues of the day and forget that this is essential in improving their business. These processes become increasingly important in a supply-driven market strategy in the communication with their collaborating partners and the approach of their clients with their product portfolio of pre-engineered solutions. Together with their partners in the construction process Ooms Construction should therefore put effort in designing or procuring (ICT-)tools to share this information with their partners and make it available if they are approaching the client.
- This research promotes the need for change at middle-sized contractor companies for preparing for a probable future. The field research has shown that some possible partners indicate that they are willing to develop in this direction. This research has however focused on contractor companies that are expected to be willing to make the change in the same direction. It would therefore be interesting to investigate the desired direction of development at contractor companies market wide and nationwide to see if there and what are the similarities and discrepancies between the desired direction of all middle-sized contractor companies.
- Large-sized contractor companies have been out of the scope of this research. A possible strategic position for medium-sized contractor companies could be as a "direct 1st tier road construction supplier" to a larger integrator company. In the current market there seems to be no place for such a supplier

role. It could however be a profitable position for medium-sized contractor companies. The possibilities in the market to attain this position should be investigated at the large-sized contractor companies as well as in relation to a systems integrator without construction execution capacity.

- Generally (road construction) contractors serve a variety of target markets. This research however has mainly focused and only has done field research in the large scale road construction market. A couple of threats identified in this research are particular present in the public market. It is therefore potentially very interesting to do research on the applicability of the supply-driven market strategy in other (private) markets. For a road construction contractor some exemplary target markets can be: seaports, airports, parking facilities, project development, municipal roads, etc. Probably in this markets the client, due to lack of engineering knowledge, will give the contractor more freedom in developing its own solution. The experience gained in these markets can subsequently be applied in the large scale road construction market.
- Actors in various roles in the entire construction process are engaged in improving their own business process and in adjusting themselves to the changing large scale road construction market. The willingness to change is good for the industry and it should be stimulated. Till now it seems that the various parties are mainly concentrating on their own organisation and on project-based developments. It is however time to focus on project-independent collaboration throughout the entire market. There is however no structural regular project-independent exchange of knowledge between the demand side and the supply side of the construction process. Research should therefore be performed on the possibility of a platform for project-independent market-wide collaboration and communication between principal suppliers, suppliers, clients and financiers to connect demand (general requirements and wishes) and supply (the possibilities and expected innovations).
- This research has been a good first exploration of desires supply chain management for the future large scale road construction market. The research has described the general conditions in which a supply-driven market strategy can exist from an organisational perspective. To make the supply-driven market strategy increasingly applicable to the road construction practice there are a variety of tools available, e.g. modular design, designing in Building Information Models, other ICT applications, designing product families, learning environments and evaluation through Key Performance Indicators. A future research could therefore focus on the application of these tools in the large scale road construction market from a technical perspective.
- If the supply-driven market strategy is adopted throughout the market this implies that actors collaborate with each other in a different way. There are responsibilities shifting towards principal suppliers and lower tier suppliers. The collaboration is becoming project-independent and the various supply chain members are becoming more dependent on each other. It is obvious that the contractual agreements between these parties will change accordingly. The contractual agreements should reflect the will to collaborate, exchange knowledge and at the same time divide profits according to effort. Future research could investigate the new contractual agreements that have to be constructed from a jurisprudential point of view.

Epilogue

Around September 2009 I have started orienting on my master thesis subject along with finalising my last courses in Civil Engineering. From the start I had decided to bring up my research subject myself, because I was convinced that this way I would be able to remain motivated during my last project most easily. I have always agreed with prof. de Ridder's lectures that a supply-driven market strategy seems appealing to the construction market and therefore I preferred a subject in that direction. A recommendation in a fellow student's thesis report was the immediate cause to my motivation to outline the business processes of a contractor in a supply-driven market. The recommendation stated that the contractor company should adapt its procurement strategy along with attaining a supply-driven strategy. From that recommendation and the other master thesis reports I have read I noticed that research till now had rather focused on the client-contractor relation and not on the contractor's supply chain itself. The subject for my thesis was born!

Probably because I live in Amsterdam prof. de Ridder advised me to contact Ooms Construction, an innovative contractor is his opinion. I think this has eventually been a good occasion to finally promote a supply-driven market strategy in North-Holland and not only at one of the large contractor companies that dominate the Dutch construction market in the end. At Ooms Construction I found myself in a company that has always had a proactive attitude towards innovation in road construction and therefore they were eager to give me the opportunity to perform a research at their company. On the other side I found myself at a company that was not familiar with internship students in my field of expertise. This is probably because on one hand Ooms Construction is still traditional in terms of focus on technology and on the other hand because Delft is 80 kilometres away from Ooms Construction's main office.

These two factors made that I have pull the entire research quite independently and it has asked for a lot of self-motivation. I am proud that I have successfully managed to perform this research and I have the feeling that it is really my own thing.

In retrospect I would have done two things differently to perform better with respect to the content of the research; firstly I would have prepared myself better to the research method. Within the section Design and Construction Processes the research tends to focus more on social science than on technical research. When I started this research I didn't expect this to be so much different. Along the way I realised that I have not learned to do research this way till I had to learn it myself during my thesis. I would therefore recommend my fellow students to prepare more thoroughly than I did with regard to this aspect. Secondly I have concentrated for too long on the theoretical part of the research and thereby I have postponed my field research too long. It is precisely in the field research that the subject comes to life and there the student can notice that it does not solely happen on paper, but that it is a real world challenge. I would therefore advise my fellow students to start with the field research even if the theoretical part is not yet complete.

During my research it was amazing to see that there is the recognition of the need for change widely through the industry. In all sorts of ways the various parties in road construction are engaged in improving their processes and securing that they are apt for the future. In spite of that it is also amazing to see that the various

parties are still trying to make the change independently. In my opinion the contractors as well as their suppliers and clients are not focusing enough on the fact that their businesses are intrinsically connected. It seems that they are still inclined to point to one another instead of setting their shoulders to the wheel. I hope that this research can contribute to changing the traditional adversarial culture in which most parties try to squeeze each other and shifting the focus on price solely to improving the construction process as a whole aiming for focus on customer value. Hopefully finally the actors in construction industry find out the advantages of collaboration instead of working together but with different goals. If this attitudinal change is made I think the construction industry can manage to restructure, rationalise and economise. Besides that the industry will become more attractive to work in and hopefully the bad reputation of construction industry as a whole will fade.

I regard this research to be a possible first impulse to Ooms Construction to manage their business processes better in the changing environment. I think that the technology, knowledge and will is there in Ooms Construction's organisation to be prepared for the future. And I believe if Ooms Construction will take the dare to invest in their business, they will show that their innovative reputation is justified and that it will remain justified in the future.

Literature

- Ang, F., Groosman, M. and Scholten, N.P.M. (2005), "Dutch performance-based approach to building regulations and public procurement", *Building Research and Information*, vol. 33(2), pp.107-119
- Bijl, N. (2008), *Master thesis: a supply-driven road construction industry, a new demand and supply strategy for contractors and municipalities*, TU Delft, Delft
- Briscoe, G., Andrew, R.J. and Millett, S. (2001), "Construction supply chain partnerships: skills, knowledge and attitudinal requirements", *European Journal of Purchasing & Supply Management*, vol. 7, pp. 243-255
- Caniels, M.E. (2007), *Marketing nog geen gemeengoed in de bouw*. USP Marketing Consultants.
- Davies, A., Brady, T. and Hobday, M. (2007), "Organizing for solutions: Systems seller vs. Systems integrator", *Industrial marketing management*, vol. 36(2), pp. 183
- Dorée, A.G. (2001), *Dobberen tussen concurrentie en co-development, de problematiek van samenwerking in de bouw, intreerede Universiteit Twente (floating between competition and co-development, the problems of collaboration in construction)*, Universiteit Twente, Enschede
- Elling, R. et al (1994), *Rapportagetechniek: schrijven voor lezers met weinig tijd*. Wolters-Noordhoff, Groningen
- Gann, D.M. and Salter, A.J. (2000), "Innovation in project-based service-enhanced firms: the construction of complex products and systems", *Research policy*, vol. 29, pp. 955-972
- Gray, C. and Davies, R.J. (2007), "Perspectives on experiences of innovation: the development of an assessment methodology appropriate to construction project organizations", *Construction management and economics*, vol. 25, pp. 1251-1268
- Gulati, R. (1998), "Alliances and networks", *Strategic management journals*, vol. 19, pp. 293-317
- Harland, C.M. (1996), "Supply chain management: relationships, chains and networks". *British Academy of Management* vol. 7, pp. 63-80
- Henderson, R.M. and Clark, K.B. (1990), "Architectural innovation – the reconfiguration of existing product technologies and the failure of established firms", *Administrative Science Quarterly*, vol. 35(1), pp. 9 - 30

- Hielkema, M. et al. (2008), *Van aannemen naar ondernemen, 18 nieuwe business modellen voor bouwbedrijven*, research in cooperation with the Bridge; Zoetermeer
- Hines, P. and Rich, N. (1997), "Supply-chain management and time-based competition: the role of the supplier association", *International Journal of physical distribution & logistics management*, vol. 27(3-4), pp. 201-225
- Hobday, M., Davies, A. and Prencipe, A. (2005), "Systems integration: A core capability of the modern corporation", *Industrial and corporate change*, vol. 14(6), pp. 1109-1143
- Kok (2007), *Master thesis: a supply-driven construction industry for transportation infrastructure*, TU Delft, Delft
- Koskela, L. (2003), "Is structural change the primary solution to the problems of Construction?", *Building Research and Information*, vol. 31(2), pp. 85-96
- Kotler, P.J. and Armstrong, G. (1994), *Principles of marketing 6th edition*, Prentice Hall International Editions
- Lambert, D.M. and Cooper, M.C. (2000), "Issues in supply chain management", *Industrial Marketing Management* vol. 29(1), pp 65-83
- Leeuw, A.C.J. (2002) de Leeuw, *Bedrijfskundig management, primair proces, strategie en organisatie*, Koninklijke van Gorcum, Assen
- Ludema, M.W. (2003), "Supply chain analysis thinking, *IEEE International Conference on Systems, Man and Cybernetics, 2003*.
- Miller, R., Hobday, M., Leroux-Demers, T. and Olleros, X. (1995), "Innovation in complex systems industries: the case of flight simulation", *Industrial and Corporate Change*, vol. 4(2), pp. 363-400
- Miller, R. and Lessard, D.R. (2000), *The strategic management of large engineering projects; shaping institutions risks and governance*, Massachusetts Institute of Technology, pp. 33-39
- Porter, M.E. (1980), *Competitive strategy: techniques for analysing industries and competitors*, New York: Free Press
- Porter, M.E. (1985), *Competitive advantage: creating and sustaining superior performance*, New York: Free Press
- Pries, F. and Dorée, A. (2005), "A century of innovation in the Dutch construction industry", *Construction Management and economics*, vol. 23(6), pp. 561-564
- Pries, F. and Janszen, F. (1995), "Innovation in the construction industry: the dominant role of the environment", *Construction Management and Economics*, vol. 13(1), pp. 43-51

- Ridder, H.A.J. de (1994), *Design and construct of complex civil engineering systems: a new approach to organisation and contracts*, Delft University Press, Delft
- Ridder, H.A.J. de (2006), *Het living building concept, een wenkend perspectief voor de bouw*, PSIBouw, Gouda
- Ridder, H.A.J. de (2006a), Lecture sheets CT5981: *Collaboration and procurement procedures in the civil engineering industry*, University of Delft, Delft
- Ridder, H.A.J. de (2007), Lecture notes course CT5981: *Collaboration and procurement procedures in the civil engineering industry*, University of Delft, Delft
- Ridder, H.A.J. de, and Vrijhoef, R. (2003), "The concept of life cycle benefit of buildings: developing a framework for life cycle value management", *In: Proceedings CIB W055+065+107 Joint Conference Knowledge Construction, 22-24 October 2003, Singapore*, vol. 1, pp. 654-664
- Ridder, H.A.J. de, and Vrijhoef, R. (2007), "From demand-driven supply towards supply-driven demand in Construction", *In: Proceedings CME25 Conference. 16-18 July 2007*, University of Reading, UK.
- Rudberg, M. and Wikner, J., "Mass customisation in terms of the customer order decoupling Point", *Production, Planning and Control*, vol. 15(4), pp. 445-458
- Rutten, M.E.J., Dorée, A.D. and Halman, J.I.M. (2007), *Systeemintegratoren in de bouwsector, leiderschap in innovatie*, University of Twente, Enschede
- RWS (2008), *Rijkswaterstaat – Jaarverslag 2007*, Rijkswaterstaat, Den Haag
- Sexton, M. and Barrett, P. (2005), "Performance-based building and innovation: balancing client and industry needs", *Building Research & Information*, vol. 33(2), pp. 142-148
- Telgen, J., Buter, J., Schotanus, F. (2006), *Reader purchasing management*, Enschede, Universiteit Twente
- Terpstra, K. (2008), *Ondernemingsplan Ooms Construction BV 2008-2010*, Scharwoude
- Veld, J. in 't (2002), *Analyse van organisatieproblemen, een toepassing van denken in systemen en processen*, Wolters-Noordhoff, Groningen
- Verschuren, P. and Doorewaard, H. (2005), *Designing a research project*. Lemma, Utrecht
- Vrijhoef, R. and Koskela, L. (2000), "The four roles of supply chain management in construction", *European Journal of Purchasing and Supply Management*, vol. 6, pp. 169-178

- Vrijhoef, R. and Koskela, L. (2005), "Revisiting the three peculiarities of production in construction", *Proceedings IGLC-13, July 2005, Sydney, Australia*, pp. 155 - 163
- Vrijhoef, R. and Ridder, H.A.J. de (2007), "Supply chain systems engineering in construction", *In: Proceedings CIB World Building Congress 14-17 May 2007, Cape Town*, pp. 279-291
- Winch, G. (1998), "Zephyrs of creative destruction: understanding the management of innovation in construction", *Building Research & Information*, vol. 26(4), pp. 268-279
- Winch, G. (2000), "Institutional reform in British construction: partnering and private finance", *Building Research and Information*, vol. 28(1), pp. 141-155
- Winch, G. (2003), "Models of manufacturing and the construction process: the genesis of re-engineering Construction", *Building Research & Information*, vol. 31(2), pp. 107-118
- Womack J., Jones, D. and Roos, D. (1990), *The Machine that Changed the World*, Rawson Associates, New York, NY.
- | | |
|--|---|
| Centraal Bureau voor de Statistiek | http://www.cbs.nl |
| Economisch instituut voor de bouwnijverheid; | http://www.eib.nl |
| INCOSE | http://www.incose.org |
| Living Building Concept; | http://www.livingbuildingconcept.nl |
| Ooms Avenhorn Holding; | http://www.ooms.nl |
| The Bridge | http://www.thebridge.nl |

Appendices

A supply-driven approach applied to the Contractor's organisation

"a view on supply chain management for medium-sized contractor companies in large scale road construction projects"



Section Design and building processes



Master of Science
Graduation thesis

Status:

FINAL

Student:
Martijn Verster

1040006

July 2009

Table of contents

Table of contents	III
A Innovative products Ooms Construction.....	1
A.1 Road energy systems®	1
A.2 Sealoflex® - polymer modified bitumen	3
A.3 Invisible joint systems	4
B Glossary	5
C Interview reports.....	9
C.1 General interview framework.....	9
C.2 Interviews Ooms Construction	10
C.3 Interviews possible partners.....	21
C.4 Interviews possible clients.....	29
D Production strategies with Ooms Construction.....	37
D.1 Introduction.....	37
D.2 Element supplier – asphaltic mixtures.....	37
D.3 3 rd tier subsystem supplier – Invisible joint transition	38
D.4 1 st and 2 nd tier subsystem supplier – solely road construction	39
D.5 Project/system supplier.....	40
E Management meeting results.....	43
E.1 Introduction.....	43
E.2 Statement 1.....	43
E.3 Statement 2.....	44
E.4 Statement 3.....	45
E.5 Statement 4.....	46
E.6 Statement 5.....	47
E.7 Statement 6.....	48

A Innovative products Ooms Construction

A.1 Road energy systems®

Road energy systems® is developed in cooperation with TipSpit, an engineering firm specialised in innovative products. Road energy systems extracts heat from asphalt, this heat is stored in the ground and extracted later heat buildings and the road.

A.1.1 Main principle

Road Energy Systems® consists of a layer of asphalt concrete that has a closed system of pipes running through it. The pipes are connected to underground aquifers (water-bearing sand). In summer the sun heats the asphalt concrete pavement, which in turn raises the temperature of the water in the pipes. The water is then transported to the heat source area, where it is stored for several months. As soon as autumn arrives, the system brings the warm water to the surface, where a heat pump raises its temperature to a level suitable for low temperature heating systems. The surplus thermal energy is used to keep the temperature of the asphalt concrete above freezing point. The asphalt concrete cools the water to the point where it can eventually flow to the cold source. In summer the process is reversed. Water is pumped up from the cold source and used to cool buildings. This warms the water, which then moves through the asphalt collector again, is heated further by the sun and then injected into the heat source in the ground (see figure A.1-a).

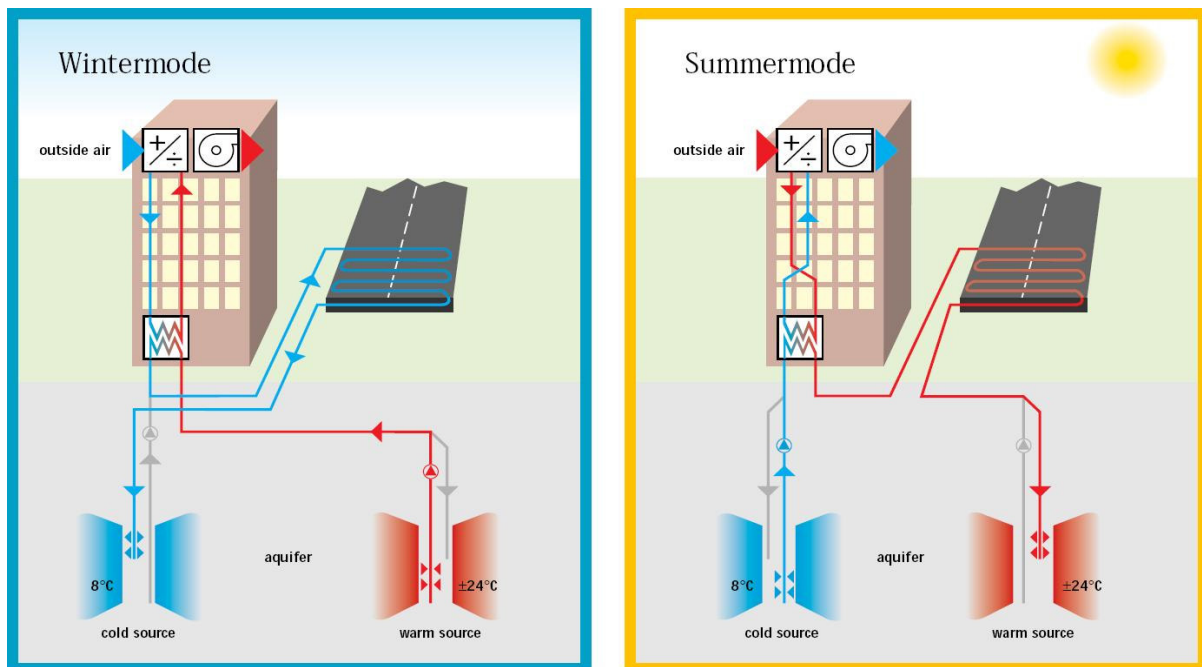


figure A.1-a: road energy systems®

A.1.2 Economic value

Improving traffic safety

In winter the temperature of asphalt can be kept above freezing, preventing the formation of ice on the road. The evaporation rate of rain and melt water is also speeded up. In summer, cooling the surface to below the temperature at which bitumen begins to soften prevents the asphalt structures from being deformed. This in turn prevents the formation of ruts or permanent deformation, which significantly improves traffic safety, especially under poor weather conditions.



figure A.1-b: a road heated by Road Energy Systems®

Increasing durability of roads

Road Energy Systems® can be used to reduce variations in temperature that can occur in an asphalt layer, thereby extending the life of the asphalt construction. Cooling and heating asphalt also reduces general wear and tear. Because these asphalt constructions are less prone to cracking, there will also be less damage caused by freezing and thawing. In addition, the combination of temperature regulation and a specially reinforced structure will extend the life of the asphalt construction even further.

Environmental gain

Using Road Energy Systems® to heat roads in winter results in savings on the use of salt on icy roads, thus lowering the environmental impact of salt. Using Road Energy Systems® to heat buildings means using less fossil fuel, which reduces CO₂ emissions.

Increasing durability of concrete structures

By controlling the temperature of a concrete structure within a certain range, it will not expand and contract as much, significantly reducing the expansion and contraction between the joints in the concrete structure. By using water-impermeable bituminous membranes in combination with Road Energy Systems®, it is possible to use an asphalt covering layer on structures without the need for joints. By not having to spray as much salt or any salt at all, there is no damage to the concrete from corrosion of the reinforcement as a result of salt penetration.

A.2 Sealoflex® - polymer modified bitumen

Ever increasing traffic intensities, higher axle loads and tyre pressures and unfavourable wheel configurations result in increasing deterioration of asphalt pavements. Pavement performance can be improved by improving the properties of asphalt mixes. The best improvements are obtained by incorporating specific polymers to the bituminous binder.

Sealoflex® comprises a group of polymer modified binders for use in heavy duty asphalt pavements. Since its introduction in the early eighties Sealoflex® has proved its value in practice in terms of performance, durability and cost effectiveness. Nowadays Sealoflex® is manufactured and used worldwide.

Properties

Asphalt mixes based on Sealoflex® binders are characterized by:

- low temperature susceptibility
- high elastic recovery
- high resistance to fatigue
- high flexibility
- high stability.

The specific properties of Sealoflex® asphalt provide excellent resistance to fatigue, reflective cracking and permanent deformation, which results in extended durability of the pavement. Besides that Sealoflex® is highly resistant to damage through jet fuel (see figure A.2-a). These special properties result in suitability for asphalt structures that are exposed to oil, petrol and chemicals and layers that need extensive durability, such as in airport lanes, tank stations and industrial applications.

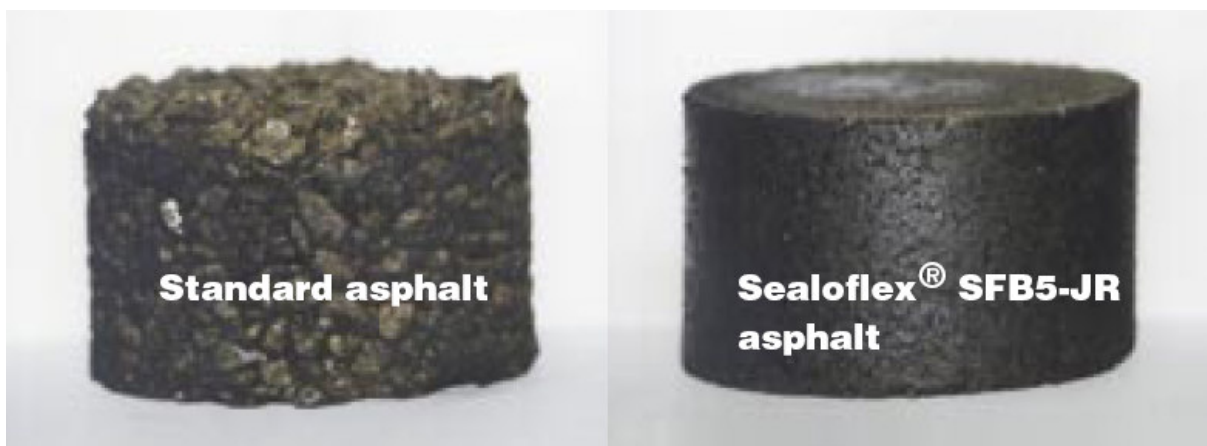


figure A.2-a: Compacted samples after 24 hours immersion in jet fuel.

A.3 Invisible joint systems

Traditional transitions from roads founded on soil to roads founded on civil structures have always been a headache to road construction. The joints induce heavy noise and vibrations to the traffic as well as the structure beneath it. This results in large cracks in the asphalt layers (see figure A.3-a). Consequently water is penetrating and the process is aggravating at an exponential pace.



figure A.3-a: crack in asphalt due to transition of foundation

Ooms Construction has started the development of the Invisible joint systems in cooperation with the Bouwdienst of Rijkswaterstaat. The transition structure is designed as a standard detail, that can be applied to all bridges with a span of 80 metres and smaller. The invisible joint system is a transition structure that is applied above the joint in the bottom layer of the asphalt structure. The transition is taking the movements due to extending and shortening of the concrete structure underneath (see figure A.3-a).

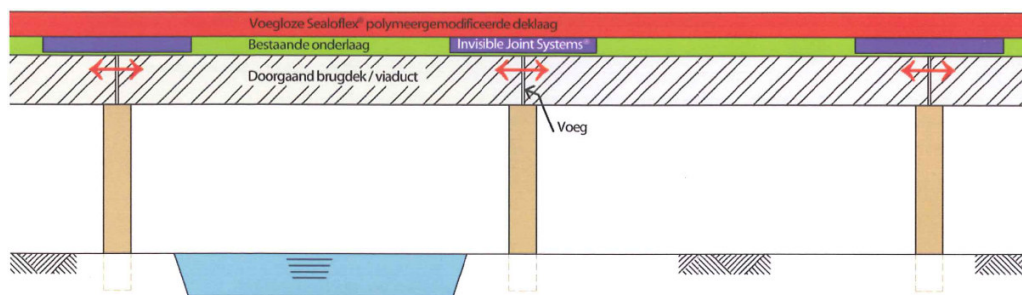


figure A.3-b: principle detail invisible joint system

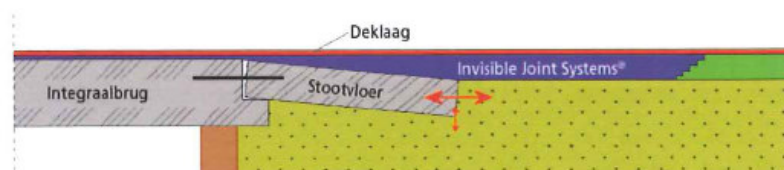


figure A.3-c: principle detail 2 invisible joint system

B Glossary

Client (owner, demander, demanding party)	Different terminology is often used for the same purpose. In this report the term 'client' is used for the value demanding party who pays 'money for value' and receives 'value for money'. In large scale road construction the client is a governmental party. It thereby is a representative for the demand of the end users which are the people paying tax.
Contractor (supplier)	
Demander, demanding party	see client
Design and Construct / Design and Build (D&C, DB)	see client
Demand-driven construction industry	Traditionally the construction industry is demand-driven; nothing happens until the demander decides to initiate a project. The demanding party (client) or a consulting engineer on behalf of the client, fully specifies the solution and controls the details. Clients specify their wishes (demand) at a high abstraction level. Consulting engineers take care of design and engineering work, resulting in a fully specified project with drawings, specifications and standards. The specified project is considered to be an object with fixed quantity and quality. Contractors are invited to submit a proposal containing a working method for realization and mostly a fixed price. The contractor with the lowest fixed price gets the contract awarded for realization. Creativity is fully allocated in demand specifications instead of at the supply side. When the client specifies output specifications for compliance in advance, it is still considered demand-driven. In a demand-driven system there is very limited or no room for creativity at the market and no incentive for product development, research and development and unsolicited proposals. The solution is dictated by the client and inherent risks and costs of innovation are not rewarded in a lowest-price system.

Large scale road construction	sector of the civil road infrastructure market of Dutch A-x (autosnelweg) and N-x (autoweg) roads, in English: motorway (UK), interstate highway (US) or freeway (US). These are predominantly dual-carriageway roads with grade-separated crossings. Next to road construction the projects include the construction of crossing structures, dynamic traffic management and road surroundings.
Ooms Avenhorn Holding	Ooms Construction is a subsidiary company of Avenhorn Holding Holding. The holding exist of a couple of divisions among what there are a engineering/consultancy division (Unihorn), a housing construction division, an international division and a civil engineering division (Ooms Constrution)
Owner	See client
Product	In marketing a product is anything that is supplied to satisfy clients' needs and wishes. The concept of product is not limited to physical objects, anything capable of satisfying a need can be called a product, i.e. physical objects, services, persons, places, organisations, activities and ideas. In road construction for example not only the constructed works itself is a product, the additional maintenance, operation, financial and other services are considered to be part of the product as well.
Project	In project management a project consists of a temporary endeavor undertaken to create a unique product, service or result.
Rijkswaterstaat	Government agency for transport, public works and water management. In large scale road construction this is the main client.
Supplier	Different terminology is often used for the same purpose. In this report the term 'supplier' is used for the value delivering party who supplies 'value for money' and receives 'money for value'. In large scale road construction

Supply-driven construction industry

In a supply-driven construction industry, the supplying party/contractor specifies its own solution, making optimisations and purposefully limits what he offers. Components of the supplying party are to a certain extend pre-designed, specified and validated. The supplier only has to demonstrate that the aggregation of components forms the right product/service according to the client's wishes and requirements. The demanding party (client) states its requirements and wishes on a high level of abstraction and recognizes that the supplier has the competence to define the appropriate specifications for the problem (wishes and requirements). In the supply-driven construction industry, there is room for concept/product development and unsolicited proposals initiated by supplying parties.

System / Systems engineering

From perspective of systems theory a system is a set of interacting or interdependent entities, real or abstract, forming an integrated whole. A large scale road construction project or the delivered product of contractors is often regarded to be a complex product system (see paragraph 3.4 in the report)

SWOT-analysis

A SWOT-analysis is a strategic planning method used to evaluate the Strengths, Weaknesses, Opportunities, and Threats involved in a project or in a business venture. It involves specifying the objective of the business venture or project and identifying the internal and external factors that are favorable and unfavorable to achieving that objective.

A SWOT-analysis is often performed by a business organisation, but it can also be utilized to analyse a model. In this research the SWOT analysis is use to test the proposed theoretical solution in the framework to practical experience by interviewing managers in Ooms Construction's business environment.

C Interview reports

The framework for the road construction industry has been tested with a selection of parties in Ooms Construction's business environment. The respondent can roughly be divided in three separate groups. The respondents in the first group are the managers of Ooms Construction, the second group consists of managers with Ooms Construction's possible partners and the latter group is that of Ooms Construction's clients in large scale road construction industry. Thereby there is aimed to get a complete overview of data from Ooms Construction itself as well as the parties involved in Ooms Construction's business environment.

The chosen interview method has been semi-structured interview. A semi-structured interview is flexible, allowing new questions to be brought up during the interview as a result of what the interviewee says. In advance of the interview a framework of themes to be explored and accompanying possible questions have been prepared.

The interviews have taken place in Dutch. The results of the interview are therefore elaborated in Dutch to prevent misinterpretation of the respondents' answers. In the report the response is translated in English to make it usable over there. The interview outcome has been given as a feedback to the respondents again to prevent misinterpretation of the spoken words.

C.1 General interview framework

After a short introduction of the student, company and respondent profiles, the research subject has been introduced. Besides that during the interview three main themes have been treated (see figure C.1-a). First the developed framework for supply-driven road construction is presented. Trough a set of questions about the framework itself, the respondent is invited to assess the applicability of the framework and the opportunities and threats for the industry by doing so. The second set of questions focuses on the possible strategic positions of Ooms Construction in the supply chain. For the various positions the respondent is invited to judge Ooms Construction on strengths and weaknesses at that particular position. The latter theme is about how the relationships should change between Ooms and its business environment in future large scale road construction.

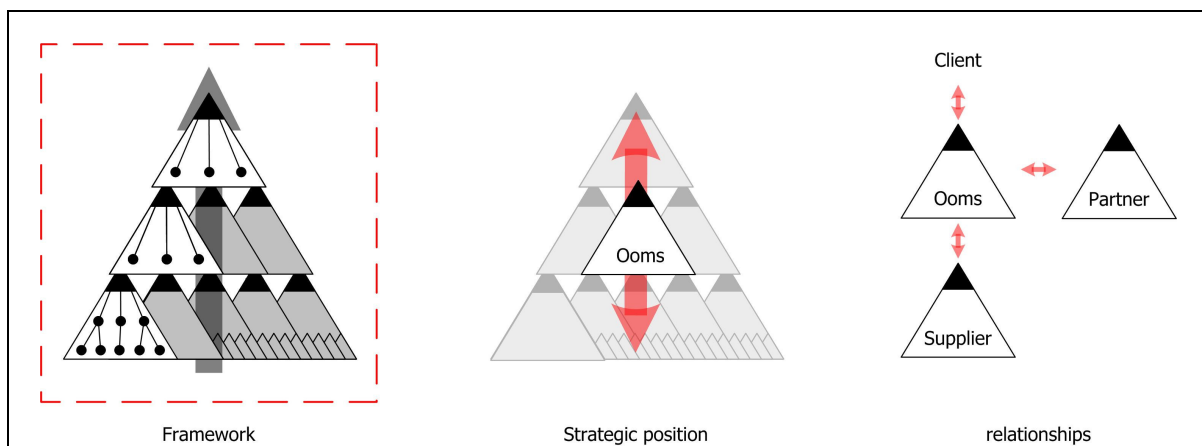


figure C.1-a: main themes in the interviews

In the interviews with all the respondents the same main themes have been treated. The questions asked however have been adapted to the respondent's position. That way the survey collects the expectations of the actors involved in the change of Ooms Construction into a supply-driven contractor company.

The interviewee's response has been elaborated per theme, because the questions have not been followed as strictly as they are stated rather the questions are used to assure that the entire theme is covered.

C.2 Interviews Ooms Construction

C.2.1 Respondents

Interviews Ooms Construction B.V.			
Name	Company	Position	Date interview
Ing. K. Terpstra	Ooms Construction B.V.	managing director civil engineering	14-04-'09
Ir. I. Oost	Ooms Construction B.V.	contract manager	16-04-'09
Dr. ir. A.H. de Bondt	Ooms Construction B.V.	manager R&D	29-04-'09

C.2.2 Interview guide managers Ooms Construction

1) Framework

- 1.1 What are the opportunities and threats for a middle-sized contractor company to proactively develop products for the large scale road construction market?
- 1.2 What are the opportunities and threats to middle-sized contractor companies to do joint product development in collaboration with other middle-sized contractor companies?
- 1.3 What are the opportunities and threats of structuring the supply chain according to the proposed framework for road construction industry?
- 1.4 Is the separate system integrator role desirable on different tiers? What are the opportunities and threats for implementing a system integrator in the road construction supply chain?
- 1.5 Is there something missing in the framework that should be treated?

2) Strategic position Ooms Construction

- 2.1 On which position(s) is Ooms Construction capable to operate at the moment?
- 2.2 What are the strengths and weaknesses of Ooms Construction at this (these) particular position(s)?
- 2.3 On which position(s) is Ooms Construction capable to operate in a supply-driven road construction market?
- 2.4 What are the capabilities that Ooms Construction has to (further) develop to be able to act at this (these) particular position(s)?
- 2.5 What position is most apt for Ooms Construction / On what position do you think Ooms Construction should aim in a supply-driven future?

3a) Relations of Ooms with partners and suppliers

3a.1 How should Ooms Construction and her partners/suppliers shape project-independent collaboration in a supply-driven road construction market?

3a.2 How should Ooms Construction give her partners/suppliers the incentive to attain a supply-driven market strategy?

3a.3 What question(s) would you like to be answered by your client?

3b) Relations of Ooms with clients

3b.1 How should the demand specification of the client in large scale road construction change to give contractors the opportunity to attain a supply-driven market strategy?

3b.2 How should the selection criteria of the client in large scale road construction change to give contractors the opportunity to attain a supply-driven market strategy?

3b.3 What question(s) would you like to be answered by your client?

C.2.3 Results Klaas Terpstra

Reacties gedurende presentatie onderzoeksuitkomsten

Dhr. Terpstra geeft aan dat het inderdaad voor de onderneming belangrijk is om betere economische prestaties na te streven met een aanbodedreven werkwijze. Ooms Construction werkt hiernaast met het principe van Maatschappelijk Verantwoord Ondernemen (MVO). Deze vorm van ondernemen is naast rentabiliteit (profit), gericht op het sociale aspect (people) en binnen ecologische randvoorwaarden (planet). Dhr. Terpstra geeft aan dat de marges in D&C groter zijn dan in andere projecten. Dit is dan ook een reden voor Ooms Construction om een speler te willen blijven in deze markt.

De verwachting dat in een aanbodedreven wegenbouw de prijsgerichte markt en fragmentatie verandert naar een met gedeelde doelen en strategische samenwerkingen wordt bevestigd met de kanttekening dat het hier over de complexe projecten gaat. Dhr. Terpstra geeft aan dat in eenvoudige projecten de markt niet zal veranderen aangezien er op dat niveau een groot aantal aanbieders hetzelfde aanbieden en daardoor het voordeel van concurrentie groot is.

De systeemintegrator op het hoogste niveau wordt in de bouwwereld de hoofdaannemer, contractpartner of penvoerder genoemd. Deze wordt door de combinanten samen bepaald, meestal op grond van grootste bijdrage aan de totale prijs van het project. Ooms Construction heeft ook wel met bepaalde partners de stilzwijgende afspraak dat de rol van hoofdaannemer ongeveer 50-50 verdeeld wordt over projecten. Projecten tot +/- € 50 miljoen kan Ooms Construction individueel trekken en zijn zij dus systeemintegrator.

Framework

De bedreiging van aanbodedreven werken zijn de ontwikkelingskosten die het met zich mee brengt. Hierdoor moet Ooms Construction altijd zijn plaats weten en is het onmogelijk vanwege financiële middelen om het zeer groot aan te pakken.

Het grote voordeel van samen producten ontwikkelen is dat je investeringen kunt delen en dus het risico samen oppakt. De opdrachtgever zal echter altijd hoofdelijke aansprakelijkheid vragen van een partij, dus dit moet

onderling geregeld worden. Een bedreiging is dat Ooms Construction voornamelijk in West en Noordwest Nederland actief is

In principe werken we volgens een structuur van aanbieders gelijkend het framework. Het wordt alleen niet op deze manier opgeschreven. Als dit wel gedaan wordt dan is er een duidelijkere structuur van samenwerkende partijen en de verantwoordelijkheden die zij verdelen.

In product Road Energy Systems® heeft Ooms Construction duidelijk de systems integrator rol op zich genomen. Bij het ontwikkelen van dit product was er kennis van verschillende componenten nodig om deze goed te kunnen aggregeren tot een product. Kennis van asfalt, rasterwapening, buizen en het warmtepompsysteem was nodig om tot een geheel te komen. Ooms Construction heeft hierover weinig kennis in huis. Het werkte niet goed om samen aanbieder te zijn, dus we hebben de vorm gekozen van Ooms Construction als hoofdaanbieder. Het principe van productontwikkende aannemer in de auto(snel)wegenbouw kan je toepassen op de situatie van Ooms, alleen moet je wel je beperkingen weten wat betreft capaciteit. In het Road Energy Systems® was dit behapbaar, omdat het vergeleken met een geheel auto(snel)wegproject relatief kleinschalig is. Een structuur volgens het framework had zeker een invulling kunnen krijgen en nuttig geweest in een dergelijk project. Als systeemintegrator ben je inderdaad primair touwtjes aan elkaar aan het knopen. Binnen raakvlakken management is het belangrijk dat met alles rekening gehouden worden, niets over het hoofd gezien wordt en dat alle in het contract gevraagde componenten verdeeld worden. Daarna gaat iedereen zich concentreren op hun eigen discipline.

Martijn zegt: Je moet projectonafhankelijk die organisatie al neerzeggen. Dhr. Terpstra: Wat zijn de werkzaamheden die het meest bepalend zijn. Je zou daar schema voor kunnen maken, dat ieder weet wat hij moet doen. Beperkend voor Ooms is de locatiegebondenheid, zij willen zuid en west Nederland doen. MNO bijvoorbeeld is over het hele land en daarom kan dit een bedreiging zijn.

Martijn zegt: Wat mist u in het model? Je moet de kennis en knowhow in huis hebben bovenaan een paar sterke personen hebben bovenin. Zou graag zien om tendermanagers ook in het project in te zetten, want dit is dit heel belangrijk. Maar dit ligt lastig met de manier waarop projecten nu georganiseerd zijn en de capaciteit die je in huis hebt.

Strategic position Ooms Construction

Ooms Construction heeft de ambitie om als hoofdaannemer op te treden in auto(snel)wegenprojecten. Deze ambitie kan Ooms Construction op het moment waarmaken. Om mee te blijven doen op het hoogste niveau is het nodig om de organisatie te versterken. Want als Ooms Construction bepaal jij op dat moment het gezicht. Er zijn projecten waarin je afsprekt samen als een hoofdaanbieder op te treden, maar je wordt regelmatig alsnog als onderaannemer gezien. Op de vraag of een partij als GTI ook de ambitie heeft om op de plek van hoofdaannemer te acteren, antwoordt dhr. Terpstra dat dit niet het geval is, omdat zij er minder bedreven in zijn om andere mee te nemen in het project. Ooms Construction zal het er dus eerder opaan sturen om GTI mee te nemen. De opdrachtgever die wil namelijk graag een gesprekspartner. Dhr. Terpstra zegt dat GTI bijvoorbeeld wel logischerwijs als penvoerder optreedt, wanneer zij 75% van het werk in een project op zich nemen.

Het is wel eens besproken onder een aantal combinanten, waarmee Ooms Construction containerterminals bouwt, om samen zichzelf als aanbieder van complete containerterminals te profileren. Hierbij kan het complete pakket van asfalt, elektrotechniek en kraanbanen in een keer aangeboden worden inclusief ontwerp en eventueel

onderhoud. De opdrachtgever is alleen daar toch bang om met een aantal aanbieders in een partij in zee te gaan. Hierbij zijn ze bang voor concurrentiegevoeligheid, via prequalificatie wordt eerst de markt verkend.

Met RES wel eens gehad, wat Ide ook zei. Die bieden een ander systeem aan. Toen hebben ze een bouwteam gevormd, provincie NH in Langedijk. Dan wordt alles uitbesteed, behalve het RES. Bedreiging dat Opdrachtgever bang is dat er geen concurrentie is. K: bescherming innovaties is nihil, dit doen zij om concurrentie in te voeren. Wethouder heeft een belang: die formuleert een beleid, aanbestedingsbeleid, dat zijn bedragen. Overal is een escape, als het moeilijk te omschrijven is dan kunnen ze wel direct met je in zee gaan. Ze vragen altijd: ben je de enige die dit kan?

De hoogste positie kunnen we innemen, alleen we pakken het niet zo gestructureerd. Op de vraag of het mogelijk is om op een aanbodgedreven wijze de hoofdaannemer te zijn, antwoordt dhr. Terpstra dat er in theorie unsolicited proposals aan de markt aangeboden kunnen worden. Hier is echter een grote investering voor nodig. We zitten ook nog in het begin van het veranderingsproces. Het is een te grote investering om het helemaal op te zetten. Bovendien wil de opdrachtgever op het moment zich er nog veel te veel mee bemoeien. Ze willen functionaliteit vragen, maar indirect vragen ze gedetailleerde uitwerking. Dit wordt deels ingegeven door het feit dat zij weer te maken hebben met eigen accountants waarnaar zij zich moeten verantwoorden.

Ooms Construction kan makkelijker op lagere niveaus acteren. Ooms Construction heeft duidelijk de ambitie om zich hoger te profileren. Enerzijds omdat zij anders uit de markt dreigen te verdwijnen, en hiermee ook uit de markt van de grotere private opdrachtgevers. Anderzijds is dit een kwestie van reputatie en aanzien, Ooms Construction heeft ook gevoelsmatig de drive om hoofdaannemer te blijven.

Relations and mutual expectations in the supply chain

Ooms Construction zoekt gericht naar partners met de bedoeling om langere relaties op te bouwen. Omdat veel leveranciers ad hoc bekijken of zij voldoende werk hebben zullen zij, op het moment dat zij veel werk hebben, voor een veel hogere prijs aanbieden. Zij gaan dan risico ontwijkend gedrag vertonen.

Dhr. Terpstra geeft aan dat de opdrachtgever een meerwaarde moet belonen met financiële stimulansen. De interviewer vraagt hierop of Ooms Construction op dezelfde wijze ook zijn leveranciers op deze manier wenst te stimuleren. Dhr. Terpstra geeft aan dat de middenbedrijven als een reactie daarop leidende principes op papier hebben gezet. Hier hebben zij vastgelegd dat zij als opdrachtgevers beter met onderaannemers om te zullen gaan. Het gaat dan over transparantie over prijzenonderhandelingen. Dhr. Terpstra vindt dat zij niet klakkeloos overnemen om prestaties te belonen. Er wordt wel aan risicospreiding gedaan, bijvoorbeeld: ontwerpkosten worden door een ingenieursbureau aangeboden tegen inkoopsprijs. Op het moment dat het werk aangenomen wordt dan krijgen zij de normale prijs. Op het moment dat zij extra toegevoegde waarde bieden en daardoor prijs drukken, dan krijgen ze bonus. De interviewer vraagt of dit soort stimulansen ook naar partners wordt gebruikt maar dit is volgens dhr. Terpstra niet nodig omdat zij dan gezamenlijk belang hebben.

Op het moment zijn de waardebepalende factoren in een wegenbouwproject: verstoring en verkeershinder, omgevingsmanagement, duurzaamheid. Daaruit bepalen zij de EMVI-score (Economisch Meest Voordelige Inschrijving). Bovendien moet er tegenwoordig het project gepresenteerd worden. Hierin moet de aannemer duidelijk maken hoe zij denkt over de aanpak van het project en samenwerkingen met andere aanbiedende partijen. Mist alleen nog een goede methode om andere waardebepalende aspecten van een project met elkaar te wegen.

Ik verwacht van de opdrachtgever dat hij in de toekomst gaat selecteren op de volgende aspecten: prijs, organisatie (benadering), hoe is de samenwerking (ON-OG), duurzaamheid (LCA, life cycle analysis), garanties (hoelang bijvoorbeeld niet meer op de weg), prijs blijft hierin zeker belangrijk. De organisatie is belangrijk omdat de opdrachtgever vertrouwen wil hebben dat er minder controle nodig is. Hierin hebben de grotere aannemersbedrijven een voorsprong.

Martijn vraagt: Hoezo is organisatie belangrijk? Dhr. Terpstra: Opdrachtgever wil vertrouwen, en dat er daardoor minder controle nodig is. Richting opdrachtgever heeft Ooms Construction wat dat betreft nadeel tegenover grote jongens. Het is aantrekkelijk van Ooms Construction dat ze weten met wie ze praten. Bij de BAM kan je bijvoorbeeld een werkmaatschappij krijgen.

Voegloze overgang is iets unieks van ooms en je merkt dat je door die soort ontwikkelingen een unieke positie in de markt vergaart

C.2.4 Results Ide Oost

Reacties gedurende presentatie onderzoeksuitkomsten

Wat je duidelijke maakt is een toekomstig alternatief, je doet het in de huidige situatie met een pot eisen van een opdrachtgever. Deze vul je in, maar je bent minder aan het actief oplossen van het probleem. In het huidige proces zit Ooms Construction wel al in die top maar je aanbodgedreven ontwikkelingen zijn kleine adertjes in het geheel. Het raamwerk heeft tot doel naar een gestandaardiseerde aanpak van problemen, processen, projecten te gaan en deze aan te bieden. Dit wordt structureel aangepakt vanuit de aannemer's eigen initiatief. Hij biedt daarbij complete concepten, geïntegreerde concepten aan. Dit zijn totaalproducten. De aannemer moet dit doen op een efficiëntere manier door daar standaardisatie in aan te brengen, in samenwerking in composities van bestaande componenten.

Framework

De kansen en risico's van een product actief aanbieden als middelgrote aannemer in de auto(snel)wegenmarkt zijn: Het geeft de kans is om jezelf een uniek positie te verwerven. Voegloze overgang is een dergelijk product. Door deze ontwikkelingen blijf je betrokken in die markt waarin je aan de hand van je grootte eigenlijk niet tussenpast. Je zit nu aan de onderkant en kan dus eigenlijk nog niet meedoen. Een bedreiging is dat je producten ontwikkelt die wel voor de auto(snel)wegenmarkt bedoeld zijn, maar dat je door je grootte toch niet de mogelijkheid krijgt om mee te doen voor dergelijke projecten. Dit kan gebeuren op basis van preselectiecriteria bijvoorbeeld, andere wetgeving. Je loopt dan het risico dat de aannemer het product voor niets ontwikkelt. Een kans is, dat het de aannemer in de kijker zet en hierdoor wordt je aantrekkelijk voor andere partijen om mee samen te werken. Hierbij zal je soms lager in de keten terechtkomen. Bijvoorbeeld bij de randweg Eindhoven voert Ooms Construction alleen voegloze overgangen uit. Dat project in zijn geheel is niet geschikt voor de grootte van Ooms Construction. Via een andere weg kan Ooms soms een product aan Rijkswaterstaat leveren, bijvoorbeeld bij de tunnel in Vught. Rijkswaterstaat maakt dan een losse offerte voor alleen de voeg en is dan aan andere aanbestedingsregels gebonden.

Een mogelijkheid is inderdaad om in combinatie met je partners producten of processen te ontwikkelen. Een voorbeeld hiervan is Novachip, een Ooms Construction – MNO Vervat feestje. De kosten van ontwikkelingen worden gedeeld en er wordt gezamenlijk kennis ingezet. Er zijn ook voorbeelden van uitvoeringssamenwerking. Bij bepaalde innovaties is Ooms Construction de trekker van het project geweest. Je loopt dan mogelijk tegen

het nadeel op dat je vastzit aan een bepaalde partij. Sommige ontwikkelingen had Ooms Construction naar mijn mening beter voor zichzelf kunnen houden en dan had Ooms Construction daar alleen van kunnen profiteren. Het is dus bij gezamenlijk aan ontwikkeling doen een vereiste om gezamenlijk voordeel te behalen. Bij het RES kan je bijvoorbeeld veel logischer andere disciplines bij zoeken.

De structuur zoals je deze op papier hebt gezet is voor een aanbodgedreven markt zeer kansrijk. Het is logisch om aanbieders op verschillende niveaus te brengen. In de huidige markt doen we het zelfs enigszins vergelijkbaar, maar het blijft een vraaggedreven verhaal. Er zijn wel leveranciers/onderaannemers die met eigen productontwikkelingen komen, waar eisen meer opengelaten worden. Deze komen dan met innovatieve ideeën. Nu gebeurt dit op projecten basis en dat moet op een meer structurele basis gebeuren. Het is alleen de vraag of je er baat bij hebt. De baat uit structurele samenwerking omdat je elkaar sneller weet te vinden. Je kunt daardoor sneller schakelen. Het is eigenlijk meer het kennisnetwerk wat je ervan opdoet als je meer op een structurele manier samenwerkt. Je bent van elkaar op de hoogte wat je elkaar kan bieden. Hierbij is het fijn als je niet diep in het specialisme van een partner hoeft te duiken. Hierbij moet je wel het vertrouwen hebben dat iemand effectief meedenkt in kosten, kwaliteit en procesbeheersing. Dat je weet in systems engineering dat het mogelijk is om die eis door te zetten en je het vertrouwen kan hebben dat zij met deze verantwoordelijkheid kunnen werken. Tussen de samenwerkende partners moet er de bereidheid zijn om mee te denken over de raakvlakken van de verschillende disciplines. Je moet weten waar elkaars specialisme elkaar raakt. Je moet breed in de markt staan en bovendien moet je partner kunnen zeggen wanneer hij iets niet kan aanbieden en wanneer je dus beter voor een ander partij kan kiezen. Je verwacht dus van je onderaannemers dat zij niet alleen proberen hun eigen producten te slijten maar ook hun beperkingen onderkennen. Bovendien moeten zij de juiste kennis leveren om de systeemintegrator zijn werk te laten doen.

In de huidige situatie ben je systeemintegrator door eisen door te zetten en te zorgen om die raakvlakken te beheersen. Dat is meer een systeem organisator. Dit is anders dan een systeemintegrator die actief dingen oppakt en daarmee aan de gang gaat. Die systeem integrator is daadwerkelijk een systeemontwikkelaar. In de huidige rol zit daar geen marketing actie in. Op het moment creëer je een organisatie rond een pakket aan wensen van de klant. In een vraaggedreven markt krijgt de aannemer een probleem op zijn bord en gaat dat organiseren. Als je echter aanbodgedreven gaat werken dan moet je kansen in de markt signaleren. De aannemer kijkt bijvoorbeeld als ik een aantal producten nou samenpak en deze integreer, dan kan ik die in de vitrine zetten als nieuw idee. Je moet je wel blijven realiseren dat er wel altijd een minimaal pakket aan eisen, hoever zou je alleen moeten gaan aan de vragende kant.

De belangrijke vragen bij het beoordelen van het model die je aan de andere partijen zou moeten stellen zijn, hoever zou je willen dat opdrachtgevers gaan met hun vraagstelling. Als je als aannemer een open vraag wil, hoe open moet die zijn? Zie je als aannemer kansen voor je ontwikkeling op het moment dat de voorschrijvende vraag wegvalt. En hoe globaal wil de aannemer in de vraag bediend worden. Welke contractvorm hoort bij deze nieuwe vraagstelling? Naar mijn idee moet dit contract ruimte creëren voor een gezamenlijk voordeel, efficiënter produceren en efficiënter procedures doorlopen.

Strategic position Ooms Construction

In een aanbodgedreven markt kan Ooms Construction niet als hoofdaanbieder acteren met de huidige organisatie. In de huidige vraaggedreven situatie kunnen we dat wel. In kleinere projecten kunnen we dat ook aanbodgedreven doen. Bij bijvoorbeeld provinciale en gemeentelijke wegen kunnen we dit nu wel en gebeurt dit

ook. Een ander goed voorbeeld van een aanbodgedreven project was vliegbasis Woensdrecht (€1.5 miljoen). In dit project heeft Ooms Construction een wegverharding inclusief installaties aangeboden en uitgevoerd. Dit heb je dus vanuit een eigen ontwikkeling gerealiseerd. Als je een grootschaliger project van bijvoorbeeld rond de €10 miljoen wilt aanbieden dan, schiet Ooms Construction qua kennis van grote kunstwerken en elektrotechnische installaties te kort om dit individueel te kunnen aanbieden. Bovendien is er te weinig capaciteit en kwaliteit dit op dit moment. Er zijn te weinig mensen op managementniveau gericht op aanbodgedreven werken in meerdere disciplines. In de huidige markt vormen de middelgrote aannemers combinaties om die andere disciplines in huis te halen. Echt grootschalige projecten vragen echter ook in de huidige marktsituatie teveel capaciteit. De mogelijkheid om in deze projecten mee te doen wordt groter als je samen gaat werken. Er is op dat moment een gezamenlijke wil en een gezamenlijk prikkel om kennis te delen en elkaar als gelijkwaardige partners te beschouwen. Wat Ooms Construction dus zou moeten doen is zijn managementcapaciteit intern bijspijkeren.

De partners die je in de huidige vraaggedreven markt nodig hebt, die heeft Ooms Construction ook zeker nodig in een aanbodgedreven markt. Als Ooms Construction en andere middelgrote aannemers dus een rol willen blijven spelen is het een kans (en bovendien een voorwaarde) om samenwerking te zoeken. Het is dan belangrijk duidelijk te krijgen wat Ooms Construction meer heeft te bieden dan concurrenten? Een voordeel is op het moment dat je gewend bent met meerdere en verschillende partijen te werken, dat Ooms als organisatie zich goed kan aanpassen. Bovendien in grote bedrijven moet iedereen verantwoording afleggen aan dezelfde baas. Daardoor kan het zijn dat je niet wil onderdoen voor je collega. Dit kan juist tegendraads werken in tegenstelling tot wanneer je ongedwongen bent samen te werken. Middelgrote aannemers zijn daardoor vrijer om te selecteren met wie zij willen samenwerken. Hierdoor valt de gedwongen winkelnering weg en is Ooms Construction dus flexibeler want je wordt niet gedwongen je eigen partij te kiezen.

Dit is ook een belangrijk kenmerk van een goede systeemintegrator dat als deze zijn rol goed verstaat dan is hij in staat om op de juiste momenten de juiste partijen te kiezen voor een project. Als je naar de huidige marktsituatie van Ooms kijkt dan is er een risico, dat in de grote auto(snel)wegprojecten de keuzemogelijkheden voor partners beperkt zijn. Martijn: Vindt je persoonlijk dat Ooms moet nastreven om bovenin te acteren. Dhr. Oost: Als ooms wil overleven (zwaar uitgedrukt) of als je in ieder geval een bepalende rol wil blijven spelen zou je ook in de auto(snel)wegenmarkt actief moeten blijven. Dit is nodig om een aantrekkelijke speler te blijven een niveau lager. En op dat niveau zit juist een groot deel van je winst. Als je daar continuïteit behoud en daar ervaring opdoet, dan kan blijven meedoen in de grotere markt. Bovendien is het belangrijk om je te blijven profileren in de markt voor grote industriële ondernemingen en grote gemeenten en provincies en dit doe je door actief te blijven in het niveau daarboven. Op het moment heeft Ooms Construction misschien een project per jaar (grote) hier kan zij de kennis niet mee op peil houden.

Relations and mutual expectations in the supply chain

Er moet bij Ooms Construction en partners een projectonafhankelijke manier van samenwerking komen. Het is echter wel zo dat snelwegprojecten unieke projecten zijn in omvang, locatie en tijd. Elk van die parameters kan de kans van slagen van een samenwerking groter of kleiner maken. Als de omvang van het project niet past in de disciplines, dan kan er onbalans ontstaan in gelijkwaardige samenwerking. Het belang en risico's voor elke verschillende partij zijn dan niet gelijk, locatie speelt hierin een zeer belangrijke rol. Ooms Construction is bijvoorbeeld voornamelijk actief in het westen van Nederland, GTI en MNO hebben in een landelijk gebied belang. Vaak zie je dan qua tijd een probleem ontstaan, omdat de capaciteit van de organisaties niet op elkaar

afgestemd is. Ieder heeft zijn eigen winstverantwoordelijkheid, dus wat dat betreft werken de bedrijven individueel. Op het moment dat je het over een concern hebt, dan is dat makkelijker en logischer elkaar op te zoeken. Dit werkt zelfs binnen Ooms Avenhorn Holding zo. Het kan bij ons ook voorkomen als Ooms Construction het druk heeft en de bouwmaatschappij vraagt een offerte dan wordt zij slechter bediend dan wanneer Ooms Construction het heel druk heeft. Je moet je sowieso afvragen hoe moet de samenwerking er concreet uit komt te zien. Maar er zijn overeenkomsten in te tekenen. De mate waarin je het projectonafhankelijk kan vastleggen is gecompliceerd omdat je een gedeeld doel nodig hebt. Dat is op het moment een nieuwe ontwikkeling in de markt. Een voorbeeld binnen Ooms: Microchip is aparte VOF en dit is in feite een project onafhankelijke samenwerking. Het is nu alleen de vraag of het niveau hoger komt dan het huidige componentniveau. Op het moment is dit niet zo. Het Road Energy Systems is een ontwikkeling geweest in samenwerking met een aantal partners. De bedrijven die het meeontwikkeld hebben die krijgen per m² een bepaald bedrag. Achteraf bekeken zouden we de technologie liever in een keer afgekocht hebben. De samenwerkende partners steken op het moment namelijk op geen enkele manier meer moeite in het product. Het verdelen van opbrengsten en verliezen is gecompliceerd, zeker als iemand er niet direct op afgerekend wordt. Het structureel neerzetten op de markt is minder eenvoudig dan het lijkt. Ook hier is locatie weer belangrijk, bij Road Energy Systems bijvoorbeeld regionaal installateur. Verdere ontwikkeling stuit vaak ook tegen nieuwe expertises. Bij het aanleggen van het RES wordt de aannemer bijvoorbeeld ineen keer ook warmteleverancier. Dit heeft dan weer allerlei consequenties.

Een nieuwe ontwikkeling kan ook het volgende effect hebben: Ooms Construction heeft eens in combinatie met Rijkswaterstaat de eisen van het RES uitgevraagd. Met die eisen is Rijkswaterstaat ze uiteindelijk toch een openbare aanbesteding gaan doen. KWS had eigen systeem bedacht met buisjes in beton. Deze ontwikkeling is uiteindelijk een bedreiging gebleken. Een andere aannemer legt dan iets wat niet functioneert aan en dan kan dat de reputatie van het product om zeep helpen. Je kunt dan krijgen dat bijvoorbeeld de term gemodificeerd een slechte naam krijgt. Bovendien kan Rijkswaterstaat eisen dat de aannemer zijn specificaties openbaar maakt, en dan wordt dit in volgende project klakkeloos overgenomen door een andere aannemer overgenomen. Hierdoor zijn een hoop patenten zijn niet houdbaar of Rijkswaterstaat zorgt ervoor dat er snel een andere oplossing te vinden is. Zo is het bijvoorbeeld ook moeilijk houdbaar om asfaltmengsels te patenteren.

Concluding remarks

Martijn: Heeft u wellicht nog interessante vragen voor partners en leveranciers van Ooms Construction? Dhr. Oost: In hoeverre zij producten denken te hebben die aansluiten op de wensen van Ooms Construction en wat is hun beeld van Ooms Construction. Kan Ooms alleen maar iets betekenen als productie of alleen om asfalt te draaien. Waarom vinden jullie Ooms Construction een goede partner? Wat zou je beter willen of wat zou Ooms Construction beter kunnen doen als je vaker of meer gestructureerd willen samenwerken. Zijn die partijen geïnteresseerd in deze manier van werken. Wat moet ooms doen om voor hen een aantrekkelijke partij te blijven en vice versa.

Je zoekt elkaar op in projectomgeving, maar je praat minder over hoe je jezelf projectonafhankelijk samen in de markt kan zetten. Vanuit de overheid zijn er slalombewegingen om op een bepaalde aannemer te sturen. Ze kunnen bijvoorbeeld bepalen of ze een bepaalde combinatie wel of niet toestaan. Daarnaast organiseren publieke opdrachtgevers ook bijeenkomsten met (grote) partijen om eerste oplossingen te bekijken.

Voor Ooms Construction zijn auto(snel)wegprojecten zonder GTI of MNO sowieso een kansloze exercitie. Rijkswaterstaat heeft in het verleden wel positief gereageerd op het feit dat deze partijen elkaar van de voren als aan het opzoeken zijn. In nieuwe contracten is inspectie is ook wel eens onderdeel van aannemers taak. Dan worden aannemers weer bij elkaar gezet. Hier en daar kijkt de overheid dus ook wel weer door de vingers. Vraag voor opdrachtgevers: verwachten ze de optimalisatieslag van aannemers? En in hoeverre willen zij de markt vrij geven? En wat verwachten zij van aannemers als reactie op hun meer te kunnen bieden. Er wordt gesteld door de Ridder dat er 20% efficiëntie behaald worden. Er moet duidelijk worden waar die slag te halen is als dat duidelijk wordt dan gaan het treintje lopen. In projecten worden ook veel kosten weggemoffeld. Dus het is ook moeilijk lokaliseren.

C.2.5 Results Arian de Bondt

Reacties gedurende presentatie onderzoeksuitkomsten

Als toevoeging op de slechte marges die de aannemers over zijn projecten haalt, zegt dhr. De Bondt: De maatschappij krijgt op het moment een slechtere kosteneffectiviteit. De bouwwereld wordt hierdoor ook als minder aantrekkelijk gevonden door technici. Wat jij beschrijft als wens doen we nu met voegloze overgangen. Op het moment trek ik die hele ontwikkeling noodgedwongen. Als je volgens het Living Building Concept zou willen werken heb je een ander type mensen nodig bij Ooms Construction, en een andere werkwijze. Als je nu bijvoorbeeld naar de afdeling Calculatie kijkt, komt daar de wens uit de lucht vallen en daar wordt aan gerekend. Als iemand een vage (nog niet gedetailleerd uitgeschreven) wens heeft dan wordt daar niet echt op ingespeeld, er is dus een duidelijke cultuurverandering nodig. De opdrachtgever moet veranderen maar de aannemer ook. Ik herken al die punten die jij noemt. (op de karakteristieken van de traditionele bouw en de mogelijke alternatieven.

Dhr. de Bondt: de aannemer moet geen aannemer blijven maar aanbieder/leverancier worden van wegconcepten. Liefst zou je als aannemer in een vast teamverband met de hele keten met vaste partners werken, zo krijg je innovatie. De aannemer moet dan niet zijn onderaannemer zelf alleen op prijs selecteren.

Framework

De kansen voor een aannemer om actief te markt op te gaan worden besproken. Volgens dhr. de Bondt zijn de lijnen in een middenbedrijf kort en er wordt meer op de langere termijn nagedacht. Een investering hoeft zich niet op de korte termijn terug te verdienen. Dit in bij een goede innovatie in de bouwwereld ook nodig omdat het product in eerste instantie een tijdje in gebruik moet zijn voordat het zijn gegarandeerde prestatie heeft bewezen. De lijnen binnen Ooms Construction zijn kort intern, maar ook naar buiten toe. Een bedreiging aan de andere kant is dat er minder financiële middelen voor ontwikkeling beschikbaar zijn. Op het moment is scholing en intellectueel niveau te laag op de verschillende niveaus. Zo zal van een hoofd van een afdeling bij een middelgrote aannemer van lager intellectueel niveau zijn dan bij een grootbedrijf. Een andere bedreiging (zwakte van Ooms Construction) is het beperkt marktgebied. Als je echter een productontwikkeling hebt gedaan dan is het sneller toepasbaar, omdat de beslissingen binnen het bedrijf snel en efficiënt genomen kunnen worden. Er is een goede interactie tussen praktijk en theorie. Daardoor gaat de informatie sneller door de organisatie heen. Je kunt de aanbodgedreven werkwijze concretiseren naar de voegloze overgang. Deze is nu feitelijk gestandaardiseerd en kan als standaard ingezet worden. Het ontwerp en het product in zijn geheel is marktrijp. Nu dit punt bereikt is, loopt Ooms Construction tegen de nadelen lopen aan. De organisatie is er niet voor

geschikt om het product aan de man te brengen. Het geografisch marktgebied is te klein, dit maakt het promoten in ieder geval lastiger. Het is nog altijd beter dan dat een hoofdaannemer het zelf laten doen, dan ben je ze constant opnieuw aan het opleiden. Ik vind dat er het volgende moet gebeuren: Als ik van hier naar Rotterdam rijdt zie ik genoeg gelegenheid om voegen te verbeteren. Ooms Construction zou alle dienstkringen bij Rijkswaterstaat moeten inlichten. Eventueel wanneer onderhoud daar wordt gepleegd zullen ze het pas meenemen, maar wellicht zijn de mensen die er nu zitten dan al weg. Het is belangrijk om voordat een andere aannemer een goed alternatief heeft bedacht om nu je innovatie zich te laten terugverdienen. Je moet het dus rondbazuinen in de juiste kringen.

Als een middelgrote aannemer in samenwerking producten op de markt gaat zetten dan zitten daar verschillende voor- en nadelen aan. Ooms Construction kan bijvoorbeeld met MNO een product strategisch op de markt zetten. De kans hierin is om de faalkosten omlaag te brengen. Je raakt meer op elkaar ingespeeld en als je in langdurig verband werkt gaan partners ook samen meer ideeën genereren dan beide partijen afzonderlijk zouden doen. Je kunt ook een samenwerkingsverband met prefab beton industrie aangaan zodat deze producten op Ooms Construction's producten aansluiten. De moeilijkheid daarvan is het dat je dezelfde taal moet spreken. Bovendien is men bang voor concurrentie, er is namelijk binnen samenwerkingen ook een prijscultuur. Verschillende aannemers gunnen elkaar vaak niet echt dingen. Het is dus belangrijk dat beide partijen er beter van moeten worden. Voor de lange termijn moet je beide profiteren. Men is angstig om meer committent aan te gaan. Het is ook mogelijk om je product samen met een vergelijkbare aannemer in de markt te zetten zodat je het hele land bestrijkt. Wat ik altijd vreemd heb gevonden, vroeger werkten grote bedrijven meer samen met elkaar dan kleine bedrijven. De kleinere bedrijven zijn vaak familiebedrijven en die hebben een soort eigengereidheid. Dat is gelukkig aan het veranderen en er komt dus steeds meer samenwerking en openheid binnen Ooms Construction.

Eigen aanbod en methoden: Wij hebben werkprocessen en materieel waarmee je snel kan werken, dus ook al heeft iemand anders hetzelfde dan heb je nog steeds een concurrentievoordeel. Dan moet dat wel gewaardeerd worden. Soms wil je meer samenwerken in de keten, maar je kent niet alle mogelijkheden. In feite moet je de marketing zowel naar boven als onder doorzetten. Je zou graag willen dat leveranciers naar je toe komen met ideeën en dit gebeurt ook wel. De afgelopen maanden zijn genoeg mensen naar mij toe gekomen om over dergelijke zaken te praten. Het imago van een aannemer naar de klant toe is belangrijk, maar ook naar mogelijke partners. Het bekend staan om een proactieve innovatieve houding is een factor van belang. Je moet dan wel periodiek iets van je innovatieve kracht laten zien. Iets schrijven in groepswerk of jezelf op een congres laten zien. Martijn stelt dat de ontwikkelingen alleen op een laag niveau in de keten blijven hangen. Dhr. de Bondt antwoordt hierop: In feite zouden we dat bij stalen brugdekken moeten doen, Ooms Construction heeft alleen te weinig contact in de staalwereld, de contacten met klanten zijn er al. Als je voor bekende problemen van je klant oplossingen hebt, dan kan je met je ontwikkeling langsgaan bij deze klanten. Op het moment probeert alleen ieder middenbedrijf het voor zichzelf op te lossen. Een voorbeeld van hoe het tekort aan technische mensen opgelost kan worden is door meer samenwerking. Ooms Construction en andere middenbedrijven zijn echter nog te veel met de dagelijkse praktijk bezig om vooruit te kijken.

Strategic position Ooms Construction

Op het hoogste niveau zou Ooms Construction wegconcepten moeten aanbieden. Een niveau eronder kan je onderdelen aanbieden, zoals de voegloze overgang. Onderaan kan je als leverancier van bitumen een product leveren. We hebben op de verschillende niveaus geacteerd in verschillende projecten.

Een sterkte is dat we in alle lagen mee kunnen spelen. Een zwakte, als het complexer wordt, dan komt het teveel op dezelfde personen terecht. Als iets 100% voorgeschreven staat, dan hoeft je het alleen volgens dat recept te maken. Als het aan de andere kant eigen initiatief vergt, zoals in een aanbesteding, dan is het anders. Mensen met initiatief, die zijn er te weinig binnen Ooms Construction. Een familiebedrijf straalt zekerheid uit, dus veel mensen zijn uit zekerheidsoverwegingen bij Ooms Construction gekomen. Het is dan ook een weinig prestatieve omgeving. Er is weinig communicatie tussen verschillende afdelingen. Als je bovenin wil acteren, wordt deze communicatie steeds belangrijker. Het is belangrijk te realiseren welke middelen hebben we binnen Ooms Construction wel en welke niet. Hierbij is een goede dosis zelfkritiek nodig. Een andere zwakte is dat er weinig aan werkvoorbereiding wordt gedaan. Het project wordt te snel naar de uitvoering gestuurd. Als je zelf gaat aanbieden moet je je druk gaan maken over garantievoorzieningen. Wat bied ik nou eigenlijk wel of niet aan, en hoe scherp is dat. Het is niet alleen techniek maar ook juridisch. Als we bij deze zwaktes stil gaan staan dan moet dat ook wel beter gaan, maar dan moeten we personeel wel dwingen. Als ze dat niet willen of de capaciteiten niet hebben moeten we 1) of niet voor deze strategie kiezen 2) andere mensen aantrekken, of 3) mensen opleiden. Eigenlijk loopt Ooms Construction in de huidige veranderende markt hier al tegen aan. Het wringt aan allerlei kanten, het kan net. Ooms Construction probeert zich te verbeteren, maar zij werken nog steeds met dezelfde mensen. Je kunt mensen opkrikken door ze verder op te leiden, maar op een gegeven moment loop je tegen problemen aan qua (technisch intellectueel) niveau. Een sterk punt van Ooms Construction is dat zij er wel mee bezig is. Er is wel het besef dat er iets moet gebeuren.

Relations and mutual expectations in the supply chain

Er zijn kansen om meer samen te werken met de opdrachtgever. Deze zal dit waarschijnlijk ook wel waarderen. Er is meer PR nodig bij Rijkswaterstaat dat middenbedrijven er nog zijn voor auto(snel)wegprojecten. Vanuit de opdrachtgever moeten er open specificaties komen op technisch vlak. Op omzetvlak moet Rijkswaterstaat realistische selectiecriteria neerleggen. Zij hoeven niet per se 100 miljoen euro omzet voor een bepaald wegtype te vragen. Je moet niet eisen dat je 100 projecten van 5 rijstroken gedaan hebt, anders dan weet je zeker dat bedrijven als Ooms Construction de markt uit gewerkt worden. Enerzijds moet er technisch meer openheid zijn. Aan de andere kant zou er meer mee kunnen doen dat als een bedrijf met een eigen oplossing komt dat hij deze moet kunnen onderbouwen met wetenschappelijke experimenten, dat zou eigenlijk zwaarder moeten wegen. Rijkswaterstaat moet strenger zijn op surrogaatoplossingen. Met dunne deklagen gaat dit constant mis. De aannemers die een slecht product afleveren worden er niet op afgestraft. Dit zijn dus interessante vragen voor Rijkswaterstaat. Over het algemeen is er te weinig dialoog tussen aannemers en Rijkswaterstaat. Bijvoorbeeld garantietermijnen, aannemers willen deze best graag uitbreiden en hiertoe zijn zij ook in staat, maar Rijkswaterstaat denkt dat de aannemers dit niet willen aanbieden. Publieke opdrachtgevers moeten met de vooruitstrevende aannemers praten, anders verandert er natuurlijk nog niks. Er zijn namelijk ook traditionele aannemers en deze willen alleen maar stenen stapelen, die hoeven in principe dus niet in dit proces betrokken worden. Er is niks voor CROW in de plaats gekomen voor snelwegprojecten. Geen algemene specificatie (op

hoger niveau) van bijvoorbeeld stroefheid van auto(snel)wegen. Dit ligt bij Rijkswaterstaat om dit op te pakken, maar om iets functioneel op te schrijven vergt ook scholing.

Een kans van je relaties anders vormgeven is dat Ooms Construction ook innovatieve kracht uit leveranciers haalt. Hierbij kom je echter altijd op de vraag in hoeverre biedt een aannemer de leverancier exclusiviteit en hoe voorkomt de aannemer dat de leverancier met andere gaat samenwerken en kennis meeneemt naar de concurrent. Ik ben een voorstander van meer projectonafhankelijke samenwerking. Een project is makkelijker organisatorisch te regelen, er zijn minder faalkosten, maar de partners moeten elkaar wel vertrouwen. Het wantrouwen tussen opdrachtgever en opdrachtnemer is er net zo goed tussen opdrachtnemer en leverancier. In mijn functie werk ik weinig richting de leverancier. Ik heb de indruk dat er weinig aan prijs/kwaliteit selectie gedaan wordt tussen verschillende leveranciers. Locatie en prijs kunnen reden tot langdurige samenwerking zijn of omdat Ooms aandelen heeft in een bepaalde firma.

Ik zie alleen maar kansen voor samenwerking met partijen die dezelfde filosofie hebben, MNO Vervat bijvoorbeeld is een prijsvechter. MNO Vervat heb ik nog nooit kunnen betrappen op wil tot innoveren. Het hangt er ook vanaf welke personen treft in het bedrijf. Er moet een gezamenlijke input zijn en stimulansen om echt samen te werken. Sommige middenbedrijven willen alleen kopiëren. In feite mist Ooms Construction een partner in beheer. MNO Vervat heeft hiervoor de Jong uit Beesd. Eigenlijk zou er een consortium van middenbedrijven moeten zijn waarin Ooms Construction meedeelt gezamenlijk met een of twee andere middenbedrijven in wegenbouw, zodat deze samen het hele land kunnen bestrijken. En die juist ook nog vooruit willen. In het zuiden zou je daarbij aan Janssen en de Jong kunnen denken bijvoorbeeld. Daaraan zou Ooms Construction moeten werken. Bij Ooms Construction is wel duidelijk altijd de drive willen ze altijd in de hoogste regionen meedoen terwijl ze ook leverancier van wegenconcepten kunnen worden.

Er is al een trend naar verbetering in de markt dat een aannemer meer in zijn aanbod kwijt kan. Er is alleen over de branche breed te weinig geschoold personeel. Toch zijn er meer mogelijkheden in de markt dan er nu benut worden.

C.3 Interviews possible partners

C.3.1 Respondents

Interviews possible partners			
Name	Company	Position	Date interview
Ir. A. de Koning	CFE Nederland B.V.	Managing director	15-04-'09
M.J.M. Stoop	K. Dekker B.V.	Managing director Civil Engineering	21-04-'09
Ing. R.M. de Klerk	GTI Energy and infra B.V.	Manager Technical Sales	22-04-'09

C.3.2 Interview guide possible partners

1) Framework

1.1 What are the opportunities and threats for a middle-sized contractor company to proactively develop products for the large scale road construction market?

1.2 What are the opportunities and threats to middle-sized contractor companies to do joint product development in collaboration with other middle-sized contractor companies?

1.3 What are the opportunities and threats of structuring the supply chain according to the proposed framework for road construction industry?

1.4 Is the separate system integrator role desirable on different tiers? What are the opportunities and threats for implementing a system integrator in the road construction supply chain?

1.5 Is there something missing in the framework that should be treated?

2) Strategic position Ooms Construction

2.1 On which position(s) is Ooms Construction capable to operate at the moment?

2.2 What are the strengths and weaknesses of Ooms Construction at this (these) particular position(s)?

2.3 On which position(s) is Ooms Construction capable to operate in a supply-driven road construction market?

2.4 What are the capabilities that Ooms Construction has to (further) develop to be able to act at this (these) particular position(s)?

2.5 What position is most apt for Ooms Construction / On what position do you think Ooms Construction should aim in a supply-driven future?

3a) Relations of Ooms with partners and suppliers

3a.1 How should Ooms Construction and her partners/suppliers shape project-independent collaboration in a supply-driven road construction market?

3a.2 How should Ooms Construction give her partners/suppliers the incentive to attain a supply-driven market strategy?

3a.3 What question(s) would you like to be answered by your client?

3b) Relations of Ooms with clients

3b.1 How should the demand specification of the client in large scale road construction change to give contractors the opportunity to attain a supply-driven market strategy?

3b.2 How should the selection criteria of the client in large scale road construction change to give contractors the opportunity to attain a supply-driven market strategy?

3b.3 What question(s) would you like to be answered by your client?

C.3.3 Results Andre de Koning

Introduction CFE Nederland B.V.

Wij zijn CFE NV, omzet €1,7 miljard, €800 miljoen constructie, €800 miljoen baggeren, €100 miljoen elektrotechniek. 100% dochters van deze organisatie zijn CFE Nederland B.V., CFE B.V. en Geka-bouw B.V. Wij zijn gespecialiseerd in funderingswerken in en rond de haven. Daarnaast wijken wij zo nu en dan uit naar de discipline bruggen voor proraail. Voor onze organisatie is een werk van €10 miljoen is te behappen. Grotere werken maken wij combinatie, zoals wij met Ooms Construction samenwerken. Voorbeelden hiervan zijn spoortunnel Delft en de 2^{de} Coentunnel. 75% van de aandelen CFE Nederland is van Vinci. Vinci is een groote bouwer in Frankrijk en België. Vinci zit voornamelijk in de projecten inclusief financiering. Zij verdienen hun geld in concessies.

In CFE zit ook een deel concessies, bijvoorbeeld het MaVa en de oostelijke ringweg Antwerpen. Binnen Nederland zitten wij veel Design & Construct-contracten op de bagagedrager in combinaties. Dit heeft een ander cultuur/werkwijze nodig. Zo houden wij ons staande in de markt van de grote jongens.

Reacties gedurende presentatie onderzoeksuitkomsten

Het doel van het onderzoek is een raamwerk te ontwerpen voor de organisatiestructuur voor middelgrote aannemer in grote snelwegprojecten. Het basisprobleem voor de aannemer is dat de huidige situatie een slechte weerslag heeft op zijn winstmarge. Dhr. de Koning: Dit kan waar zijn, het kan ook zijn dat je niet de gelegenheid hebt om je als niche speler te manifesteren. Dit zie ik ook bij Geka-bouw, als nichespeler kan je je veel beter manifesteren als een speler met een lage prijs, maar hier behalen wij toch een hoge winstmarge.

Jij hebt het over klantgericht, maar dan is mijn eerste vraag: wie zijn je klanten dan? Dat vindt ik essentieel, is Rijkswaterstaat een klant of een opdrachtgever. Wat ik bedoel in plaats van ik ga bestek aannemen. Klantgericht wil zeggen ik ga naar die klant. Rijkswaterstaat geeft nog steeds bestek uit en je moet het in huis hebben om actief een oplossing aan te dragen. Volgens mij valt dit onder de noemer raakvlakkenmanagement. Een aannemer moet niet meer de inkoper zijn die zijn leveranciers uitperst. Als hij dit wel doet maakt hij een fout.

Framework

In de bouw wordt elk project an sich beschouwd. In de nieuwe benadering moet de aannemer naar projectonafhankelijke samenwerkingen toe. Elk project is uniek, maar ik kan binnen projecten een methode of gestandaardiseerde processen uit de kast trekken en aan de hand hiervan aan het werk gaan. Het is echter niet zo dat een aannemer een product heeft en dat hij dat hier kan neerleggen en op andere plekken op dezelfde manier. We hebben in de huidige markt te maken met een zichzelf terugtrekkende opdrachtgever. Als CFE en Ooms Construction samen werken, verdelen we het werk en ieder houdt zijn eigen discipline in stand. In de nieuwe werkwijze moeten we echter gaan zorgen dat onze processen op elkaar aan te sluiten. De manier waarop wij elkaar vinden dat is netwerken.

De modellen moeten zo zijn, dat we kunnen als kleinere partijen moeten kijken hoe we tegen dat grote geweld op kunnen. En daarop moet je kijken hoe je elkaar kan aanvullen en hoe kunnen we samenwerken. Dan komt het op people's management. Ik verwacht dat we dan terecht komen op alliantiebasis. We maken dan een gezamenlijke risicopot. Martijn: Ziet u de markt veranderen naar een van aanbieders van producten. Dhr. de Koning: Nee, dat zie ik niet gebeuren. Bij Geka-bouw kan dit wel, omdat ik daar staal gebruik en dit is geschikt om als product te verwerken. Als CFE heb ik niet het gevoel dat ik een product verkoop. Ik kan een brug bouwen en ik laat die bouwen door een partner. Het actief de markt opgaan, dat zie ik in de toekomst niet gebeuren. En dan nog zie ik dat nog niet als product.

De concurrentie is bang dat een combinatie van Ooms en CFE dat samen beter kunnen aanbieden. Bij Geka-bouw hebben we bijvoorbeeld een methode om onder de waterspiegel te lassen, dit is echt product. Op het moment koppel ik zaken aan elkaar en dan vinden we een lumineuze oplossing. Op die manier denken wij slimmer te zijn dan de concurrent. Als middelgrote aannemer kan je makkelijker schakelen en ben je flexibeler. Wegens een spoedgeval tussen door is het interview niet afgemaakt.

Assessment of the interview

Dhr. de Koning belooft een nieuwe afspraak te maken. Na meerdere verzoeken is het echter nooit tot een vervolg afspraak gekomen. De uitkomsten van het interview met dhr. de Koning hebben weinig bruikbare informatie gegeven voor het onderzoek. Naar mijn persoonlijke idee is het niet gelukt om duidelijk het perspectief van een veranderende markt, en een alternatief om in deze markt te opereren, neer te zetten.

C.3.4 Results Marcel Stoop

Introduction K. Dekker B.V.

Bij K.Dekker B.V. werken totaal 170 personen over 4 werkmaatschappijen, waarvan een projectontwikkeling is. De omzet wordt voor ongeveer 60% gegenereerd door divisie GWW (Grond-, Weg- en Waterbouw) voor 25% door Utiliteitsbouw en voor 15% door de Bie & Seignette (15%). Het bedrijf bestaat voor 75% uit grond-, wegen-, en andere civiele activiteiten. De Bie & Seignette is gespecialiseerd in grondsanereringen en overslag, riolering, straatwerk en grondopslag. K.Dekker B.V. beschikt ook over een engineering deel, Sophia.

De totale omzet bedraagt € 70 miljoen. Voor de grotere projecten van € 10 to 15 miljoen zoekt K.Dekker B.V. samenwerkingen om voldoende capaciteit te genereren. De reden om veel samen te werken met Ooms Construction is omdat de bedrijven qua disciplines en geografische ligging een goede overlap hebben. Dhr. Stoop ziet Ooms Construction als een belangrijke partner in grondwerk, rioleringen en wegenbouw. Hierin zijn zij een grote speler in Noord-Holland en Zuid-Holland. De twee partijen kunnen elkaar versterken doordat zij elkaar aanvullen. De geografische ligging van K.Dekker B.V. is: Noord-Holland, het noordelijke deel van Zuid-Holland, het noordelijke deel van Utrecht en het westelijke deel van Flevoland.

Response to the presentation / before questions asked

De veranderingen die op het moment zich afspelen in de markt zijn een reactie op het feit dat traditioneel projecten 10-25% duurder uitvielen dan de inschrijving. De nieuwe contractvormen worden dan ook afgerekend door de budgethouder op basis van de traditionele contractvorm. Als reactie op de traditionele werkwijze hebben aannemers de D&C contracten ingevoerd. Ook de bouwteam- en PPS-contracten zijn een zelfde reactie om de prestatie van de bouwwereld te verbeteren. Voor middelgrote projecten is D&C een goede aanbestedingsvorm, je weet namelijk meteen wat je betaald als opdrachtgever. Dit is voor de opdrachtgever belangrijk omdat zij door de partij die het budget verdeeld, ook weer op prijs worden afgerekend.

Framework

Het framework benadrukt dat de aannemer actief met zijn product de markt op gaat. Dhr. Stoop: Er zijn veel aannemers, die producten hebben ontwikkeld. Er is echter een probleem binnen wetgeving, de mededinging. Die zorgt ervoor dat je heel snel niet meer uniek bent want de opdrachtgever kiest niet voor een bepaalde innovatie, omdat er anders geen concurrentie is. De mededingingswet stelt: als er een product omschreven wordt, dan heeft elke aanbieder het recht om een ander gelijkwaardig product aan te bieden. Andere aannemers worden dus gedwongen vergelijkbare producten neer te zetten. Er is een kans om dit aan te bieden als geheel, inclusief financiering. De belemmering is alleen lang de volgende geweest: de Bank Nederlandse Gemeenten, zij konden zorgen voor voorfinanciering voor gemeenten. Gemeentes hebben hierdoor eigen bank en die is in rente gezien altijd goedkoper geweest dan de private markt. Daar liepen aannemers tegenaan zij een project inclusief

voorfinanciering wilden aanbieden. De les die je hieruit kan trekken is dat de manier waarop de opdrachtgever acteert wordt bepaald door wet en regelgeving.

Dhr. Stoop: het is een ontwikkeling waarover je zou kunnen nadenken. Je hebt gelijk dat oplossingen volgens een bepaald eigen model / systeem kan leiden tot een verbetering van het product. Een voorbeeld hiervan is de Wilmawoning. Dit is een woning met standaard Wilma details, en een standaard Wilma bouwmethode. Dit was meest economische oplossing en voldeed aan wetgeving. Dit mis ik in de GWW, dat aannemers hun eigen detaillering en methodes hebben. Een voorbeeld in de GWW zijn bestratingsdetails, hiernaar heb ik wel eens onderzoek laten doen. Bij de opdrachtgevers (gemeenten) hadden sommige hier goed over nagedacht. Je kan je voorstellen dat een aannemer in zijn oplossingen de meest optimale methode kan vinden. Dit stelt hem in staat garantie te geven op kwaliteit en duurzaamheid. Hier moet de opdrachtgever alleen wel openstaan. Opdrachtgever zou ook kunnen vinden dat de details overal hetzelfde moet zijn. Dat zijn spanningsvelden waarin je werkt. Ooms heeft producten ontwikkeld en zijn daarin voorlopers in de markt geweest.

Een productontwikkeling van een leverancier gaat makkelijker dan een product ontwikkeling van een aannemer. De aannemer is meer een verwerker van componenten en minder een leverancier. Al levert Ooms ook asfalt als leverancier en zo heeft Ooms zich tot nu toe in de markt gemanifesteerd. Leveranciers kunnen stand-alone ontwikkelen. Gezamenlijke ontwikkeling bestaat in de GWW nog niet en dat wel moeten, zeker als je producten wil aanbieden volgens het framework. Traditionele betonproducten worden in hoge mate alleen ontwikkeld door de leverancier omdat de klant denkt dat hij daar behoefte aan heeft. Ik ben ook wel eens met een betonleverancier aan tafel gaan zitten over putten, deze zijn namelijk relatief duur en ik verwachtte een duidelijke verbetering te kunnen behalen. In deze ontwikkeling moeten de partijen samen energie stoppen. Dan pas wordt je een ontwikkelende aannemer. Deze samenwerking is er te weinig. Dit komt doordat de opdrachtgever voorschrijft hoe je moet werken en je dus geen kans krijgt om eigen technische oplossingen te verzorgen aan de klant. De traditie is er nu dat de opdrachtgever in hoge mate bepaalt hoe het ding eruit komt te zien.

Het nieuwe model vraagt om marktonderzoek, de aannemer moet dus op een of andere manier polsen of producten aanslaan. De aannemersbedrijven zullen elkaar dan gaan bespioneren, maar ze willen ook elkaar niet te afvallig zijn zodat zij de gemene deler meepakken. Als je als aannemer c.q. leverancier wil werken moet je je afvragen waar die opdrachtgever behoefte aan heeft en je moet ook onderzoeken welke randvoorwaarden hij eraan stelt, wat de beperkingen binnen de wetgeving en financiering zijn. Rijkswaterstaat kan alleen signalen afgeven in de vorm van gunningscriteria. Leveranciers moeten hierop inspelen en want op het moment is het toch al rond de 30% van het geheel.

Strategic position Ooms Construction

Ooms Construction wil expliciet mee blijven spelen als aanbieder van een snelweg. Dhr. Stoop geeft aan dat, als je je wilt bekwamen bovenin de boom, dat het verstandig is een aparte afdeling op te zetten binnen het bedrijf. Het normale type aannemer is werken volgens een aanbodedreven werkwijze namelijk niet gewend. Het management dat je in deze afdeling stopt zal niet moeten sturen op het assembleren, maar zij moeten de touwtjes aan elkaar kunnen knopen. Enerzijds hebben zij feeling nodig voor de branche. Zij moeten zich niet direct bekommeren over hoe iets uitgevoerd moet worden. Bovenin de supply chain volgens het framework moet kijken naar strategie. Zodat de aannemer zich ervan verzekert dat ze vooruit kunnen blijven lopen op ontwikkelingen in de markt. Dit geldt voor ieder traditioneel beton- of wegenbouwbedrijf in de middenlaag. In de

traditionele bouwwereld zijn zij uitvoerende aannemers. Dit zijn culturen die groeien binnen een bedrijf en om dit om te buigen duurt net zo lang als het duurde om op die cultuur te komen. Je moet zelf de namelijk meest economische manier vinden van een productvorm en daar hebben veel mensen moeite mee. Dit zie je gebeuren in D&C-projecten en niet alleen de aannemers maar ook Rijkswaterstaat heeft moeite met te bepalen hoe zij zich moeten aanpassen aan de ontwikkelingen. Dit proces gaat dan ook heel langzaam. Voor praktische invulling van de nieuwe afdeling moet je binnen je bedrijf mensen vinden die altijd in hun huidige functie zelf het initiatief nemen en in optimalisaties denken. Deze kunnen en zullen moeten plaatsnemen in de nieuwe discipline. Eigenlijk moet daar bovenin handelaren hebben. Feitelijk heeft K.Dekker B.V. hetzelfde probleem als zij aanbodgedreven zouden willen werken. In het grootbedrijf zie je dat men daar al aparte afdelingen voor heeft opricht. Je kunt ook niet van je mensen verwachten dat zij gaan veranderen en mee gaan denken. Techneuten met een handelsgeest heb je nodig. Communicatie tussen verschillende lagen wordt in de nieuwe werkwijze belangrijk. In de traditionele bedrijven (zoals de meest middenbedrijven) zijn de leidinggevenden allemaal van onderaf doorgegroeid in het management), zij kunnen zich goed voorstellen hoe het zich op de bouwplaats afspeelt. Je hebt in een projectafdeling wellicht een ander type persoon nodig. Het is in ieder geval belangrijk om verschillende personen te combineren, want dat versterkt elkaar.

Relations and mutual expectations in the supply chain

Dhr. Stoop: Je zal je relaties anders moeten inrichten. In het voorgaande deel heb ik dit getracht aan te geven, in samenwerking met je klant en je leveranciers zou je moeten kijken hoe je samen tot optimalisaties kan komen. Het is belangrijk dat de aannemer met een functioneel economische inslag gaat ontwerpen. Er zijn in samenwerking met ingenieursbureaus zeker optimalisaties vinden. Je kan je bijvoorbeeld voorstellen dat het ontwerpen bij bijvoorbeeld een hoge staalprijs een andere oplossing oplevert. De gezamenlijke ontwikkelingen die hiervoor gedaan moeten worden kunnen het beste vormgegeven worden in een nieuw bedrijfje.

Hierin opereren diezelfde mensen met technisch inzicht en handelsgeest, want dat heeft de aannemer van oorsprong niet in het systeem. We zijn fantastische handelaars in de zin van een product op de goedkoopste manier krijgen. Echter we zijn geen handelaars die zoeken naar vraag in de markt en daaraan gerelateerde optimalisaties ontwikkelen.

Concluding remarks

Dhr. Stoop: Vooruitlopend op dit gesprek had ik een idee gevormd. En ik verwachtte dat je aan het onderzoeken bent in hoeverre je jezelf verder kan ontwikkelen. Je probeert duidelijk neer te zetten hoe het is om een aanbiedende aannemer te worden. Dit heeft Ooms Construction indertijd opgepakt met het Road Energy Systems[®], een ander bedrijf heeft een gelijkend product op de markt gezet met de naam Winner-W. Ooms Construction steekt in dergelijke dingen energie. Over de ontwikkeling van een product gaat echter jaren heen. Het blijkt dat er met ongelooflijk veel aspecten rekening gehouden moet worden. Zo zijn er bijvoorbeeld de vergunningen die je nodig hebt, het wegbeheer (stel dat er een kabelsleuf door het asfalt moet, dit is onmogelijk bij het RES). Het onderzoeksonderwerp was wel in de lijn waarin ik dacht, hoe Ooms Construction zich verder denkt te ontwikkelen in de markt.

C.3.5 Results Raymond de Klerk

Introduction GTI Energy and Infra

Dhr. de Klerk is verantwoordelijk voor commercie en sales, binnen GTI Energy en Infra betekent dit dat hij ook verantwoordelijk is voor de calculatie. De dekking van GTI is landelijk over geheel Nederland. Wij hebben in deze positie dus te maken met heel wat bouwers. Wij doen ook individueel mee aan tenders. Als je naar onze organisatie kijkt dan zitten we eigenlijk een bedrijfskolom hoger dan de graafjongens. Wij hebben dus geen ploegen in dienst en geen machineparken. Wij houden ons meer bezig met het ontwerp, systems engineering en wat wij noemen toegevoegde waarde. De "handjes" lenen wij in van onze dochterbedrijven. Op deze locatie bijvoorbeeld werken 112 personen, waarvan 8 baanmonteurs. Deze situatie is dus in essentie anders dan bij andere meer traditionele aannemers. Onze producten zijn wegen, sluizen, keringen, RZWI's, AZWI's, en andere drinkwatervoorzieningen. Dit is dus een expertise uit 4 bomen.

Framework

Dhr. de Klerk: Als ik zo naar het raamwerk kijk dat heb je het over de projecten waar je meer je toegevoegde waarde kwijt kan in je kwaliteit, in de huidige markt wordt dit gestuurd door de EMVI (Economische Meest Voordelige Inschrijving). De markt is inderdaad aan het veranderen dat je als aannemer meer actief met oplossingen de markt op kan gaan. Wij streven ernaar als GTI om systeem integrator te zijn en zo profileren wij ons dus ook. In de bouwwereld is deze situatie nog steeds heel anders, maar voor mij is dit heel herkenbaar. Als jij met je verhaal naar onze utiliteit- en industrietak gaat dan snappen niet waar je het over hebt. Wij zijn al een aantal jaren bezig met kennis engineering. Wij doen dit feitelijk al alleen niet op elk niveau. Een bedreiging voor het raamwerk is dat het een investering vraagt van een aantal euro's: je moet het organiseren, je hebt mensen nodig die het snappen en die gevoel hebben voor hoe je het aan moet sturen. Op het moment zit bij Ooms Construction Ide Oost op die plek, maar daaronder houdt het op. Als je naar het raamwerk kijkt dan moet de organisatie van een project uiteindelijk eenvoudiger worden. Hiervoor is echter wel een cultuurverandering voor nodig. Als je 100 personen op een training zet, dan snapt 60 man het hogere doel. Op het moment dat 20% van de organisatie wil meewerken en deze personen zitten op leidinggevende functies, dan wordt de alternatieve werkwijze levend en gaat het werken. De ideeën die jij schetst zijn echter bij Ooms Construction nog helemaal niet uitgekristalliseerd Een bedreiging is dus voor het raamwerk, dat je een investering moet doen voor een rigoureuze organisatieverandering. Er moet iemand met een visie zijn om de verandering te trekken anders blijft het theorie. Je moet duidelijk een doel zetten, en organisatie neerzetten. Veranderingsproces is de sleutel voor succes. In het raamwerk zit nog iets heel belangrijks: Je verwacht dat een project functioneel gespecificeerd wordt, niet op geld gedreven. De klant moet er klaar voor zijn, dat hij begrijpt wat hij anders gaat krijgen en daardoor de nieuwe ontwikkeling toelaat. Hierin zie ik de grootste bedreiging, dat de klant niet mee gaat. Als ik echter naar het raamwerk kijk dan is het technisch, mooi, en het kan zeker werken. Er zit lijn in, er zit verantwoordelijkheid in, verandering, ik zie het wel zitten.

Als je nu kijkt naar Rijkswaterstaat projecten en je wil deze op een Living Building Concept-achtig manier gaan aanbieden, dan vergt dit ook een verandering van onderaannemers en leveranciers. Je gaat ervan uit dat zij ook een system integrator rol op zich gaan nemen. Doordat je deze partijen meer verantwoordelijkheid geeft en zal dit ook een verandering in je prijs gaan geven. Hoe ga je dit praktisch invullen naar de leverancier en onderaannemer? Wat gaat de klant verwachten en waar gaat hij jouw op afrekenen. Dhr. de Klerk: Hoe is jouw beeld van waardebepaling en waarop gaat de klant selecteren? Het energieverbruik wordt bijvoorbeeld

tegenwoordig ook meegewogen, life cycle-costing. Op het moment dat je de waardebeoordelingen en waarde/prijs selectie gaat toepassen, dan is het een bedreiging dat onderaannemers en leveranciers niet meedoen. Ik verwacht dat zij deze verandering niet door kunnen maken. Ooms Construction kan deze verandering van GTI vragen. GTI kan en wil die verantwoordelijkheid wel overnemen. Andere onderaannemers zullen vertellen dat zij niet in deze verandering mee willen doen en gaan die verantwoordelijkheid niet nemen. Deze partijen worden namelijk op dit moment vaak uitgekleeft door de opdrachtgever. Op het moment wordt echter wel steeds meer naar system engineering gevraagd, modulair denken. Het niveau van het werk gaat omhoog en deze partij en moeten zich bekwamen in het decomponeren van eisen. Het vervelende voor aanbieders van auto(snel)wegprojecten is, dat zij bij GTI of Imtech terechtkomen en dan worden zij gedwongen voor een van deze partijen te kiezen. Je bent tot hen veroordeeld, hoewel de aannemer eigenlijk niet die prijs willen betalen. Martijn: Er zijn ook ontwikkelingen in de markt dat onderaannemers op een hoger niveau producten gaan aanbieden, dus die aanbieders zijn er wel steeds meer in de markt. Dhr. de Klerk: Als iemand GTI vraagt 5 lampen op te hangen, dan zegt GTI hier doen wij niet aan mee. Bij een ander bedrijf kan je dit goedkoper laten doen. GTI selecteert op projecten waar zij duidelijk meerwaarde kunnen brengen. Een probleem is dus dat bedrijven niet willen innoveren. Helaas kom je dan op een kip en ei verhaal.

Strategic position Ooms Construction

GTI is wel in deze markt thuis en profileert zich als aanbieder van complete elektrotechnische installaties. In onze utiliteit- en industrietak zijn ze hiermee niet bekend. Wij hebben in Nederland de meeste tunnels geïnstalleerd. Bovendien veel bruggen en sluizen. Daardoor hebben we met de tijd een band met Civiele werken opgebouwd. Nieuwe ontwikkelingen hebben ervoor gezorgd dat de weginfra en energie als nieuwe markten zijn ontstaan. Nogmaals wij hebben niet de handjes om de kabels aan te leggen. Het systeemwerken en ontwerpen hebben wij in de vingers, op deze processen hebben wij ons geconcentreerd. Nu vraagt Rijkswaterstaat ook om de oplossingen zelf te valideren en dit kunnen wij aanbieden.

Martijn: Ooms geeft expliciet aan de ambitie om bovenin te acteren. Dhr. de Klerk: Ik ben situationeel ingesteld. Trajecten waar civiel en elektrotechniek samen in zitten, daarin moet je per project bekijken welke speler het voortouw moet nemen op basis van de verdeling werk. Het ligt aan het product en aan de uitvraag van de klant, wat hij het belangrijkste vindt. In de meest werken zitten wij als organisatie onder Ooms. GTI heeft met beide rollen geen moeite.

Martijn: Wat zijn sterktes zwaktes Ooms in toppositie? Dhr. de Klerk: Ooms Construction heeft meer body nodig op de tussenlaag waar Ide Oost opereert. Eigenlijk heb je drie keer een soort Ide nodig om een groot project op te kunnen pakken. Daaronder een aantal handjes, consultants noemen wij die. Het middenkader is belangrijk. Die intelligente mensen zijn indirecte kosten en moeten terugverdiend worden. Ooms heeft te weinig body in die laag. Als er in de basis veranderingen doorgevoerd moeten worden dat moet er iemand dit aanpakken. Het werk wat Ooms doet zijn ze goed in. Ze zouden naar mijn idee op die plek kunnen behoren en daarvoor moet Ooms Construction gaan uitbouwen. Het zou een start kunnen zijn om die positie te handhaven, want op het moment kunnen ze dat nog niet. Een traject in Noord-Holland is voor hen gemaakt, in dat geval zou ik Ooms Construction niet op de tweede plaats willen hebben. Het biedt dat kansen om dat in strategische samenwerking op te pakken. Dan moet je GTI zien als directe leverancier van Ooms Construction. Dit kan omdat GTI als team kan samenwerken op het niveau van een product aanbieden. Voor een project ben je met een team een aantal maanden bezig. Dit weegt zwaar op het management en dit moet terugverdiend worden. Je moet een op de vier

aanbestedingen winnen om het terug te verdienen. Als Ooms Construction een groeiscenario voor zich ziet dan moet zij investeren. Deze verandering kan je niet zonder slag of stoot doorvoeren. Het mag best een beetje knellen het mag pijn gaan doen. Het is op het moment alleen de vraag wat het doel van Ooms Construction is' 1) zich handhaven in de markt, of 2) doorgroeien in een andere aanbodstrategie. De strategie wordt ook niet openlijk gepresenteerd. Het doet zeer om uit te breiden, kost een hoop pijn en moeite. Je gaat een model tot leven wekken om daarmee een doel te hebben. Dit geeft het beeld waar je heen moet. Het doel moet een duidelijke visie vormgeven. Het doel zou groei kunnen betekenen of je zou kunnen zeggen ik ga mijn bedrijfsproces op orde brengen voor een veranderende markt.

Relations and mutual expectations in the supply chain

Het is inderdaad zeer belangrijk hoe Ooms Construction de relaties met partners gaat vormgeven. Martijn: Hoever denk u dat zij die vraag kunnen loslaten. Dhr. de Klerk: De personen die bij Rijkswaterstaat aan het rour zitten zijn conventionele mensen. Ze willen alles controleren, dus ze zullen niet zomaar de vraag loslaten. Mensen die echt wat willen kunnen hoogstens een pilot neerzetten. Martijn: Wat zou je willen verwachten van de opdrachtgever? Dhr. de Klerk: Dat Rijkswaterstaat echt meehelpt een project te realiseren en niet vanaf afstand via bureaus een afrekencultuur tot stand brengt. Vooralsnog huren zij allerlei teams in om de aannemer te controleren. Het gehele proces moet erop gericht zijn om elkaar te stimuleren beter te acteren. Het is nog steeds geen win-win model tussen opdrachtgever en aannemerij. Kijk naar A73 hoe dat gelopen is.

Vragen voor Ooms en opdrachtgever:

Voor Ooms: Met welke visie / doel doet Ooms dit onderzoek?

Voor de opdrachtgever: Hoe gaan zij het voor elkaar krijgen om die win-win situatie te creëren?

C.4 Interviews possible clients

C.4.1 Respondents

Interviews possible clients			
Name	Party	Position	Date interview
Ing. J.J.A. Hendriks	Province Zuid-Holland	Directing infrastructure client	06-05-'09
Ir. L.P.I.M. Hombergen	Rijkswaterstaat	Knowledge manager	13-05-'09

C.4.2 Interview guide possible clients

1) Framework

1.1 What are the opportunities and threats for a middle-sized contractor company to proactively develop products for the large scale road construction market?

1.2 What are the opportunities and threats to middle-sized contractor companies to do joint product development in collaboration with other middle-sized contractor companies?

1.3 What are the opportunities and threats of structuring the supply chain according to the proposed framework for road construction industry?

1.4 Is the separate system integrator role desirable on different tiers? What are the opportunities and threats for implementing a system integrator in the road construction supply chain?

1.5 Is there something missing in the framework that should be treated?

2) Strategic position Ooms Construction

- 2.1 On which position(s) is Ooms Construction capable to operate at the moment?
- 2.2 What are the strengths and weaknesses of Ooms Construction at this (these) particular position(s)?
- 2.3 On which position(s) is Ooms Construction capable to operate in a supply-driven road construction market?
- 2.4 What are the capabilities that Ooms Construction has to (further) develop to be able to act at this (these) particular position(s)?
- 2.5 What position is most apt for Ooms Construction / On what position do you think Ooms Construction should aim in a supply-driven future?

3) Relations of Ooms with clients

- 3.1 How should the demand specification of the client in large scale road construction change to give contractors the opportunity to attain a supply-driven market strategy?
- 3.2 How should the selection criteria of the client in large scale road construction change to give contractors the opportunity to attain a supply-driven market strategy?
- 3.3 What question(s) would you like to be answered by Ooms Construction?

C.4.3 Results Jos Hendriks

Introduction position Jos Hendriks as a provincial client

Functie Jos Hendriks: hij werkt 5 jaar bij de provincie Zuid-Holland. Eerst 2 projecten in uitvoering projectmanagement gedaan. Nu afdeling verkeer en vervoer als opdrachtgever infrastructuur. Afdeling heeft budgetten binnen de afdeling programma's en projecten. In meerjarenplan infrastructuur staat wat er in de toekomst uitgevoerd moet worden. Deze werken worden in deelopdrachten verstrekt aan afdeling programma's en projecten. Enerzijds lopen er projecten, deze zijn in de uitvoering bezig. De doorlooptijd van een project is ongeveer 5-8 jaar. In deze projecten is de afstemming financiële partners belangrijk, dit gebeurt bijna altijd in combinatie met Rijkswaterstaat, waterschappen, gemeentes en eventueel andere provincies. Martijn: Hoe staat u in direct contact met Ooms Construction? Dhr. Hendriks: In mijn huidige rol sta ik daar niet direct mee in contact, in vorige rol meer tijdens de uitvoering.

Reacties gedurende presentatie onderzoeksuitkomsten

De meetbaarheid van waarde is een belangrijk issue bij publieke projecten. Ik zal dit staven met een voorbeeld. Ik bied als aannemer een Design & Construct project aan, maar in plaats van 20 geef ik 30 jaar garantie. Denk je daaraan als het over waarde gaat? Martijn: Ja en je kan tevens denken aan het feit dat de aanbieder zelf technisch invulling geeft in het ontwerp van functionele eisen zoals geluidsreductie.

Strookt de geschetste ontwikkeling met de beweging in de markt? Ja, het lastige in de markt is dat de huidige situatie een vechtersmarkt is en als opdrachtgever ben je verplicht op een transparante manier de verschillende oplossingen naast elkaar te leggen. Ook al stel je de vraagspecificatie ruim op, door functioneel uit te vragen, zodat aannemer extra kan bieden, de opdrachtgever moet in zijn gunningscriteria kijken of dat past. Er moet namelijk transparant en vergelijkbaar gemeten kunnen worden. Als je niet de laagste prijs kiest maar een andere aanbieder, moet de opdrachtgever zich kunnen verantwoorden tegenover die laagste. Dit moet vooraf op een vrij complexe manier vastgelegd worden in je uitvraag. Hierbij komt bij mij het woord optiepakket in gedachte.

Martijn: Denkt u dat in dit licht op de korte termijn de EMVI wordt uitgebreid met meer selectiecriteria? Dhr. Hendriks: Ja dat denk ik wel. Daar staat de provincie Zuid-Holland voor over. Vaak doe je een aanbesteding per project, de doorkijk maken naar een volgend project is vanuit de opdrachtgever lastig, omdat je intern en europees weer aan de regelgeving gebonden. Wat wel eens gebeurt, dat de opdrachtgever 5 projecten op de markt zet en alleen de eerste gunt. Hierbij kan hij de intentie geven om bij tevreden resultaat, weer met elkaar in zee te gaan. Dit moet je dan wel goed formuleren in het contract.

Framework

Het is heel prettig in dit format dat de opdrachtgever een aanspreekpunt heeft. Waar je normaal integratie vraagt, wordt dit je nu geïntegreerd aangeboden. Is het een bedreiging voor middengrote aannemersbedrijven dat zij zich profileren als een combinatie? Wanneer de provincie een project opzet wordt nu toenadering gezocht tussen de partijen van een combinatie. Zij gaan dit nu van te voren actief aanpakken. Het kan nu wel eens zijn dat als je contract uitvraag leest, dat er een bepaalde partij voor de verlichting gekozen moet worden, en een bepaalde andere partij voor de belijning. Dit kan gebeuren door te sterk te sturen op bepaalde producten. Het is bijvoorbeeld heel lastig om de verkeerssystemen volledig vrij te geven, want dan krijg je problemen bij beheer en onderhoud. Kansen en bedreigingen om aanbodgedreven te gaan werken; Kansen zijn er heel veel; een bedreiging zijn de marktpartijen zelf, zelfs de partijen die graag een markt met een bepaald waardeoordeel willen. Op het moment dat een partij vindt dat hij de beste aanbieder heeft gedaan, en zij worden niet gekozen, zijn aanbiederpartijen geneigd zijn om naar de rechter te lopen om de beslissing aan te vechten. Ik denk dat ze respect voor elkaar moeten opbrengen en elkaar het licht in de ogen gunnen.

De volgende verbeteringen verwacht ik bij een aanbodgedreven markt: Ik verwacht een betere vervlechting van de technische installaties in plaats van een samenraapsel van losse elementen. Een kleinere partij als Ooms Construction heeft voordelen of nadelen ten opzichte van een grotere aannemer. Grote aannemers zijn vaak verdeeld in B.V.'s daardoor krijg je een verplichte winkelnering. Als je tot elkaar veroordeeld bent dan, op het moment dat het spontaan gaat. Als daar een grote chemie is heeft dat een goede weerslag op het product. Als je met dezelfde partijen vaker samen werkt, kan dat zeker leiden tot een zeker chemie, waar voordelen uit komt. Vaak is er wel duidelijkheid over degene waar je mee werkt bij een BAM.

De selectie is al gemaakt op het moment dat je elkaar treft, maar dan kan je niet meer terug. De relatie die je hebt opgebouwd in een tenderfase en het gaat naar de uitvoering is die relatie meestal helemaal weg omdat dit volledig andere mensen zijn. Bij kleine organisatie val je makkelijker terug op de mensen die je hebt leren kennen.

Strategic position Ooms Construction

Waarom zou je graag met Ooms Construction willen werken, wat zijn de sterktes van Ooms Construction. Dat ligt eraan over welke schaalgrootte we het hebben. Er is een grens waarboven Ooms Construction te klein wordt. Ergens boven de €50 miljoen wordt het voor ooms te groot. Met name in de grotere projecten heb je te werken achter een weekendafsluiting en dan heb je capaciteit nodig/kritische massa om het project snel genoeg uit te voeren. Hoe groter je organisatie hoe makkelijker je dat kan doen. Ooms Construction is vooruitstrevend in productontwikkeling en materieelontwikkeling. Vanuit het oogpunt van de opdrachtgever moet Ooms meedoen in die projecten, omdat concurrentie een stimulans is voor alle partijen. In wezen is het voordeel van het

traditioneel proces, dat het spelers gelijkwaardig maakt. Daarom hebben vanuit hun oogpunt aannemers de ruimte nodig om te kunnen etaleren wat ze in huis hebben.

Relations and mutual expectations in the supply chain

Als belangrijkste stuurgereedenschappen van de opdrachtgever worden vraagspecificatie, prequalificatie-eis, en selectiecriteria vastgesteld. Martijn: Hoever denkt u dat het zinnig is om de vraagspecificatie verder open te maken. Dhr. Hendriks: Ik heb een goed voorbeeld van wat wenselijk is naar mijn idee: de reconstructie van de N210. Dit project bestond uit 15 km provinciale weg, puur functioneel omschreven. Als opdrachtgever wilde we 5 partijen die veel moeite in hun aanbidding gingen steken. Door de open specificatie konden we kiezen uit 5 verschillende technische oplossingen. Er was een strook van 30 m aan de zuidkant aangekocht als speelruimte voor de aannemer. De hele logistiek van het project hebben we losgelaten. Martijn: Heeft die stappen terug doen geresulteerd in een betere oplossing? Dhr. Hendriks: Dit heeft met patenten te maken, de opdrachtgever kan niet een technische oplossing voorschrijven, omdat in dat geval maar een bedrijf het project kan uitvoeren. Als opdrachtgever vond de provincie het belangrijk dat er zo min mogelijk verkeerhinder was. Er kwamen grote verschillen in de prijs uit met totaal verschillende risicoprofielen. Een ander project net daarvoor was de N475. We hadden 11 maanden voor het werk staan, maar de uiteindelijke aanbieder heeft er 2 weken over gedaan. Er waren in dit project ook meer selectiecriteria. Voornamelijk op verkeerhinder. Ik denk dat je als provincie de opdrachtnemers een goede uitdaging geeft. De uiteindelijke oplossing kwam als het volgt tot stand: Een persoon van Dura Vermeer kende de boeren daar, hierdoor hebben zij zowel in de prijs als in kwaliteit een hele speciale oplossing aangedragen. Als je de voegloze overgang beschouwt, is dit een deelproduct, een onderdeel van een groter geheel. Als een aannemer een aantal van dat soort producten in zijn aanbod heeft, dan kan deze zich onderscheiden door een bepaald klantspecifiek product aan te bieden. Je kan je bij de inschrijving voor 10% meer inschrijven, en doordat daardoor minder onderhoud is verdienen je daar de kosten weer terug. Voorbeeld N474, we hebben daar zelf gekozen voor asfalt met hogere geluidsreductie. Eerst een andere laag aangebracht omdat de weg altijd nog een beetje gaat werken. Hierdoor was minder natuurcompensatie nodig. Zo kunnen ook optimalisatieslagen gemaakt worden.

De opdrachtgever zal ook projectonafhankelijk vraagspecificatie neer te zetten, zodat aanbieders hier hun ontwikkelingen op kunnen aanpassen. Dan moet je als opdrachtgever de markt veel eerder benaderen. Er zijn voorbeelden te noemen dat de opdrachtgever de aanbesteding al gedaan heeft voordat de ruimtelijke ontwikkeling is uitgedacht. Als je de aannemer meer mee naar voren neemt dan opent dat mogelijkheden. Rijkswaterstaat doet vaak aanbesteding met voorselectie en dan komen er een soort consultatierondes. Hierin kunnen aannemers ideeën delen. Ik zit heel vaak projectmatig bekijken, bijvoorbeeld die voegovergang. Stel, je komt die op 50 plaatsen tegen, zeg dan als aanbieder tegen RWS ik kan die voegen zo uitvoeren dat ze er beter bij liggen. Ik zou liever zien dat aannemers zo een selectie maken van een aantal onderscheidende features en die probeert toe te passen in een project.

Overheden worden vaak op de vinger getikt dat ze transparant moeten zijn, zodat alle marktpartijen gelijke kansen krijgen. Als ik een particuliere partij ben, dan is het makkelijker uit te blinken. Ik zie als een goede vraag richting de aannemer: Hoe onderscheidt zij zich in meerwaarde. Goed in meedenken over hoe je EMVI kan toepassen. Stop eens met je eigen graf te graven, dus respecteren als je laagste bent maar niet gekozen wordt vanwege een selectie via de EMVI.

C.4.4 Results Leon Hombergen

Reacties gedurende presentatie onderzoeksuitkomsten

Dhr. Hombergen: Als ik kijk naar je raamwerk in vergelijking met de huidige oplossing; Traditioneel is het zo dat de aannemer na oplevering van zijn verantwoordelijkheid af is. De opdrachtgever moet alles specificeren en moet tijdens de bouw/fabricage toezicht houden en daar staat tegenover dat de aannemer van zijn verantwoordelijkheid af is tenzij er grote malversatie is. Op het moment dat aannemer zijn eigen product gaat ontwikkelen moet hij ook meer garantie afgeven over een langere termijn. De aannemer moet dus steeds minder in producten nadenken maar meer in services, onderhoud, operationeel blijven. Een voorbeeld: de opdrachtgever zegt in plaats van gedetailleerde oplossingen, zorg dat de komende 10-15 jaar de weg verlicht is met x aantal Lumen. Doe ons maar een voorstel. In de oplossing komt dan ook iets als meerwaarde, de opdrachtgever heeft specificatie en toezicht als tools om kwaliteit te waarborgen. Er moeten hiervoor dus iets in de plaats komen. Het valt me op dat je Ooms Construction heel centraal zet. Bedrijven houden er niet van om lager in de supply chain te zitten, maar dat kan voor een middelgrote aannemer best een goede positie zijn. Ik heb vermoeden dat Ooms Construction niet graag als onderaannemer gaat zitten, historisch is dat zo. Maar je hebt net ook geschetst dat je in de keten als systeem integrator naar veel meer moet gaan kijken dan naar prijs, ook kwaliteit, services, leveringsvoorwaarden, flexibiliteit. Als deze dingen worden belangrijker dan prijs, als hij dat naar onderen wil doorsturen, dan moeten je als partij lager het zo ook ontvangen. Iedereen wil graag opwaarts kijken, hoofdaannemer zijn. Heel belangrijk dat er een netwerk van aannemers ontstaat om een bedrijf, een vorm van gegarandeerde supply chain, ingesteld op onderlinge samenwerking. Je zal maar eens aan de werkvoorbereiding moeten vragen, er wordt van alles besteld, en vervolgens op de bouwplaats te laat geleverd. Dit geeft een hoop ellende. De faalkosten kunnen in de bouw heel ver omlaag op het moment dat je een geïntegreerde supply chain hebt. Hierbij wordt communicatie en dergelijke zaken steeds belangrijker. Je hebt inderdaad die strategische allianties, je kan alleen echter niet verwachten dat de partijen onder je alleen voor jou werken vanwege hun concurrentiepositie.

Framework

Kansen en bedreigingen voor een ontwikkelende aannemer: achterwaartse compatibiliteit is belangrijk. Stel dat je een weg aan gaat leggen met andere putdeksels dan in de andere wegen, dan is dat onhandig voor een gemeente. Deze onderhoudszaken moeten op elkaar blijven aansluiten. De grote opdrachtgevers willen graag standaardiseren in hun onderhoudsbeleid en dit is dus een bedreiging. Middelgrote aannemers hebben een uitstekende mogelijkheid om zich te specialiseren ze zijn flexibeler en wendbaarder, dat weten de grote aannemers ook. De grotere bedrijven zijn wel degene die het beste kunnen integreren maar ze zijn zich er bewust van dat ze niet in alles het beste zijn. Door goed te specialiseren en te profileren, daar kan een middelgrote aannemer zijn slag mee slaan. Waarom zou een middelgrote aannemer alles moeten kunnen? Hij moet het kunnen organiseren en de juiste partijen om zich heen verzamelen.

Een nieuwe alternatieve manier van werken moet wel duidelijk zijn voor het personeel, net als de strategie en een aannemersbedrijf moet ook stimulansen afgeven aan het personeel en zijn leveranciers om in deze strategie te werken. Productontwikkeling in samenwerking met middengrote aannemers. De partijen moeten er dan voor de zorgen dat je het hele project in kunt zetten. Er is niks op tegen als middelgrote aannemers samen in combinatie gaan werken, ze kunnen echter niet verwachten dat projecten worden opgeknipt en dat ze vervolgens dit door de opdrachtgever gecoördineerd wordt. – Er mag niet een bepaald product voorgeschreven

worden het product mag dus niet heel aanbiederspecifiek zijn. Het moet inschrijfbaar zijn voor meerdere partijen, omdat het een open aanbesteding moet zijn. Consequenties hiervan zijn: Bij het ontwikkelen van producten moet er dus rekening gehouden worden met algemene specificaties inzetbaar is. Desnoods moet je ervoor zorgen dat er concurrentie is, maar dat jouw product beter van kwaliteit is. Je kan ook kijken naar Philips toen zij CD spelers gingen maken, zij hebben gezorgd dat dit product marktbreed ontwikkeld werd in samenwerking met concurrenten. Een voorbeeld in de aannemerij is V-polder, dit kan ook moeilijk ingezet worden omdat de vraag snel te aanbiederspecifiek wordt. Aannemers zijn gewend om een beschermde wereld te leven en een voet tussen de deur te krijgen door productontwikkeling. Als je zorgt dat jou product beter werkt en betere specificaties heeft dan wordt je wel verkozen op prijs kwaliteit. Het feit dat vindingen overgenomen worden, kan je niet tegenhouden. De aanbieder moet dan zorgen dat hij de betere partij is. De structuur volgens het framework kan op zich kan wel op deze manier. De systeem integrator moet niet alleen aan de top staan, maar zich toch meer bemoeien met de gehele supply chain. Bijvoorbeeld Philips maakt zelf niet echt tv's meer maar doet aan outsourcing en integratie. Tegelijk zit Philips om de kwaliteit te garanderen diep in de bedrijfsprocessen van hun leveranciers van componenten. Je bekijkt hoe ze ervoor zorgen dat de kwaliteit goed is, flexibel zijn, organisatie goed is. Het is dus balanceren tussen gelegenheid geven tot optimalisatie en controleren van de bedrijfsprocessen. Dat kan ook wel maar als je telkens incidentele leveranciers gebruikt kun je dat niet doen. Als je toch al weet dat dat bedrijf goede producten levert moet je je meer in hun proces gaan verdiepen ook. Dan goed werken door in dialoog verbeteringen door te voeren.

Het gesprek is via Skype op de computer gehouden en opgenomen. Op dit moment viel de computer uit en zijn er verder met de hand aantekeningen gemaakt

Strategic position Ooms Construction

Martijn: Wat zijn de redenen voor een publieke opdrachtgever om wel/niet graag te zien dat middelgrote aannemers in combinatie deelnemen in de auto(snel)wegenmarkt? Wederom komt hier het bezwaar van garantie naar boven. Publieke opdrachtgevers gaan in toenemende mate verwachten dat aanbieders en bepaalde productverantwoordelijkheid gaan nemen en hiervoor ook de hieraan gerelateerde financiële draagkracht hebben en garanderen. Op het moment dat je als combinatie een de facto lege huls bent, dan kan je deze garantie moeilijker geven aangezien je geen eigen vermogen hebt. De opdrachtgever is daarom erover bezorgd dat deze lege onderneming failliet kan gaan en dan zitten zijn met de gebakken peren. Aannemers hebben in het traditionele bouwproces over het algemeen in vergelijking met de financiële grootte van het project een laag eigen vermogen, dit is dus een bedreiging voor de aanbodgedreven werkwijze. Martijn: Wat zijn sterktes en zwaktes van middelgrote aannemersbedrijven in een aanbodgedreven auto(snel)wegenbouw? Gerelateerd aan het antwoord op de vorige vraag, kan je dus stellen dat middelgrote aannemers minder makkelijk die financiële garantie kunnen geven. Hiervoor zouden zij bijvoorbeeld met banken in zee moeten gaan. Die kunnen deze financiële draagkracht dan ondersteunen en zo kunnen zij de garantie wel voor elkaar krijgen. Vragen 2c en 2d zijn overgeslagen aangezien de respondent geen specifieke kennis heeft over Ooms Construction en de situatie waarin zij zich bevinden.

Relations and mutual expectations in the supply chain

Martijn: De voornaamste stuurgrootheden voor de opdrachtgever zijn vraagspecificatie, prequalificatie en gunningscriteria. Dhr. Hombergen: hieraan zal je kwaliteitborging, nazorg en garantie moeten toevoegen. Verder klopt deze stelling. Martijn: Op welke manier zou de publieke opdrachtgever zijn vraag moeten uitgeven om aannemers de kans te geven om aanbodgedreven te werken. Dhr. Hombergen: De vraagspecificatie moet waar mogelijk functioneel omschreven worden, zodat de aanbieder hierop zijn eigen technische oplossingen kan toepassen, hierdoor is hij in de gelegenheid om zijn eigen proces te optimaliseren. Onderdeel van de vraagspecificatie is ook dat er gevraagd wordt aan te geven hoe het bedrijf georganiseerd is, hiervoor bestaan algemene tools zoals het Nederlandse INK-model en de internationale tegenhanger EFQM excellence model. In Engeland wordt bovendien door de highway-agency het CAT(capability assessment toolkit)-model gebruikt om leverancier te beoordelen. De structuur van het framework kan ervoor gebruikt worden om de vraag naar inzicht in de supply chain van een aanbieder te beantwoorden. Zo kunnen aanbieders in de grootschalige wegenbouw bewijzen dat het bedrijf zelf en de gehele keten goed georganiseerd zijn.

Martijn: Behoeft de wijze van prequalificatie aanpassing voor een aanbodgedreven wegenbouw? Dhr. Hombergen: financiële betrouwbaarheid en het betalingsritme worden belangrijke criteria in DBFM contracten.

Martijn: Hoe moet de opdrachtgever zijn gunningscriteria aanpassen? Dhr. Hombergen: kwaliteit moet een belangrijkere plaats krijgen, deze verandering is al duidelijk zichtbaar in de huidige markt. Mogelijke uitbreiding van criteria kan zijn, CO₂ uitstoot, andere vormen van duurzaamheid, after sales garanties met een langere termijn focus.

Martijn: Is het nodig om nog op andere manieren innovatie te stimuleren vanuit de opdrachtgever, zo ja welke? Dhr. Hombergen: In Engeland hebben ze een systeem van communities. Dit houdt in dat opdrachtgevers, aanbieders en partijen verder in de supply chain met elkaar om de tafel gaan zitten om met elkaar te praten over hoe zij omgaan met veranderingen in de markt en elkaar in te lichten over de mogelijkheden die zij zien. Op deze manier wordt er een structurele dialoog opgezet.

D Production strategies with Ooms Construction

In this annex the current business strategies on various supplier tiers of the framework are investigated. It should show the current status of Ooms Construction's business.

D.1 Introduction

In the relevant theory chapter various production strategies encountered in production industries, such as construction, have been described. In future supply-driven building practice these alternative production strategies could be implemented in road construction projects. In table D.1-a the expected production strategies at the various supply chain tiers are depicted. The following paragraphs present the outcome of an investigation in the current status of Ooms Construction's business. Thereby it gives insight in possible directions to evolve to in the future.

Level	Product	Product properties	Production system	Design work
Project / system	road infrastructure, incl DTM, crossing constructions. DB(+FMO, legal issues)	Concepts – functional properties	DtO	Links client-specific demand to functional design, interfaces subsystems
Subsystem 1 st tier	road incl. lineation, static constructions (signaling, crash barriers)	Pre-engineered concept – preliminary design - functional properties	Between DtO and MtO-C	
Subsystem 2 nd tier	Road paving construction, superstructure and substructure.	Highly engineered design – technical and functional properties	MtO-C	Preliminary design – applied subsystems
Subsystem 3 rd tier	Joint transition	Adaptable design – technical properties	Between MtO-C and MtO	Fill in design parameters based on specific location
Element	Asphaltic concrete	Design – technical properties	MtO	none

table D.1-a: proposed production strategies on various tiers of a large scale road construction project

D.2 Element supplier – asphaltic mixtures

Ooms Construction sells asphalt concrete on the road construction market via an independent working company called Bituned. This company is for 50% possessed by Ooms Avenhorn Holding and for 50% possessed by MNO Vervat, another middle-sized contractor company in the Netherlands. Ooms Avenhorn Holding is the mother company of Ooms Construction. The asphalt is produced in asphalt plants that are also owned in partnerships with other contractor companies. Ooms Construction chooses for this option for two reasons. First this way it is possible to have production capacity over a larger area, secondly there is the simple fact that other contractor companies are not willing to be dependent on their competitors for asphalt.

D.2.1 Product and product supplier

Bituned has a wide variety of asphalt products in their portfolio. It ranges from relatively normal simple asphalt mixtures to all kinds of specific performance asphalts, such as very porous asphalt concrete, asphalts containing polymer modified bitumen and special maintenance asphalts. The properties of the asphalt mixtures are known and therefore there is a clear view on the quality that is assigned to them. The properties (e.g. resistance to

fatigue, noise reduction, elasticity) are captured in quality certificates (CE-marking) and thereby the supplier can guarantee proven quality. The production process is constantly monitored to secure that the properties are as stated. This quality control is recorded in standard procedures.

D.2.2 Production strategy

If there is zoomed in to the production strategy associated with the product asphalt it can be noticed that it is a make-to-order product. The components that are used are completely recorded. If an order for asphalt is entering the production process the planning, manufacturing (production) and control are pre-designed. The raw materials are on stock at the factory.

D.2.3 Supply chain

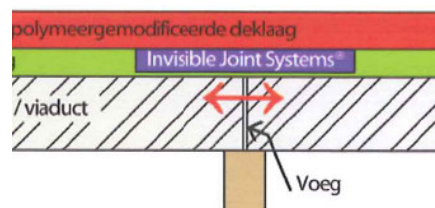
The supply chain of Bituned consists of raw material suppliers of asphalt binders, mineral aggregate and special additives. The supply chain is therefore relatively simple and easy to oversee. These raw material suppliers are always the same companies and therefore the supply chain for asphalt products is stable. The selection of suppliers is based on historically preferred suppliers.

D.2.4 Product development

Most of the asphalt products Bituned is producing are developed by the in-house R&D-department within Ooms Avenhorn Holding. The R&D department is constantly working on improving asphalt mixtures. In the laboratory new additives are investigated and tested with qualified testing methods

D.3 3rd tier subsystem supplier – Invisible joint transition

Ooms Construction has developed an invisible joint transition for joints in the road paving of bridges and tunnels. Due to temperature concrete components are lengthening and shortening and therefore there have to be joints between concrete elements. The invisible joint system bridges these joints without joint in the asphalt layer.



D.3.1 Product

The invisible joint system is a good example of a product for the road construction. Ooms Construction has developed this product in reaction to a demand in the market for joint transitions without joints in the asphalt and therefore less vibration and resulting noise. Besides that the joints need less maintenance and the road has more driving comfort.

Ooms Construction 'sells' the invisible joint systems to other contractor companies in subcontracting arrangement as well as provides the client with this solution in projects executed by themselves.

D.3.2 Production strategy

The invisible joint system can be typified by a make-to-order/customisation production strategy. The design is completely elaborated in standard design details. These design details can be made specific for a particular situation, because the dimensions of the elements are not filled in yet. A couple of parameters in the design provide for the possibility to customise to specific requirements. The dimensions of the design drawings are defined by filling in the design parameters.

The product invisible joint systems is at the moment almost completely developed. The design is entirely engineered and in that sense thought-out. The properties and performance (at least in short term) are clearly defined and therefore can be guaranteed to the client. The product is recently developed and along with the development process closely monitored. The product is still relatively simple and the planning, manufacturing, assembly and control processes are clearly defined and recorded. If an order for a invisible transition is placed at Ooms Construction no extra design work is needed (except filling in parameters) and therefore information on costs and performance are easily acquired.

D.3.3 Supply chain

In the supply chain for the invisible joint transition Ooms Construction is dependent on the asphalt supplier Bituned, and supplies from their in-house business. . Since the design is recorded and the product needs relatively little capacity, the supply chain is almost entirely stable. It is completely clear what the supply chain looks like and it is always the same.

D.3.4 Product development/improvement

Since the product is relatively new the entire process is still monitored intensively. The pitfalls in execution are therefore still adapted to optimise the construction process. Besides that the R&D-department is monitoring the executed joint transition to find out if long term behaviour is as expected.

In the development process the direct suppliers were/were not involved

D.4 1st and 2nd tier subsystem supplier – solely road construction

The situations of Ooms Construction as a 1st and 2nd tier subsystem supplier is described here in once for two reasons. Firstly in spite of the products and their complexity are different, there is similarity in their current production strategy, supply chain and product development. Secondly the role as 2nd tier subsystem supplier of solely road paving excluding static constructions is not found in the current market.

D.4.1 Product supplier

At this product level it can be argued that the executed works of Ooms Construction is really a product anymore, it is rather providing for production capacity. To a large extend the project delivery process is similar to the traditional reactive approach. A part of the contracts is design and construction, but most of the works are executed according to detailed specified demands. The production strategy, supply chain and product development is project-based.

D.4.2 Production strategy

The production strategy attained in the road construction market is concept-to-order. In case of traditional contracts the concept and design development is done by engineering firms in order from the client. If there is opted for a design and construct contract, then the concept and preliminary design development is done by the engineering firm and the detailed design is part of the contractor's tender. So in both situations the production strategy is concept to order.

D.4.3 Supply chain

The supply chain in these project becomes increasingly complex. In spite of potentially being the same supply chain for different projects, it is set up for every project independently. In these projects Ooms Construction takes a principal contractor role in relation to the remainder of the supply chain. A following process can be recognised; in the tender phase of a project Ooms Construction with the specifications in hands gathers information about the costs that subcontractors demand for supply of materials and capacity. Thereby the price of the project is determined. If the project is acquired, in a similar process the supply chain is constructed and the project is planned.

The stability of the supply chain is tried to secure by preferred suppliers. Since price is almost always leading however, there is often still opted for the cheapest suppliers. After a project there is some done some analysis about the performance of the suppliers. This is recorded and there is a system for feedback, however this process is not really structured and used frequently in following projects. If a supplier has been performing really bad it is put on a black list and is not asked for a certain period of time.

D.4.4 Product development/improvement

In spite of being in the same company (and even across the street) the engineering department and the project organisation of Ooms Construction act relatively disintegrated. In a sense the engineering department is considered to be a separate firm and for engineering work other engineering firms are often hired. In the development of solutions for the large scale road construction industry there is almost no standard detailing used.

D.5 Project/system supplier

D.5.1 Product supplier

The project supplier in large scale road construction projects is a combination/partnership of Ooms Construction with other middle-sized contractor companies. These contractors act as one supplier to the governmental client. The collaborating parties form a partnership over which one of the partnership parties acts as principal supplier. The principal supplier role is designated to the company that determines the greatest part of the price, if both/all parties are having a similar share in the price the role is assigned by turns

D.5.2 Production strategy

The production strategy is similar to that of 1st and 2nd subsystem supplier. There is no particular development of recording of standard road concepts in advance. The client delivers a product concept and leaves design and engineering to the contractor mostly.

D.5.3 Supply chain

The supply chain for a road infrastructure project containing concrete structures, like flyovers, dynamic traffic management systems and road construction. The supply chain shows a similar fragmented character as in the previous paragraph. The difference is that Ooms Construction lacks the knowledge in the specific disciplines of their partners to really judge their work.

E Management meeting results

E.1 Introduction

To validate the outcome of the research a management meeting is organised at Ooms Construction. The practical application of the framework is presented to three managers within Ooms Construction in this meeting. The meeting at the Ooms Construction office has been introduced with a presentation of the framework and the outcome of the field research. After that the practical application has been put forward. To guide the discussion of the research results a set of statements have been discussed. First every respondent has been given the opportunity to react on the statement individually, after that the statement was discussed in the group. The results of the management meeting can be found in this appendix. The participants at the management meeting can be found in the following table.

E.1.1 Participants

Management meeting at Ooms Construction, 17 th of June 2009	
Name	Function
Ing. K (Klaas) Terpstra	Managing director
Ir. I. (Ide) Oost	Contract manager
Dr. Ir. A.H. (Arian) de Bondt	Manager R&D
M.P. Verster	Graduation student / researcher

E.2 Statement 1

Stelling 1 is gepresenteerd als een keuze tussen twee verschillende stellingen. Deze stellingen stelde de huidige situatie naast de mogelijk toekomstige situatie.

Stelling 1a:

Ooms Construction heeft als individueel bedrijf de capaciteit en de kennis in huis om als regievoerder op te treden in een aanbodgedreven markt voor auto(snel)wegprojecten.

Stelling 1b:

Ooms Construction heeft als individueel bedrijf de capaciteit en de kennis om volledige contractuele verantwoordelijkheid te kunnen nemen in een aanbodgedreven markt voor auto(snel)wegprojecten.

Dhr. Terpstra:

Stelling 1a. Bij de huidige omvang van Ooms kies ik voor de bovenste. Dat heeft te maken met de omvang van de contracten, die heel wat risico's met zich meedragen, onder €30-40 miljoen. Kan Ooms Construction alleen aanbieder zijn. Als we willen groeien naar de tweede keuzemogelijkheid, dan moeten we ons vergroten, want bovenin de aanbiedersketen delen we op dit moment nog de verantwoordelijkheid.

Dhr. Oost:

Ook stelling 1, met de huidige vraaggestuurde manier van werken is dit. Je bent in staat om de eisen van de klant door te zetten naar contractpartners of combinanten. Mocht Ooms Construction daadwerkelijk onder eigen verantwoordelijkheid een geheel project gaan aanbieden, dan verandert deze situatie. Er moet dan een product geïntegreerd worden uit de producten van leveranciers. Voor grote auto(snel)wegprojecten kan Ooms Construction dit nog niet. Dit wordt veroorzaakt door beperkte management capaciteit om zich te kunnen verdiepen in de andere disciplines. In de rol van systeemintegrator moet Ooms Construction multidisciplinair het management trekken. Hiervoor ben je op het moment nog te klein. Binnen de organisatie hebben we de personele bezetting niet om dit multidisciplinair op te pakken. Er is te weinig kennis van elektrotechniek en betonconstructies en daarom is Ooms Construction hiervoor afhankelijk van andere partijen. Op het moment hebben we nog wel de mensen die een prijs kunnen beoordelen. Om een complete aanbieder te worden moet de organisatie meer affiniteit verkrijgen voor binnen andere disciplines.

Dhr. de Bondt:

Stelling 1a. Ik kan hier weinig aan toevoegen. Het is nu meer de vraag, hoe je het wel zou moeten regelen. Gezien de grootte van Ooms Construction is er ook niet 100% van de tijd behoefte aan om de hoofdaanbieder te zijn. Feitelijk zou je om het geheel op een hoger plan te trekken wel de kennis van andere disciplines als know-how in huis willen hebben. Om de goede bezettingsgraad te kunnen hebben zou je die personen vervolgens weer een deel van de tijd moeten verhuren. Het is de vraag in hoeverre dat mogelijk is. Het zou wel interessant zijn. Het ingenieursbureau van Ooms Construction zou deze kennis in huis moeten halen en dan kunnen ze deze de rest van de tijd verhuren.

Discussie:

We gaan hierbij uit van de omvang die Ooms op dit moment heeft. Je kan partnering zoeken maar dan geef je een stukje identiteit kwijt. Het is belangrijk te realiseren dat deze identiteit in de huidige markt heel belangrijk is.

E.3 Statement 2

Stelling 2:

De rol van directe leverancier van het subsysteem "weg" van een auto(snel)wegenproject sluit beter aan bij de grootte en capaciteiten van Ooms Construction, zij zou daarom zich meer als niche-speler moeten positioneren. (om wellicht daarna verder door te groeien naar de "top"-positie)¹

Dhr. Oost:

Mee eens. Ik denk dat deze stelling aansluit bij de vorige stelling. In het subsysteem weg kan Ooms Construction een topspecialist zijn. De discussie moet hierbij zijn wat moet Ooms Construction vervolgens doen om die top te

¹ Bij deze stelling moet het volgende opgemerkt worden. In de week van de management meeting heeft Strukton via de Cobouw te kennen gegeven dat zijn op zoek zijn naar een partner in de wegenbouw in West-Nederland. In principe kan dit beschouwd worden als een open sollicitatie aan het adres van Ooms Construction.

bereiken. Je zou Ooms Construction inderdaad prima in zo'n positie kunnen voorstellen. Ik denk dat Strukton ook op deze manier naar Ooms Construction kijkt. Er zijn in het verleden met deze werkverdeling diverse malen combinaties geweest.

In feite zit Strukton in dezelfde positie als Ooms, alleen mist Strukton dan weer de tak wegenbouw om deze projecten geheel te kunnen aanbieden. Er staan in dat artikel in de cobouw ook concrete voorbeelden van het doel om aanbodgedreven te gaan werken. Op het moment profileren ons als multidisciplinaire speler, maar op kleinere schaal.

Dhr. Terpstra:

Mee eens. In feite heeft Strukton inderdaad hetzelfde probleem als Ooms Construction. Zij hebben wel een wegenbouw tak in een ander deel van het land. Alhoewel deze niet half zo ver in de ontwikkeling zijn als Ooms Construction. Het is dus gewoon een open sollicitatie. We zijn voor de betonbouwers een graag geziene partner voor grootschalig auto(snel)wegprojecten. Na het project Kosmos staan wij daar minder om te springen, omdat dit eigenlijk een slechte ervaring is geweest. In een project is het namelijk belangrijk hoe zij zich tegenover ons opstellen. Maar in de stelling kan ik mij 100% vinden.

Als je MNO Vervat bekijkt; zij hebben een moeilijke tijd gehad, maar ze hebben zich in breed ingekocht in kennis van verschillende disciplines. Dat heeft MNO Vervat erg goed gedaan, en dat hebben wij minder gedaan. Dat kan ook komen omdat we ons echt specialiseren op asfalt.

Dhr. de Bondt:

Mee eens. Naar mijn inschatting is het een beetje de arrogantie van Strukton om het op deze manier via de media te spelen. In feite staan wij er vaak om bekend een grootbedrijf zijn, als men onze grootte niet kent. Het is alleen de vraag of Ooms Construction, als zij zich als wegenbouw niche-speler profileert, genoeg werk kan genereren.

E.4 Statement 3

Stelling 3:

Ooms Construction moet ernaar streven om op elk niveau van de keten projectoverschrijdend samen te werken met dezelfde leveranciers.

Dhr. de Bondt:

Het hangt ervan af. Ik zou eigenlijk ja willen zeggen, zeker als het om een 100% aanbodgedreven markt gaat. Dan is dat echt nodig. Voor de voegloze overgang voor bestaande projecten zou ik graag een keten van dezelfde partijen gebruiken. Je verwacht dan dat er na elk project ook evaluatie en optimalisatie van het bestaande ontwerp en proces plaatsvinden. De samenwerkende partners moeten er dan wel helemaal voor gaan. Samen moeten zij de acquisitie voeren en bouwmethoden optimaliseren. Samenwerken betekent geven en nemen. De aannemers in onze branche zijn daar nog niet aan gewend.

Dhr. Oost:

Gedeeltelijk mee eens. Ik denk niet dat het strikt noodzakelijk is, als een aannemer in een aanbodgedreven markt zelf het initiatief neemt. Je kan wisselen van partners. Het kan zijn dat er verschillende leveranciers zijn die dezelfde kwaliteit leveren, zoals bijvoorbeeld Philips of Siemens die allebei een lamp kunnen leveren rond dezelfde specificaties. (Dhr. de Bondt: dan ga jij ervan uit dat je zelf een meer overheersende rol speelt, als je dat niet kan moet je meer inhoudelijk samenwerken). In een aanbodgedreven markt kan je je voorstellen dat er een andere leverancier met een beter aanbod komt, met betere specificaties en dan wil je voor die kiezen. (Dhr. de Bondt: je kan ook aan een tussenvorm denken met twee of drie partners)

Dhr. Terpstra:

Gedeeltelijk mee eens. Als je een goede productontwikkeling gedaan hebt, dan staan partijen in de rij om mee te varen op je innovatie. Je moet inderdaad streven naar een vaste selectie van preferred suppliers maar het houdt nogal wat in. Je moet je behoorlijk aan elkaar verbinden en dat kan conflicteren, omdat een andere aannemer ook een keer wat kan hebben. (Naar mijn idee wordt hier de situatie bedoeld dat vanwege capaciteit een van de partners op een bepaald moment geen stimulans heeft om mee te doen in een project.)

Discussie:

Deze stelling kan zeker waar zijn, maar er moet eens in de zoveel tijd of na een aantal projecten evaluatie plaatsvinden en vervolgens kan je dan tot andere keuzes komen. Transactie kosten worden namelijk onnoemelijk hoog als je elke keer weer gaat zoeken naar een andere partner. Deze stelling snijdt alleen houd als het over cruciale leveranciers gaat, die de waarde van het product bepalen. Martijn: Je moet er wel voor waken dat je kan blijven optimaliseren en hiervoor zijn langdurigere relaties meer geschikt. Je moet iedere aanbieder een kans bieden om een beter product aan te bieden, ook op een hoog niveau.

E.5 Statement 4

Stelling 4:

Ooms Construction zou zich meer moeten richten op het standaardiseren van ontwerpen en uitvoeringsprocessen van bestaande producten/wegconcepten, zodat zij de klant kunnen benaderen met productgaranties.

Dhr. Terpstra:

Mee eens. De vraagspecificatie zou hiervoor duidelijk omlaag moeten. In plaats van een dik pak met eisen, waar je nu bij de A12 mee geconfronteerd wordt. Je zou zeker hierin meer kunnen standaardiseren. Als je kijkt naar een rotonde, dwarsprofiel, vangrail of afrit. Dergelijke producten zou je je kunnen voorstellen in een gestandaardiseerde vorm. Van deze standaardisatie denk ik dat je zeker voordeel hebben.

Bovendien kun je je ervaring in standaarden maken voor grote projecten gebruiken om je te profileren bij lagere overheden zoals gemeenten en provincies. Die zijn vaak minder krachtig in hun ingenieursbureau. Een goed voorbeeld is de rotonde van Unihorn, deze ligt overal in Noord-Holland. Die kennis is echt aanwezig hier bij Ooms Construction en zeker in combinatie met Unihorn, daardoor kan je dit mooi doorevalueren.

Dhr. Oost:

Mee eens. Ik denk dat je, in het proces van snel je project realiseren, eerder een betrouwbare raming kan maken van tijd en geld. Vervolgens moet je het product klantspecifiek maken waar nodig. Nu verspreid je de aandacht, tijd en geld over verschillende projecten. In het licht van je risicobeheersing vermoed ik dat je zeker het een en ander kan bereiken. Dat is hetzelfde wat prof. de Ridder ook zei; het kan sneller, doordat de aanbieder met laptop op schoot bij de klant kan gaan verkopen.

Mocht je Unihorn als partner zien, dan moet je dus ook verwachten van hen dat zij ook uit standaarden putten. Zij moeten anders gaan werken dan de huidige uurtje factuurtje cultuur, wat bij hun in de business gebakken zit. Je moet er zeker voor waken wat nou precies de ontwerpen zijn die je wel en niet kan standaardiseren. Bovendien volstaat het niet om al je ontwerpen op te slaan in een database, je moet ook kijken aan welke eisen ze voldeden. Feitelijk is de tekening van de voegovergang zoiets. In de calculatie hoeven ze dan ook weinig meer te doen, dan een paar vakjes invullen in een Excel-sheet.

Dhr. de Bondt:

Mee eens, in aanbodgedreven markt. Dit is allemaal binnen de randvoorwaarde van een aanbodgedreven markt, als daar een methodiek voor is ben ik het hier ook mee eens. Je zou je er wel alvast op moeten richten. Als voorbeeld is de voegloze overgang wel leuk maar voor veel 'producten' (op een hoger niveau) is dit wellicht niet haalbaar.

E.6 Statement 5

Stelling 5:

Als Ooms Construction mee wil blijven doen in auto(snel)wegprojecten moet er een projectafdeling opgericht worden. Deze 'systeemintegratie' afdeling moet zich richten op klantwensen, communicatie, ketenintegratie en evaluatie & optimalisatie van het gehele proces.

Dhr. Terpstra:

Mee eens. Dit geeft in principe goed weer wat altijd al mijn wens is geweest. Het komt in het feite op neer dat we zo proberen te opereren, maar aan het tweede gedeelte van de stelling komen we niet aan toe, omdat we capaciteit te kort hebben. Mocht je die capaciteit overhebben, dat komt dat helemaal goed. Dan is er de bedreiging van dat het een investering kost. Ik vind het wel een goede suggestie. Deze afdeling kan er dan ook voor gaan zorgen dat je met een mooi artikel af en toe in de Cobouw verschijnt, dat je met nieuwe ontwikkelingen bezig ben. Hier krijg je dan ook weer een goede reputatie door.

Als je kijkt naar de optimalisatie van calculatie, werkvoorbereiding en dergelijke is in deze hoek de afgelopen jaren al een hele hoop ervaring opgedaan. Unsolicited proposals worden op het moment nog niet geaccepteerd, omdat als dat wel geaccepteerd wordt dan gaat iedereen met elkaar in gevecht, omdat die partij heel makkelijk aan zijn werk komt. Aanbestedingstechnisch moet hier aandacht aan besteed worden. In de particuliere markt zou dit heel goed kunnen.

Dhr. Oost:

Mee eens. Bij MNO zie je een soort van voorbeeld. Zij zijn hier naartoe gaan werken. In de huidige markt en toekomstige markt is dit zeker nodig. Het is een continue proces van verandering. Ooms Construction besteedt er alleen tijd aan als het wat rustiger is. Zolang disciplines buiten onze organisatie geen omzet genereren binnen onze eigen organisatie, is dat heel lastig om daar structureel tijd voor te maken. Road Energy Systems is in die zin een goede. Er moet ook een kans in zitten dat op het moment dat je daarmee scoort je er ook echt iets uithaalt.

Onze R&D is echt product gericht, met de tijd is het enigszins meer gericht op constructies en concepten. Er zit een gevaar dat je het verkeerde investering over praat. Waar je eigenlijk naartoe moet is een soort marktplaats waar iedereen kan shoppen.

Dhr. de Bondt:

Mee eens. Eigenlijk zit je in een cirkeltje. Ooms is net te klein, je gaat het daardoor niet realiseren, maar je gaat er ook niet echt op vooruit. Het is een risicovolle investering wat je een of twee jaar zou moeten proberen. En als het zichzelf terugbetaalt dan weet je dat. Eigenlijk willen we dit graag maar praktisch moet realiseerbaar is ook een punt. Je zou het kunnen doen met een middelgrote aannemer die op een andere plek werkt. Een beter bedrijfsproces creëren is ook al een voorbeeld van innoveren.

E.7 Statement 6

Stelling 6:

Het toepassen van een aanbodgedreven wegenbouw, waarin auto(snel)wegen worden voorontwikkeld, is in de praktijk wenselijk.

Mee eens. Ik denk dat je bepaalde systeemcomponenten heel makkelijk kan standaardiseren. Een aannemer in de auto(snel)wegenbouw kan ook standaard onderhoudsconcepten / systemen aanbieden. Het aanbieden van onderhoudspakketten. Ik bied aan zoveel jaar onderhoudsvrij. Een randvoorwaarde is dat er meer technische eisen zo omschreven wordt dat er een differentiatie in oplossingen kunnen komen.

Dhr. Terspstra.

Mee eens. Je zou dit kunnen doen richting concurrenten, en als je dit richting de klant wilt doen moet hij zijn aanbestedingsbeleid aanpassen.

Dhr. de Bondt:

Mee eens, maar structurele veranderingen nodig. Ik heb twee dagen geleden nog gezegd tegen Rijkswaterstaat: het zou op zich al prettig zijn om aan te geven richting de markt, wat je van de aannemerij inhoudelijk verwacht. Dit is niet nodig tot in detail, maar wat wordt de komende tijd belangrijk geacht. Snel onderhoud, of langer uit te stellen onderhoud. Dat soort punten. Dat zou je functioneel gezamenlijkheid in contracten moeten vaststellen. Niet elk dingetje apart, heel raar voorgeschreven. De overheid is wat dat betreft onbetrouwbaar, elke keer is het beleid anders. Het is in ons eigen belang om dit idee aan de overheid aan te bieden, maar er is geen overkoepelende koepel in de wegenbouw die wat dit betreft iets voor elkaar krijgt.

De publieke opdrachtgever is nu bang voor de prutsende aannemer en daarom geven ze de innovatieve aannemer geen kans. Bij de grotere projecten komen die prutsers niet, maar op een of andere manier kopiëren de instanties de specificaties wel van deze groep. Als we het nou omkeren, hoeveel middelgrote bedrijven hebben interesse om in die specifieke aanbodgedreven markt te gaan. Ik ken namelijk een bedrijf die bewust geen Rijkswaterstaatprojecten meer aanneemt. (Dhr. Terpstra: ik denk dat als wij die markt zouden verlaten, dat we in omzet zouden halveren.)

Als de praktijk zich gaat veranderen dan geeft jouw afstudeerverslag een goede leidraad hoe wij ons als Ooms Construction op zouden moeten stellen.

Discussie:

Dhr. de Bondt: in de particuliere sector bieden we projecten met een aanbodgedreven werkwijze aan, al doen we dit maar op kleinere schaal. De gelegenheid is er in die markt is die gelegenheid meer. Je zou je meer kunnen concentreren op het oefenen in deze werkwijze bij die projecten.

Martijn: Ik zou zeggen dat een weg relatief eenvoudig is in het ontwerp. Dus zou je hier veel meer kunnen standaardiseren omdat een kilometer snelweg er veelal hetzelfde uit ziet.

Dhr. Oost: Vroeger had je dit in Duitsland daar kreeg je een A4 met 10 verschillende autobahn constructies. Dat waren de standaarden. Ook daar zijn ze gaan veranderen omdat er een kans is om te optimaliseren omdat je allerlei dingen erbij gaat halen en hier dan winst op maakt in de prijs. Dit is zeker waar als door de vrager deze gedetailleerde uitwerking geadopteerd wordt.

Dhr. de Bondt: Wij zijn erg gefocust op asfalt. Als je naar de rijksweg A2 kijkt dan wordt het ontwerp meer bepaald bij de onderbouw. Vroeger als een aannemer een productinnovatie in huis had, dan wilde alle aannemers dit ook kunnen maken. Al kostte de ontwikkeling handen vol geld, dan nog werd erop ontwikkeld. Ik verwacht dat er wel meer nichespelers gaan komen in de toekomst.

Dhr. Oost: We zijn in de wegenbouw pas 15 jaar bezig met zelf ontwerpen. Enerzijds is er daardoor nog veel kennis bij Rijkswaterstaat en anderzijds is het product asfalt al zo oud, dat een groot deel van de optimalisaties al is gedaan, verwacht ik. Echt revolutionair innovatieve producten zijn dus ook niet te verwachten, qua techniek.

Dhr. de Bondt: De bouw kan vergeleken worden met de manier waarop schepen gebouwd worden. Bij een scheepswerf staat een aanbieder sterker tegenover de klant. Zij rekenen en tekenen zeker ook nog op het moment dat ze al een opdracht hebben.

