Optimising the Buyer Groups to Stimulate the Transition towards a Sustainable Construction Industry

Master thesis | Georgette van Driesten

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PREFACE

Dear readers,

Listening to each other, having respect for each other's characteristics, visions and interests, with the aim to make visions and strategies, while taking these aspects into account. That is, in my opinion, the only way to establish a transition towards a sustainable construction industry. In this graduation research, I have been investigating how Buyer Groups (networks of contracting authorities) can contribute to and stimulate the sustainable market transition. Part of this research was to come up with specific strategies for different types of markets, all with their characteristics, problems and needs.

From my youth till now, the building industry, combined with societal challenges, has formed a thread through my interests. It has been over a year that PIANOo and Ad Straub posted a graduation student request for a research on how coalition forming and demand harmonisation among independent contracting authorities can be executed. The mix between sustainability challenges, policies and the construction industry makes me enthusiastic. I have enjoyed to gain more knowledge about sustainable market transitions, demand harmonisation and innovation. Besides, the many different interviewees gave lots of insights, which I am glad to have now.

It is time to show some gratitude to the people who enabled and/or supported me during this process. First, I would like to thank PIANOo, in particular, Floris den Boer and Machiel van Dalen for offering the opportunity to do this research at PIANOo. This graduation report stressed again the importance of enhancing procurement knowledge at contracting authorities, to stimulate the development of new sustainable alternatives by demand. Besides, I would like to thank them for the feedback and the weekly meetings which also helped in enhancing the connection with PIANOo.

Secondly, I would like to thank my graduation commission, Ad Straub, Leon Hombergen and Hans Wamelink for their feedback and the way they thought along during the process. Their expertise guided me in the right direction. In particular, thanks to Ad Straub for the additional detailed feedback to sharpen the report.

Thirdly, I would like to thanks the 20 interviewees who contributed to this research. The given insights were of high value to this research and myself. Because all participants were very different from each other, all interviewees created extra insights. Therefore, I would like to thank them for their openness and trust.

Last, but not least, I am very grateful for the many people who surround and support me during this period. Thank you, Lennart van de Vliert and Thijmen Plomp for the working sessions and support. But in general, thanks to every person of who I have hijacked a room during this graduation period. My boyfriend, parents, roommates and further friends, I am grateful to have you in my life.

You are about to start reading this report. I hope you too see the beauty of respectful collaboration and interaction, to make the sustainable transition within the construction industry happen. Enjoy the reading!

Georgette van Driesten
Oegstgeest, November the 12th, 2021

SUMMARY

The reason for this research
The construction industry expels a substantial part of the CO_2 emission within The Netherlands. Within the Dutch Climate Covenant, the following agreement has been made: Within the construction industry the national government will, in collaboration with regional administrations, enhance the purchasing power and make agreements to work climate neutral and circular by 2030, including tenders and standardisation of demand [Nijpels, 2019].

In order to reach those goals, a system change (a transition) is needed, for a change in norms & values and the way of working. Next to financial & research institutions and NGO's, governments are responsible to stimulate market parties to innovate and market parties are responsible to develop new sustainable alternatives for the transition.

80% of the construction clients is a public organisation [Pianoo, ob], which can steer by posing a demand for sustainable alternatives with sustainable procurement. However, at this moment, this procedure doesn't create much impact. Therefore, the Buyer Groups have been initiated, to formulate a market vision for a specific product, with a small network of contracting authorities. This, to create a strategical focus, make clients responsible and to harmonize the demand. In order to formulate such a market vision, Buyer Groups, among others, execute market consultations to retrieve some needed information.

Subject and objective of this research
Because the Buyer Groups are relatively new and different market structures have an influence on the innovativeness within markets, this research has the following research question:
RQ: How can Buyer Groups effectively influence relevant construction sub markets towards a climate neutral and circular construction industry in 2030, with a harmonized market vision?
In order to answer this question, innovation dynamics within different sub market, the requirements for an ambitious and feasible market vision, a contributing market consultation and a suitable design of the Buyer Groups, were being investigated. The objective is to support future Buyer Groups, the sustainable transition in general and the research fields of innovation policy and sustainable transition.

Methodology
A qualitative exploration was being applied to study this new concept, contextualised within a social system. Two steps have been applied; First, a literature study to create a better understanding of the linked concepts. Secondly, case studies have been performed by executing interviews, which were shaped by the literature study, documents and observations of four Buyer Groups. Of each Buyer Group the coordinator, participants and linked market parties have been interviewed. The results have been validated with two interviews.

Outcomes
Within the construction industry several types of markets exist. This research, incorporates markets dominated by: supplier dominated & scale-intensive firms and specialised suppliers. These type market parties all have another relationship with their clients, determining another focus for the market vision and market consultations. For example, only specialised suppliers can focus on a product. However, making impact with the market vision and an effective design of the Buyer Group, is, more or less, generic for all markets. Next to the different type of markets, the transition phase a market is in, also determines the focus of the market vision and market consultation.

Discussion
The biggest remark to this research is that the effectiveness of the market visions, consultations and Buyer Groups have not been tested yet; the market visions have to be implemented yet. This report is based on the wishes of market parties, but not on actual effects.

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LIST OF ABBREVIATIONS

CROW:	Centrum voor Regelgeving en Onderzoek in de GWW en de Verkeerstechniek
EMVI:	Economisch Meest Verantwoorde Inschrijving
LCA:	Life Cycle Analysis
MVI:	Maatschappelijk Verantwoord Inkopen (in Englisch: Societal Responsible Purchasing)
MEAT:	Most Economically Advantageous Tender (in Dutch: EMVI)
PCP:	Pre-Commercial Procurement
PPI:	Public Procurement for Innovation
OECD:	Organisation for Economic Co-operation and Development
R&D:	Research and Development
RWS:	Rijkswaterstaat
VNG:	Vereniging voor Nederlandse Gemeenten

DEFINITIONS

Sustainable Buyer Groups: A collaboration between public and private clients, who together formulate a shared market vision to improve the level of sustainability of a specific product, harmonize their demands in the pre-procurement process and individually implement these requirements into a tender [Pianoo, 0a].

Market vision: A widely supported representation of a desired future within a specific market, which challenges the status quo and steers towards this technology direction without hindering innovation [Termeer & Dewulf, 2017].

Market strategy: Purchasing strategy to reach the defined market vision.

Market consultation: An organised information exchange, with interested parties for a (planned) tender [PIANOo, 2016]. The aim of a market consultation is to gather information on the capacity, capability and willingness of the supply chain to deliver an innovative solution.

Construction industry: Markets focused on excavation, road building and hydraulic engineering. This research is focused on the construction / infrastructure industry. However, sometimes the building industry is also incorporated. It is tried to clearly distinguish these markets within the text.

Frontrunner: Pioneers in developing innovations. In the diffusion of innovation among clients theory of Rogers [1962], the frontrunners are being called 'the initiators' or the 'lead users' and the 'early adopter'.

Peleton: All other market parties which are no frontrunners. In the diffusion of innovation among clients theory of Rogers [1962], the 'early majority', the 'late majority' and the 'laggards' can be attributed to the peleton.

Market dominated by scale intensive firms: A market with a few large firms, who seldom have contact with a project's client. They often have a product development department in which they develop innovations for suppliers higher in the supply chain [Pavitt, 1984].

Market dominated by specialised suppliers: A market with small and medium sized firms focused on a specialised product. They innovate and develop their own product in close contact with their clients, who also focus on the quality of the product [Pavitt, 1984].

Market dominated by supplier dominated firms: A market with many small and medium sized firms. They seldom innovate and rarely have contact with their clients. They adopt innovations from other parties or adapt their way of working if their is pressure from contractors, engineers or architects [Pavitt, 1984].

System integrators: Concept, stemming from the innovation theory of Winch (1998), indicating the following parties: contractors, engineers and architects.

Sustainable procurement: purchasing measure, incorporating societal goals (In Dutch: MVI).

Technology direction: A pronounced preference for certain technologies over other technologies. The realisation of the preferred technologies is becoming an ambition.

CONTENTS

1 INTRODUCTION

In this introduction, first the societal and political context is being sketched, followed by the environmental impact of the construction industry. Thirdly, the problems with stimulating innovation and sustainable procurement (MVI) will be explained, including the reason for the initiation of the Buyer Groups. After the knowledge gaps, which are related to the functioning of the Buyer Groups, the research questions will be elaborated upon. Next, the research objectives, the scientific and societal relevance and the scope choices will come to play. At last, the structure of the report will be the subject.

1.1 CONTEXT

The sketch of the context will start with the climate change, it effects and the political reaction. Next, this will be further specified for the construction industry.

1.1.1 Climate change

One of the current world's largest challenge is climate change; rising temperatures result in an increase of melted ice, causing a higher sea water level. This higher sea water level leads to big safety issues on many locations. This is a problem for The Netherlands, which is partly located below sea level, but also for other countries. Next to a high seawater level, climate change has more effects. Such as, more frequent extreme weather circumstances, causing periods of dryness or extreme rain. This can make it harder to grow food properly, for example. The scale of recent climate changes is worrying, because changes on this scale are unprecedented over many centuries [IPCC, 2021]. The effects are already visible, but will continue to have more impact on our societies. Therefore, it is time to properly prepare ourselves for those circumstances.

The climate change and its effects force us to adopt a more sustainable way of living and working. To make a start, 196 parties have drew up and signed the VN-climate covenant of Paris in 2016, with the goal to reduce emission with 40% by 2030, compared to the level of 1990 [Rijksoverheid, o]. In order to meet the political goals for 2030, agreements have to be made on more decentralised levels too. In The Netherlands, for example, a climate covenant has been made between businesses, governmental and societal organisations with the goal to reduce 49% of the emissions by 2030 and to be climate neutral in 2050 [Rijksoverheid, o]. Also, varying ministries translated these goals towards their own working field. For example, the ambition of the ministry of Infrastructure and Water Management for their own executive organisation (RWS) is to work climate neutral and circular by 2030 [Van Nieuwenhuizen & Van Veldhoven, 2020].

1.1.2 The impact of the construction industry

For this research, the Dutch Construction industry will be the starting point. Positioning the construction industry in the Dutch economy, it has been calculated that the Dutch construction industry produced 2% of the GDP in 2019 [Bouwend Nederland, o]. The remaining parts of the building industry were responsible for another 7% [Bouwend Nederland, o]. That is the economical impact. In order to reduce it's negative impact on sustainability, one of the agreements within the climate covenant for the construction industry was:

Within the construction industry the national government will, in collaboration with regional administrations, enhance the purchasing power and make agreements to work (as much as possible) climate neutral and circular by 2030, including tenders and standardisation of demand [Nijpels, 2019].

The ministry of Infrastructure and Water Management, RWS and ProRail made a plan for their own activities to be climate neutral and circular by 2030 Ministerie van Infrastructuur en Waterstaat [2020]. However, there isn't a sector wide plan yet; an execution agenda is still in development [Van Meer, 2021]. The association for Dutch municipalities (VNG) still refers to the general Dutch climate covenant goals for the municipalities as clients within the infrastructure; 50% reduction of CO_2-emission within 2030 and climate neutral by 2050 [VNG, 0]. The operationalization of the concept 'climate neutral' is that within projects the same quantity of energy is being produced as is being consumed. The operationization of the concept 'circularity' is that, (raw) materials are being reused and very little products or materials are being thrown away [Ministerie van Infrastructuur en Waterstaat, 2020].

The ministry of Infrastructure and Water Management analysed the use of materials from their executive organizations Rijkswaterstaat and the semi-public railway organization ProRail. In 2017, the total weight of their used materials was nearly 52,000 kton [Ministerie van Infrastructuur en Waterstaat, 2020]. In 2017, the total amount of CO_2 emission produced by the entire Dutch construction industry was 3 billion kilogram [Van Nieuwenhuizen, 2020]. To put this in perspective, the total amount of CO_2 emission in The Netherlands was 163 billion kilogram [CBS, 2018]. The highest levels of emissions which are being produced within the projects of Rijkswaterstaat en ProRail are in the following working areas:

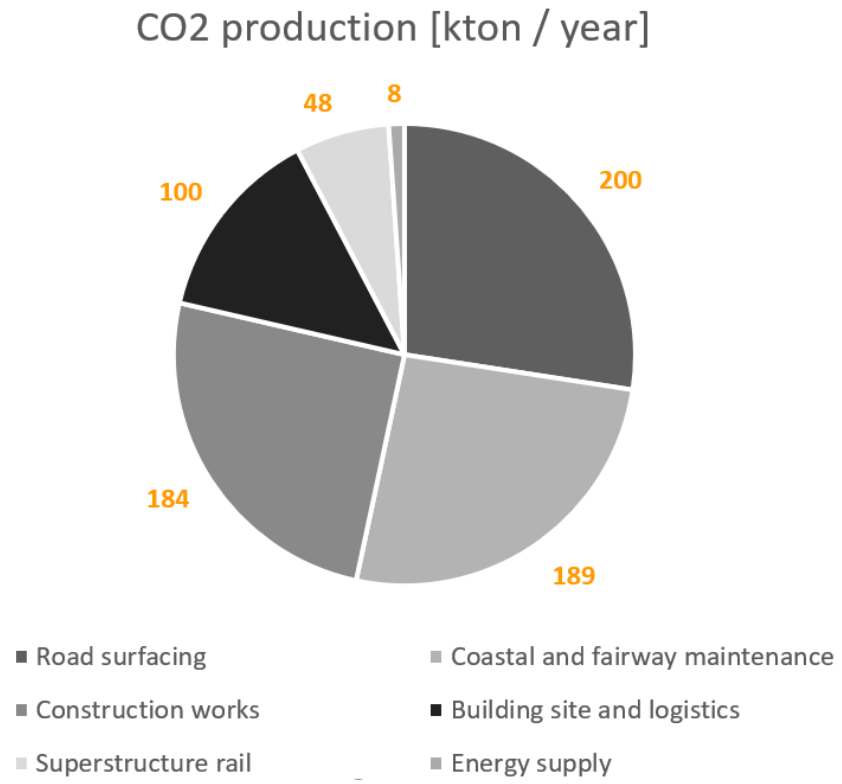


Figure 1.1: CO_2 production within different types of projects from Rijkswaterstaat and ProRail (Ministry of Infrastructure and Water Management, 2020)

In a respectively order of a high towards a low CO_2 production, the sectors are: road surfacing, coastal and fairway maintenance, construction works, building site and logistics, superstructure rail and energy supply. In short, there is some work to do for the construction industry to reach the goals for 2030. Therefore, a transition is needed.

1.2 THE PROBLEM

Based on the context, the problem will be sketched. First, the focus will be on reaching the ambitions. Also the link with the Buyer Groups will be made.

1.2.1 A slow transition

In order to meet the sustainability goals, much improvement is still needed; most parties, including The Netherlands, are laying behind on track to reach those goals [UNFCC, 2021] [Planbureau voor de Leefomgeving, 2020]. Therefore, it is time to put all the good intentions into practice.

To further accelerate the sustainable transition, renewed interest has been put in demand-driven policy measures [Borrás & Edler, 2020]. Demand from contracting authorities can play an initiating role in the innovation processes; public procurement has resulted in greater innovations than R&D subsidies and internal innovation drive of organisations [Edler & Georghiou, 2007]. In particular, a larger scale of demand can stimulate companies to innovate [Edler & Georghiou, 2007]. In the past, innovative solutions have been spread throughout society, by networks of relevant, decentralised public actors who choose a direction of change for the entire chain [Mazzucato, 2016]. Based on this line of reasoning PIANOo started networks with public and private contracting authorities to create a demand-driven market vision, signed by multiple buyers. These networks are called 'Buyer Groups'.

In order to stimulate a circular and climate neutral construction industry, one of the intentions is to enhance the collaboration between all public contracting authorities, centralized and decentralized [Van Nieuwenhuizen, 2020], because all governmental organisations together purchase a sum of 73.3 billion euros [Pianoo, 0a]. In order to positively influence these public purchasing, the Plan Maatschappelijk Verantwoord Inkopen (MVI, in English: sustainable procurement) has been written [Ministerie van Infrastructuur en Waterstaat, 2021] to stimulate the incorporation of environmental and social effects within the purchasing decision. However, although the awareness for sustainable procurement (MVI) has been growing [Ministerie van Infrastructuur en Waterstaat, 2021], the position of MVI is still not fully embedded in tender criteria for all projects. The political ambitions aren't always translated into executive goals for the contracting authorities. Besides, a new method first needs to become familiar, which costs time and money [Ministerie van Infrastructuur en Waterstaat, 2021]. As a result, market parties who developed innovative products and services, aren't enabled to sell those products to their clients; The demand doesn't match with the already developed innovations, which makes it a waste of time and money to develop these goods [Ministerie van Infrastructuur en Waterstaat, 2021].

In order to stimulate MVI, several measures have been proposed by the National Plan MVI 2021 - 2025, like monitoring the use of MVI by contracting authorities. The focus of the plan for these years is to create impact. The problem in creating impact can be broken down into three different sub problems [Ministerie van Infrastructuur en Waterstaat, 2021]:

1. The responsibilities to reach the societal goals aren't attributed to a specific entity;
2. There is minor strategical focus on creating impact;
3. The existing policy is too diffuse and voluntary.

To make more impact with MVI, the Buyer Groups have been suggested. Within Buyer Groups contracting authorities fight the diffusion by harmonizing their policies and create a strategical focus by writing a market vision and strategy, which they are responsible for to implement within two years.

1.2.2 Buyer Groups as a new measure to stimulate the transition

The exact definition of the Dutch form of 'Buyer Group' is [Pianoo, 0a]:

"A collaboration between public and private clients, who together formulate a shared market vision to improve

the level of sustainability of a specific product, harmonize their demands in the pre-procurement process and individually implement these requirements into a tender."

This addresses the problems with making impact; the market vision creates a strategic focus and enhances the responsibility of the participating contracting authorities. The policies get less diffuse by the formulation of a shared market vision. The definition of 'market vision' is (based on: Termeer et al. [2019]):

"A widely supported representation of a desired future within a specific market, which challenges the status quo and steers towards this technology direction without hindering innovation."

A distinction needs to be made between a market vision and a market strategy. The initial thought is that Buyer Groups formulate both, a market vision and a market strategy. The market vision represents the desired future and the market strategy formulates the road to this desired future. A market strategy can therefore consist out, for example, new selection criteria within tenders. The vision and the strategy are both necessary, because steering innovation needs a high ambition, but also tangible leads to energize innovating parties [Mazzucato & Perez, 2015].

The purpose of the Buyer Groups is threefold [Den Boer, 2020]:

1. Support public procurement processes focusing on circularity and CO2-reduction;
2. Creating demand harmonisation, including a widely supported market strategy;
3. Stimulating public clients to collaborate in posing a sustainable demand.

To stimulate the sustainable transition PIANOo started with 16 Buyer Groups, in which contracting authorities try to harmonize their demand with a focus on stimulating product innovation. In order to do so, a market vision and strategy will be formulated, which has to be implemented in practice within two years. During the process of writing a market vision, the market will be consulted. Besides, also contact will be sought with other contracting authorities. Contracting authorities can participate in two roles. Within the core group, which is responsible for the creation of the vision and strategy, or within the group which just wants to be informed on the process and the outcome. The objective is that these second group of contracting authorities will implement the vision and the strategy later on. Buyer Groups with a strategical focus on market transitioning, is a relatively new concept. It started in Norway with innovation partnerships, the European Union followed by initiating the Big Buyer Initiative, in 2019. Most Buyer Groups of PIANOo started during the summer of 2020 [Pianoo, 0a].

1.2.3 Knowledge gaps

Because the Buyer Groups are relatively new, much insight is needed on how to effectively design the Buyer Group and their market vision, so they can influence the movement towards a climate neutral and circular construction industry by 2030. This research focuses on four related knowledge gaps:

1. It is not known how strategies can be made suitable for different types of markets. Different market structures lead to different behavioral dynamics, which are in need of distinguished incentives to innovate;
2. Several barriers for innovation have been identified in literature, however measures to overcome these barriers are situational and less thought out. A market vision needs to give direction with a high ambition, however at the same time it also needs to incentives innovation by giving specific and realistic leads and by creating the freedom to develop alternatives;
3. The best form and intensity of the Buyer Group's relation with the market in different market structures can also use more insight;
4. The design of the Buyer Group which is capable of building such effective relations with market parties and of formulating an effective market vision, is also unknown.

1.3 RESEARCH QUESTIONS

In order to create more insights to overcome these knowledge gaps, the following research question and sub questions have been formulated. The overarching question for this research is:

"How can Buyer Groups effectively influence relevant construction sub markets towards a climate neutral and circular construction industry in 2030, with a harmonized market vision?"

Sub question 1: What are the relevant construction sub markets, what are their characteristics and what is the influence of these characteristics on the attitude towards innovation within these construction sub markets?

Sub question 2: What do market parties in sub markets of the construction industry need from contracting authorities to be persuaded to innovate towards a circular and climate neutral product?

Sub question 3: How can interaction among Buyer Groups and market parties stemming from their sub market contribute to an effective market vision?

Sub question 4: How can the characteristics of a Buyer Group contribute to an effective market vision?

1.4 OBJECTIVE, RELEVANCE AND SCOPE CHOICES

While answering the research questions, the research objective will be kept in mind. The results of the research have a scientific and societal relevance, which will be elaborated upon and different scope choices will be explained in this paragraph.

Objective
The objective with answering these research questions is to support Buyer Groups by creating insights in how they can effectively stimulate different types of sub markets within the construction industry by formulating a suitable market vision.

Relevance
The scientific relevance of this research is a contribution to the scientific fields of innovation policy (especially demand oriented policy measures) and sustainable transition theories. Buyer Groups focused on forming a harmonized and strategical vision is a relatively new demand-sided policy measure with no scientific exploration yet. The awareness that demand oriented policy measures can stimulate innovation, has been growing in the past. However, the power of a demand harmonization and a strategic market vision produced by a Buyer Group is new. Besides, the coupling of strategic oriented Buyer Groups and sustainable transition theories has not been made yet. For example, it is unknown to what aspects of a transition a Buyer Group can contribute. Besides, also knowledge is lacking on in which phase of the transition process, a Buyer Group has the most potential to stimulate the market transition.

The societal relevance is based in the societal transition towards a more sustainable world. This research creates knowledge on how contracting authorities can stimulate and reward market parties in different types of markets to innovate. However, the most specific application of this research is to help future Buyer Groups with their process in creating a market vision.

Scope choices
To define the scope of the research, choices have been made about different aspects of innovation, a type of industry and aspects of the Buyer Groups and their market vision.

Concerning the market vision, this research focuses on creating impact with a harmonized demand; How does the market vision need to be formulated in order to stimulate market parties? Market

consultations as mean to help create the market vision, is thereby also included. The focus is not on the specific implementation of this demand in the participants' projects; for example, the formulation of selection criteria for the tenders and suitable contract forms, is not included. The end-result will contain guidelines and boundaries for the formulation of a effective market vision.

The included aspects of the buyer groups are the characteristics and the composition of the Buyer Groups, including their influence on the market vision. Besides, the internal support from participating organisations will be elaborated upon. Out of scope, are the formation process, the internal cooperation and the process of involving other contracting authorities in the skin of the Buyer Groups.

The industry which is focused on, is the construction sector.

A transition process included a wide range of actors. For this research (public) contracting authorities and market parties have the focus. Other institutions will sometimes be mentioned, but are not part of the focus of this research.

Regarding the introduction of innovations, four dimensions play a key role [Frenkel et al., 2015]: 1. The cultural dimension, determining the ability to adapt to change; 2.The market dimension, indicating the power of the forces of demand and the forces of competition; 3. The institutional dimension, creating legal and socially unwritten boundaries to the implementation of an innovation; 4.The context dimension, providing the scientific, technological and physical infrastructure enabling the content of the innovation. For this research the legal restrictions and technical knowledge aren't investigated in-depth, because the research focuses on convincing market parties. The market dimension is included in this research, as well as the cultural dimension.

Regarding theories on innovation, the focus will be on innovation policy and suppliers' needs from clients. The adoption by users, different sorts of innovations and other subjects won't be investigated in depth.

This research mainly focuses on stimulating product innovation and ignores process innovation.

1.5 STRUCTURE OF THE REPORT

The first chapter after this introduction is dealing with the research methodology, in which the choices for certain methods are being explained. The third chapter is a large chapter including the theoretical framework, which gives more insight in several concepts related to the Buyer Groups, like innovation within different types of markets, transition processes and interaction between contracting authorities and market parties e.g. After this theoretical introduction, the cases which were subject to this research, are being described, included the level of innovativeness within the markets of these cases. In chapter 5, the results of the cross-case analysis are being described, including conclusions and recommendations based on this analysis. Chapter 6 'Final Results' is elaborating on the outcomes of the validation interviews and gives an overview of the final conclusions, which have been sharpened after the validation interviews. Within chapter 7 'Conclusions' the (sub) research questions are being answered. The last discussion chapter, is dealing with a discussion of the research methodology, a comparison of the result with literature, a comparison with a part of the graduation thesis of Lennart van de Vliert (2021) and, lastly, recommendations are being made for further research.

2 RESEARCH METHODOLOGY

The Buyer Groups have the aim to create a market vision in order to set a sustainable transition in motion. Such Buyer Groups, which have a strategical focus, are a new concept. Therefore, the aim of this exploratory research is to support Buyer Groups in different types of construction sub markets to stimulate these markets with a suitable market vision. The beneficiary are new Buyer Groups in The Netherlands, or elsewhere, who are at the start, or halfway with their formulation of a market vision.

To explore new mechanisms within the Buyer Groups and in their relation with market parties, qualitative research is applied; Qualitative research aims to address questions concerned with understanding the meaning of dynamics within social contexts [Fossey et al., 2002]. For future Buyer Groups, it would be useful to have a deep understanding of the mechanisms and results coming in play when a market vision and strategy will be put in the market.

The research methodology has two main pillars. First, the literature review in which more information is being gathered about the different sub markets. Besides, different manners in which contracting authorities can stimulate innovation, will be explored. These findings form a base and will be further specified for each sub market within the case studies. The case studies, are the second pillar of this research. Four different Buyer Groups have been investigated as cases. Namely, the Buyer Groups of Asphalt, Concrete, Road Signs and Circular Schools. For each Buyer Group two market parties, the coordinator and one or two participating contracting authorities have been interviewed. The results out of these interviews are being differentiated towards different types of sub markets. Based on these results, strategies have been made to design 1.) an effective market vision; 2.) a belonging market consultation; and 3.) a suitable design of the Buyer Group itself.

The result are validated by two validation interviews, with participants with an overview of the construction or building industry. The results of the cross-case analysis have been improved based on their suggestions. Figure 2.1 gives a graphical representation of the research methodology.

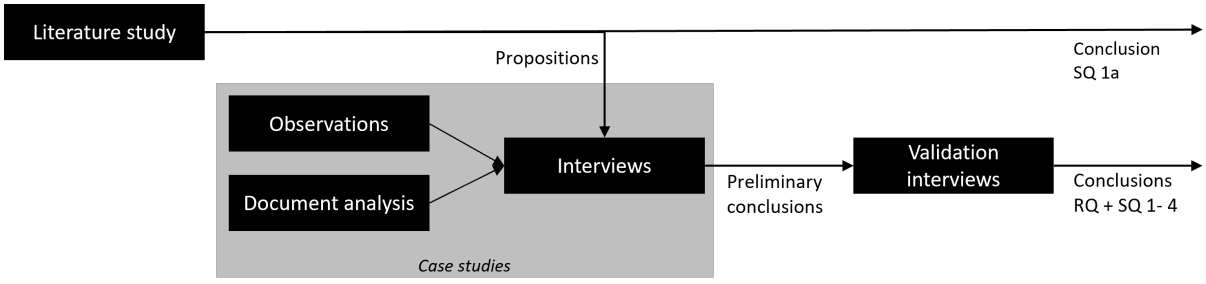


Figure 2.1: Overview Research Methodology

2.1 LITERATURE STUDY

The objective of the deductive literature study is to get more insight in the different construction sub markets and their mechanisms concerning innovation and possible interventions, which can stimulate the transition. There isn't much literature on Buyer Groups with a strategical focus of steering market transitions. Therefore, more research will be done into research areas connected to this subject, like

dynamics within different sub markets of the construction industry, innovation within the construction market and its sub markets and transition theories. Fourthly, further information is being collected about the market consultations, because one of the innovation barriers is a lack of interaction between suppliers and clients. Besides, interaction with market parties is also incorporated in the design of the Buyer Groups. The fifth aspect of the literature study is about the clients and their attitude towards innovation. The innovation adoption theory of Rogers [1962] is being used and the lead user characteristics of von Hippel [1986], amongst others. This information is useful to give recommendations for an effective design of the Buyer Groups. Based on the literature study, propositions have been drawn. These propositions have formed the base for the interview questions, which were part of the case studies.

2.2 CASE STUDIES

Case studies are an overtime study of multiple cases in real life, for which multiple sources can be used [Creswell & Poth, 2016]. The choice for case studies has been made because the contemporary context of the cases; the context of the Buyer Groups is the current market situation. The market vision needs to affect this context. The second reason for the use of case studies is, because the concept is relatively new. An in-dept description can add value [Yin, 2009]. For this study, the four earlier mentioned Buyer Groups form the four cases. The market in which they operate, their contacts with the market and the internal dynamics influencing the level of ambition and quality of the market vision was examined. Therefore, the case studies are not holistically incorporating all information, but the case studies are part of an embedded analysis, focusing on specific aspects of the case [Creswell & Poth, 2016].

A common concern is the generalizability of case studies. The question is: 'How is generalization possible with a single or a few cases?'. In dealing with this objection, the cases can't be observed as a sample of population, indicating the behavior of the entire population. However, multiple case studies can enrich theoretical propositions [Yin, 2009].

A second remark about case studies is that the results can't be directly the discovering of a new causal relationship [Yin, 2009]. Other factors, which didn't have the focus of the research could be the explanatory factor as well, for the effect which is being deducted by the case studies.

2.2.1 The sources of data

Case studies rely on multiple sources of data. For this study the sources of: documents, observations of Buyer Group meetings & market consultations and interviews have been used.

Documents
The used documents are the (concept versions) of the market vision and/or other end results of the Buyer Groups. Besides, some reports, some Buyer Groups gave assignment to, have been included in the analysis as well. For example, one Buyer Group gave assignment for a market analysis [Stasse, 2020] and another Buyer Group investigated their own functioning concerning sustainable procurement.

Observations
Besides documents, observations were also useful in building the cases. Observing who creates which input and observing the reaction of the market parties on the market vision, was useful for the interviews. The observations and the documents aren't used as a single base for the conclusions. However, they created a motive to ask more in-depth questions about certain topics within the interviews. The observations and the documents also helped in carefully asking some questions, increasing the reliability of the answers to sensitive questions [Doody & Noonan, 2013].

Interviews

The interviews were the most important instrument to collect the data; With interviews, very specifically focused data could be collected, suitable for the preferred themes [Yin, 2009]. To collect data which matched with the research's focus, but still included all other relevant data, semi-structured interviews are performed.

As being said, three different participants have been interviewed. The purpose of the interviews with the coordinators was to unravel the dynamics and group characteristics influencing the quality and the level of ambition of the market vision. Because these answers could be incomplete or biased [Yin, 2009], the participants of the Buyer Groups were also asked about this subject. Although, the most weight was being put to the answer of the coordinator, as independent party with no interest in a certain outcome.

The objective of the interviews with the participating contracting authorities was, firstly, to gain more detailed insight in sustainable procurement within the sub market of interest. Secondly, the participants were asked about the influence of the Buyer Group characteristics on the market vision. The last purpose, was to get more insights in an effective market consultation, which contributes to the formulation of an effective market vision.

The aim of the interviews with the market parties was to gain more detailed information on the manner of innovating within the sub markets. Besides, the internal motivation to start or continue innovating is being investigated. Besides, insights were sought about the preferred aspects of the market vision, the market consultation and the Buyer Groups, to best stimulate the sustainable market transition.

With inviting the participants for the interviews the choice was made to choose two different type of market parties per case, to enlighten multiple angles. This is also being done with some of the contracting authorities, if the impression was present that the sketched answers weren't representative. This impression was based on observations of the Buyer Group's meetings. Most of the participants were being approached in agreement, or at the advice of the coordinators of the Buyer Groups. With the inviting Teams link, an explanatory document was being attached with information about this graduation study, the purpose of the interview and the manner of processing the data. Also, a consent form for processing the data was being attached. The interviews were being recorded, so literal transcripts could be made.

For the analysis of the data stemming from the transcripts, several coding manners are being applied. Firstly, the data is assigned to categories. These categories were not predefined, but based on the data itself. This is named open or inductive coding and was being executed in the open-source qualitative data analysis tool, Taguette. Per Buyer Group, the transcripts were being analysed, by coding all the relevant data. Three quarters of all the data was being coded. The quarter which wasn't coded, were roughly the personal introduction text, some of the questions the interviewer asked, (detailed and personal) examples interviewees gave to illustrate their answers and clarification questions and answers. In Taguette the 879 selected pieces of transcripts were categorised in 27 categories, or axial codes (see appendix 4). Those 879 pieces of transcripts are not all unique. Most of the strophes have been assigned to multiple categories. Again, the codes of the different cases were being coded separately; they were different projects in Taguette. In order to come to an theory the main message from each open code was being distilled and categorized per axial code in Word. With these summary the Buyer Groups were being compared for each axial code. Therefore, a cross-case analysis has been performed. The outcome of this cross-case analysis can be found in chapter 5.

Both the literature study and the case studies contribute to all the research (sub)questions. An overview is given in figure 2.2.

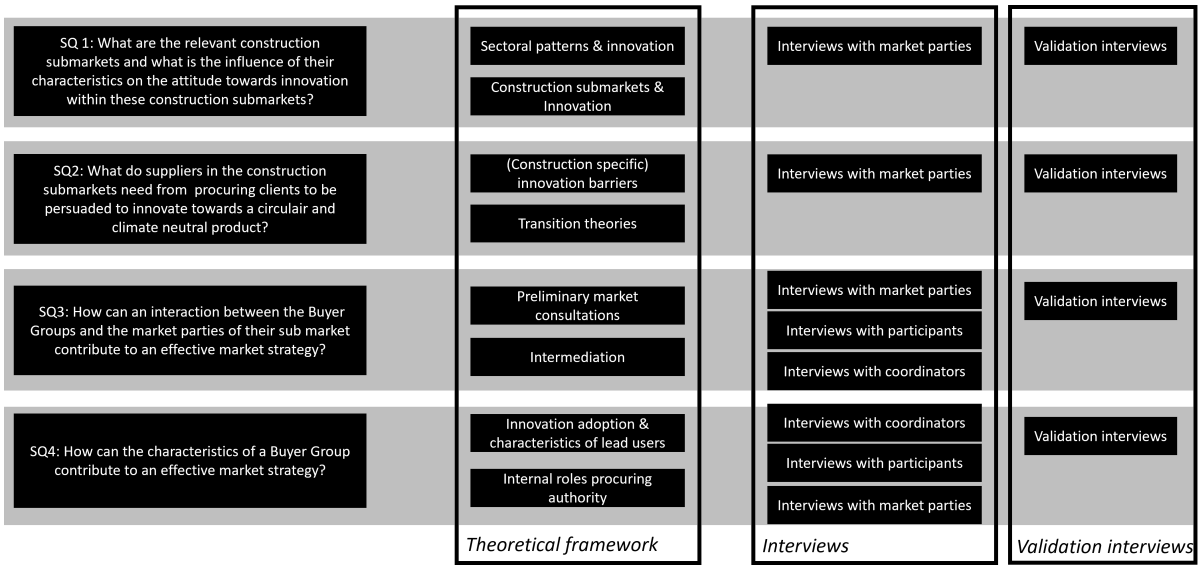


Figure 2.2: Overview data in answering the sub research questions

2.2.2 Validation

In order to come to viable conclusions to procedures have been applied. Firstly, the transcribed interviews were checked by the interviewees and secondly, two validation interviews have been performed to check the preliminary conclusions.

All interviews were being transcribed literally. Those documents were being checked and improved manually by the researcher. The improvements were: applying correct spellings of words the transcribing machine didn't hear and spell properly. After the transcripts were improved, they were send to the participants, who were being asked to check the transcripts on the level of veracity. The checked transcripts were being used for the analysis.

Based on the cross-case analysis preliminary conclusions have been drawn. These preliminary conclusions were checked within two validation interviews. The participants of these interviews, both had extensive knowledge about the construction and building industries. Within these interviews they gave their reaction to all the 26 preliminary conclusions. Based on their reactions the preliminary conclusions were being improved.

3 THEORETICAL FRAMEWORK

This framework will serve as a base for the case studies. Besides, it is being mentioned to give the researcher and the reader a better understanding of the concepts related to the Buyer Groups. In this chapter, first a general idea will be given about the process of market transition. Secondly, several type of market structures will be explained, including their influence on innovation within a market. This will be followed, by an investigation of three relevant construction sub markets. In the third paragraph, barriers for market parties to innovate will be discussed. Barriers in the construction sector, but also barriers in general, experienced by product developers. The Buyer Group will also be positioned as a solution to some of these barriers. In paragraph 3.4 the two transition approaches of Sustainable Market transition and Small Wins will be elaborated upon, because they give very practical advice (for among others, public clients) on how and when to stimulate a market transition. Fifthly, the interaction between buyers and their suppliers is being elaborated upon, partly because one aspect of the Buyer Groups is the market consultation, but also because a bad interaction between suppliers and buyers is a barrier for innovation. The last paragraph of this chapter focuses on a potential design of the Buyer Group. Characteristics of potential participants are investigated using the theories of innovation diffusion [Rogers, 1962] and the characteristics of Lead Users [von Hippel, 1986]. Lastly, an elaboration will be given on different roles within the contracting authorities.

3.1 TRANSITION TOWARDS A MORE SUSTAINABLE WORLD

In order to reach the sustainability goals for 2030 and 2050, changes and interventions need to take place in a complex system. Finding solutions within a complex systems is often hard, because a solution might be suitable for one element of the system, but at the same time, it can cause a problem elsewhere in the system. The complex challenge to reach the sustainability goals is, therefore, labeled as a wicked problem. In order to cope with wicked problems, an integral system transition is needed.

The IPCC report (2012) gave a definition of 'transition':
"*A transition is a long-term, continuous process of change during which a society, or a subsystem of society, fundamentally changes. The change includes a change of paradigm, perceptions, norms and values, social networks and interactions, power relations and the introduction of new institutions.*" [IPCC, 2012].

In order to change (a subsystem of) society, interconnected changes within different areas, such as technology, institutions, economy, ecology, culture, behavior and belief systems need to reinforce each other [Rotmans & Kemp, 2003].

Several approaches exist in explaining how such a transition needs to look like. These different approaches all have their own accent and can thus be complementary towards each other [van der Minne et al., 2021]. However, all these approaches have six principles in common [van der Minne et al., 2021]:

1. Transitions are complex, non-linear, unpredictable processes with recognisable underlying mechanisms;
2. Transitions develop when there is a general sense of dissatisfaction about the current way of dealing, including a sense of urgency;
3. Transitions can't be planned, however the direction and the velocity can be guided;
4. Transitions demand big, specific ambitions and small acts;

5. Transitioning isn't a project, but a process within which flexibility, experimenting and learning are essential;

6. Systemic change can only occur in the presence of alternatives.

These principles are key to have in mind while formulating the market strategy, as a Buyer Group. The first and fifth principle are indicating characteristics of a transition. The second principle is a boundary condition which needs to be present before a transition can take place. The third and fourth principle are assignments for (public) actors and the sixth principle, to provide new product alternatives, is the main responsibility of market parties (figure: 3.1).

The many different aspects, like technology, institutions, economy, ecology, culture and behavior, and the general sense of urgency, indicate that many different parties need to be committed within a transition process. Simons & Nijfhof [2021] indicate the following five groups of stakeholders: The industry, who needs to develop new alternative solutions; The government who needs to stimulate innovative industry parties, NGO's who don't have the power to write policies, but can stimulate the forerunners by collaborating and can raise awareness within society. Financial institutions can create financial incentives and lastly, research institutions can investigate the potential positive and negative impact of suggested alternatives, create benchmarks and change the agenda.

In this research the focus will be on the main parties involved in a procurement process, which are the industry and the government. The industry represent the market parties who deliver products and need to come up with new alternatives and the government represents the (public) construction clients who need to steer the innovations by guiding the technology direction by posing an ambitious demand and rewarding innovators. In the following two sub paragraph these two roles will be further investigated.

3.1.1 The creation of alternatives by market parties

In order to develop new alternatives, market parties need to innovate their products. The definition of innovation is declared by the Organisation for Economic Co-operation and Development in the Oslo Manual (2005):

"An innovation is the implementation of a new or a significantly improved product (good or service), or process, a new marketing method or a new organisational method in business practices, workplace organisation or external relations."

As can be derived out of this definition different forms of innovation exists. The focus for this research will be on product innovation. A product innovation is the introduction of a good or service that is new or significantly improved with respect to its characteristics or intended uses. Including technical specifications, components, materials, incorporated software, user friendliness or other functional characteristics [OECD, 2005]. A product change is often focused on improving quality, while a process innovation is often done to lower the cost price of the production product, which can strengthen the competition position [OECD, 2005]. Since this research focuses on making a sustainable transition, the focus for this research will be on product innovations which contribute to a higher level of sustainability.

Product development process
In order to better understand the development of new product innovations, several models have been developed, in the past. The first model is the linear model, which indicates sequential phases in the life cycle of a new product [Godin, 2006]. The most commonly accepted version of the linear model declares that a product starts with basic research, followed by applied research and development of the product. The last two steps are the production and the diffusion of the product [Godin, 2006].

Basic research - Applied research - Development - Production - Diffusion

The linear approach has long been dominant and is still being used because of its simplicity and rhetoric [Godin, 2006]. However, this model has been criticized and other perspectives on the product development process have been developed as well [Edquist et al., 2015]. For example, the Systems of Innovation Approach, which is more in line with the trend of system thinking. This approach includes all important economic, social, political, organizational and institutional factors that have an influence on the development, diffusion and use of innovations. The transition theories are also elaborating further on this approach of innovation. The six essential functions within this system, which stimulate innovation, are [McKelvey, 1997] [Johnson, 2001] [Bergek et al., 2008]:

1. Development and diffusion of scientific, technical, production and design knowledge;
2. Freedom for enterprises to experiment and create new products;
3. A direction of search for the use of resources;
4. Formation of (new) markets;
5. Legitimation to lower societal resistance;
6. Resource mobilization, like indubitably funding and competence

3.1.2 Guidance of the transition by contracting authorities

The Buyer Groups are initiated to steer the direction and the velocity of the transition, amongst others by creating a high and specific ambition and demanding according to this ambition. Such a way of working, which takes demand as a starting point, is not the most obvious choice. In the past, most of the times, steering measures for innovation have been supply oriented measures. For example, subsidising the most preferred alternative, which is a reaction to the already existing supply. The preference for those supply oriented measures, was being stimulated by the political vision that government intervention needs to be applied with the aim to fix market failures [Mazzucato et al., 2020]. In this vision, markets and governmental institutions are two separate systems. Governmental intervention can then be seen as a disturbing factor to the free reigning of market forces. Therefore, the opinion was that governmental intervention should be minimized or only used in case the market showed failures. However, a second vision on markets, creates more possibilities for demand as an intervention measure. This vision images markets as being deeply embedded in social institutions and created by policies, which indicates one integral system instead of a separation of the public and private sectors [Mazzucato et al., 2020]. The Economist Karl Polanyi wrote in 1944: "The road to the free market was opened and kept open by an enormous increase in continuous, centrally organized and controlled interventionism". Thinkers with this starting point see a role for public powers in creating & shaping markets and engaging in missions to solve societal problem [Borrás & Edler, 2020].

Besides, this theoretical argumentation for a bigger role for demand in the transition process, Edler & Georghiou [2007] also empirically examined, that asking for certain solutions by public procurement has resulted in greater innovations than the supply-oriented R&D subsidies, for example. Public demand for innovative solutions stimulates innovation in three different manners [Edler & Georghiou, 2007]: 1.) Demanding innovation stimulates the development of new or improved products; 2.) It incentives the supply chain to invest in innovation; 3.) It can trigger private use of the new products in other privatized markets. Therefore, public demand stimulates the development, adoption and diffusion of innovations, which can result in major contributions in transition processes [Uyarra et al., 2020]. There are numerous demand sided measures which can help stimulating innovation. An overview is being given in appendix 1, including a positioning of the Buyer Groups within this spectrum.

The transition theory is going a step further than: create demand to stimulate innovation. According to this theory, the demand should also be ambitious to further accelerate and steer the system towards a preferred technology direction. However, there has been a discussion about the manner of steering; whether this should be a top down or a bottom up approach. In paragraph 3.4 two specific transition theories will be elaborated upon, but here some rationales and fundamental discussions will be mentioned. Mazzucato & Perez [2015] argue that policymakers should stimulate transition, similar

like the mission to put the first man on the moon. This high and specific ambition caused a wide stream of new innovations, also outside of the aerospace industry, like for example satellites which are the bases for most communication channels, nowadays. The thought is that with a high and specific ambition, market parties are being steered towards a certain technology direction and many unintentional innovations will be developed as a result of it [Mazzucato & Perez, 2015]. Other approaches criticize this top down approach, because the wicked problems aren't that straight forward like the technical ambition of the moon landing. Wicked challenges have ill-defined ambitions. Therefore, very directing and specific policies might face problems of legitimacy [Uyarra et al., 2020]. Besides, a third vision is, that wicked problems and their solutions are also being understood differently dependent on location specific problems, qualities and priorities. A local approach, with actors implementing policies 'on the ground' is therefore being perceived as more effective. Besides, with a local approach, diversification and the local competition position can be stimulated [Uyarra et al., 2020]. Theories in line with these bottom-up approaches are called 'smart specialisation' and 'new industry policy'. However, the critique to such approaches is that they merely focuses on the local competition position, without making a real contribution to solve the 'wicked' problems and without incorporating a normative argument to stimulate policy outcomes. This, while especially the state can influence conditions for the transition process [Uyarra et al., 2020]. Therefore, in conclusion, a market vision can create impact by focusing on the bigger system, while also incorporating the nature of wicked problems and with including space to differentiate towards local circumstances.

Summary
The boundary condition for transitions are a general sense of dissatisfaction about the current way of dealing, including a sense of urgency. The process of transition is complex, non-linear, unpredictable with recognisable underlying mechanisms, which requires flexibility, experimenting and learning. Transitions can't be planned, however the direction and the velocity can be guided by (public) organisations, if they demand big, specific ambitions and perform small acts. However, systemic change can only occur in the presence of alternatives created by product developers [van der Minne et al., 2021]. Research and financial institutions also play a (facilitating) role in this process, but they are not part of the scope of this research. An overview of the general idea of transitions is being given in figure 3.1.

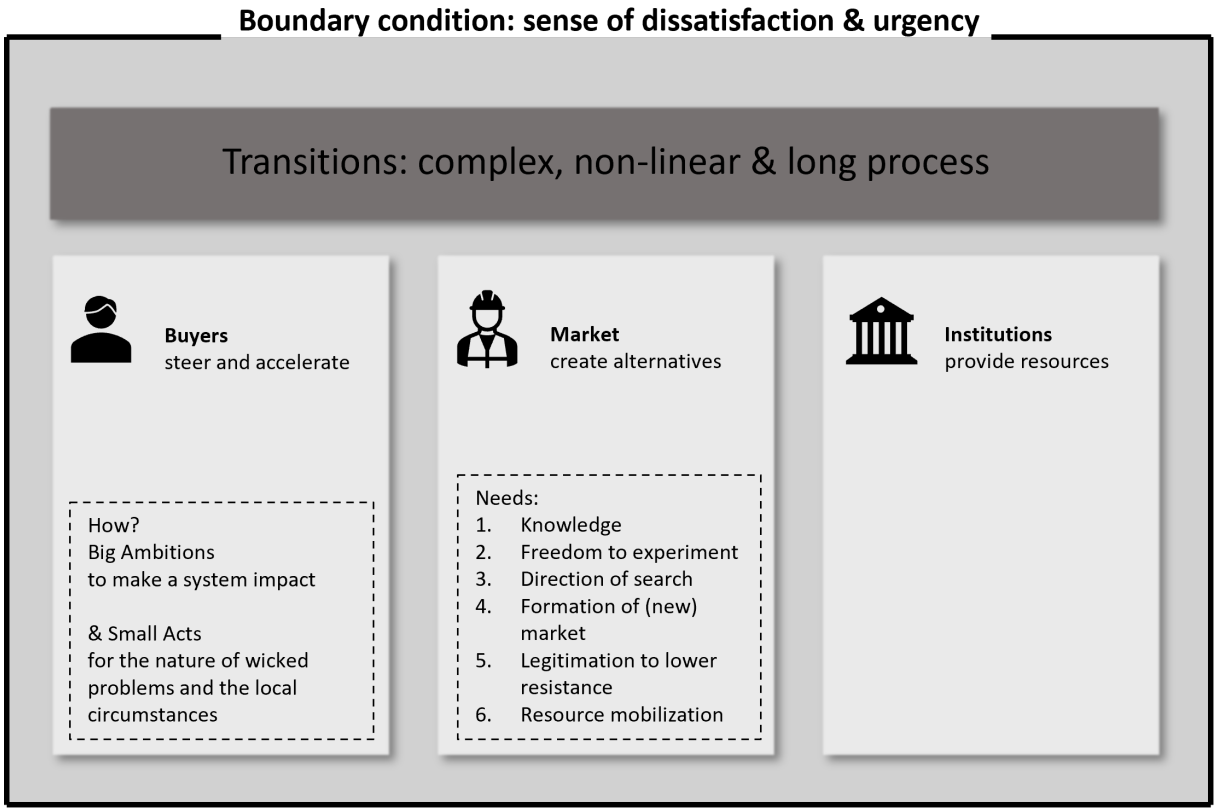


Figure 3.1: Elements in the transition process (own figure)

3.2 MARKET STRUCTURES AND INNOVATION WITHIN THE CONSTRUCTION SUB MARKETS

Market structures influence the relationships between market parties and contracting authorities, but also among different market parties. All these relationships together, influence the ease with which an innovation can be implemented, adopted and diffused within a market. Therefore, first some theoretical background will be given on different market structures and their influence on innovation. When it is known, what market characteristics influence innovation, the general construction market and relevant sub markets will be examined based on these characteristics and therefore, their level of innovation-friendliness. The sub markets which will be included are: the general road and rail industry, the specialised road and rail industry, the hydraulic market and the concrete industry.

3.2.1 Market structures and their influence on innovation

Market are not homogeneous. Some market have a high number of suppliers, some just a few, which results in different types of power plays between clients and suppliers. These different power plays are in need for different steering mechanisms by contracting authorities. Pavitt [1984] made the link between different market structures and the development of innovation, by describing the behaviour of innovating firms and by describing sectoral characteristics influencing technology change. He categorized firms into: supplier dominated, scale intensive, specialised suppliers and science based (see: figure 3.1).

Category of firm	Examplaric sectors	Size firms	Innovate?	Drive	Focus	Development	Innovation diffusion
Supplier dominated	Traditional housing	Small	No, adopt from suppliers	Price sensitive	Process	Supplier research; Demand; Government-financed research; Extension services	Low; within supply chain
Scale intensive	Bulk materials	Large	Yes, for suppliers	Price sensitive	Process	Own production engineering;	High; within supply chain
Specialised suppliers	Machinery; Instruments	Small	Yes, for customers	Performance sensitive	Product	Development in relation with clients	Low; to other supply chains
Science based	Electronics	Large	Yes, for suppliers	Mixed	Mixed	Own production engineering;	Low; within High; to other supply chains

Table 3.1: Market structures and sectoral patterns (based on Pavitt (1984))

The column 'focus' indicates whether a type of firm focuses more on product or on process innovation Pavitt [1984]. The type of client indicates the focus of the clients (drive). Do they want their supply for the lowest price possible, or is their focus a qualitative product. The column 'development' indicates the source stimulating product innovation, including the related other parties. Lastly, the diversification is about the diffusion of the innovation. Whether the innovation is being spread in the own supply chain (vertical) or also to other sectors (concentric). And whether the level of diffusion is high or low [Pavitt, 1984].

Supplier dominated firms are dominant in traditional sectors, existing out of small construction firms, which don't focus on R&D for their products. In contrast, their innovations are most of the time focused on internal processes [Pavitt, 1984]. Their reason to innovate is because of financial matters and because the competition is fierce within these markets. A rare increase in research activities to improve their products can be initiated by a demand posed by large customers, a governmental fund or a declining demand. However, in most cases, innovations aren't being made by themselves, but are just being adopted from their suppliers [Pavitt, 1984]. Therefore, their diversification is low, and only coming from the own supply chain, which is indicated by the low vertical diversification in figure 4.2.

Scale intensive firms, are large firms focusing on process improvement, because of financial incentives. Innovations are usually incremental and come from their internal production engineering department. The innovations are rather produced for the suppliers later in the chain, than in close relationship with their customers [Bogliacino & Pianta, 2016]. These firms have a strong relation with the rest of the supply chain, and therefore also spread their innovations within the supply chain [Pavitt, 1984].

Specialised suppliers, are small businesses focused on tuning their product with their clients' wishes and are thus focused on distinguishing themselves on the quality of their product, instead of delivering their product for the lowest price possible. The close relationship between supplier and client ensures the provision of resources and testing facilities from large clients. In return, suppliers offer clients their specialised knowledge. These companies perform in-house R&D in close relationship with their customers. Another driver for innovation within these companies is tacit knowledge and design skills from their employees [Bogliacino & Pianta, 2016]. The developed innovations are sometimes being used in other markets as well (a low concentric diversification of the technology).

Science based firms focus on Research and Development. Besides, they produce most of their product and process innovations themselves [Pavitt, 1984]. Their focus is on product development [Bogliacino & Pianta, 2016]. It used to be hard to enter such isolated markets with large established organizations. However, rapid technological change has created opportunities for new entry on these markets, in the past [Pavitt, 1984]. Their drive for innovation is both price and performance driven and it is being initiated by their own research and engineering departments, to serve the suppliers further in the varying supply chains. Their innovations are often being spread to other markets, and sometimes being used within the own supply chain.

A comparison of and the relations between the different type of firms
The table in figure 3.1 shows that price sensitivity relates with innovations or optimizations for the internal business processes. On the other hand, only performance sensitivity results in mainly product innovations, which can be used by other parties within the supply chain [Pavitt, 1984]. Supplier innovations are a major source of new innovations within three of the four markets structures. Within the supplier dominated market the innovation is just being adopted from their suppliers, while the other two markets the innovation which is being made in-house is being diffused to suppliers. The exception is the market which is dominated by specialised suppliers. They develop for their customer. Concerning the diversification of innovations only the scale intensive firms have a high impact of spreading innovations through the rest of the supply chain. The innovations of science based companies have a high impact in other markets, outside the own supply chain. Based on the diversification characteristics an overview has been made of the flow of product innovation between the different types of companies, which can be seen in figure 3.2.

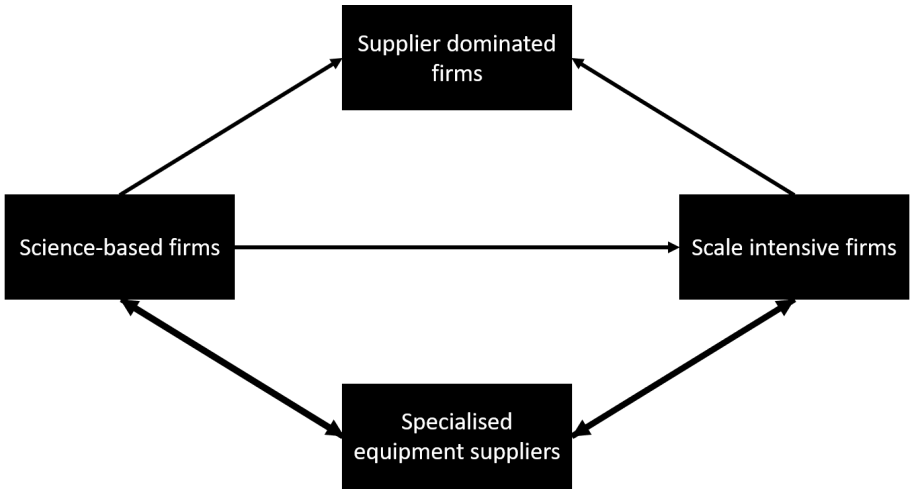


Figure 3.2: Sectoral patterns of innovation (Pavitt, 1984)

Science-based firms are most important; they feed all other firm categories with new technologies. Firms with specialized equipment generate technology for the science based firms and the scale intensive firms. Lastly, the scale intensive firms generates technology for the specialised equipment suppliers and the supplier dominated firms. The supply dominated firms barely produce product innovations and therefore, these companies aren't of use to stimulate innovation for the other type of firms [Pavitt, 1984].

Discussion of Pavitt's taxomony
It has to be mentioned that Pavitt's taxomony has its flaws. First of all, a sector doesn't have one category of innovating firms [Archibugi, 2001], but it often is being dominated by one category of innovating firms. Based on this side note, it is therefore important to diversify policies for an industry, and not to solely focus on the dominating firm category. Besides, some companies can be attributed to multiple categories [Archibugi, 2001]. Secondly, discussions have been focused on adding another, fifth category of firms [Archibugi, 2001], which also has been rejected again. Thirdly, the theory is stemming from 1984, which could lead to the argumentation that the theory is outdated. However, Pavitt's taxomony is still being used, because it provides a good starting point in building a theory. Recently, the theory has also been used to investigate service industries. The conclusion of the research was that Pavitt's taxonomy also is suitable for this type of industries [Bogliacino & Pianta, 2016].

Propositions for the interviews:

1. The performance of supplier dominated firms can most easily being steered by improvement of the products of their suppliers (scale intensive firms or science based firms);
2. Specialised suppliers and science based firms react most easily to performance incentives to innovate the performance of their product;
3. Especially specialised suppliers are most sensitive to demand from their clients;
4. Scale intensive firms can make the most impact by spreading their new innovations in their own supply chain, followed by science based firms.
5. Science based firms firms can make the most impact by spreading their new innovations towards other markets, followed by specialised suppliers.

3.2.2 The Construction industry

After the discussion of different types of markets and their innovating behavior, the construction industry and its different sub market will be examined for their characteristics and their innovating behavior.

The sub markets are the general road and rail industry, the specialised road and rail industry, the hydraulic engineering industry and the civil concrete market. These sub markets are the most relevant, because, as earlier mentioned in the introduction, the civil constructions, coastal works & fairways and the road constructions have the most impact on CO_2 production (see: figure 1.1). The fourth product category which also has a major impact is the building site and its logistics. However, about these belonging products, no figures have been found.

Before the different sub markets will be discussed, innovation in the general construction industry will elaborated upon. The construction market is divided into many different sub markets, of which a few will be described later. The type of companies active in the Western European construction market are many small and medium sized construction companies (1 - 50 employees, family-owned), including a few large enterprises [Pries & Janszen, 1995]. The Netherlands has 30 large construction companies with more than 1,000 employees [Arnoldussen et al., 2017]. Because of their size, most of the contractors are focused on projects within their own region [Seaden & Manseau, 2001].

The competition within the sector is severe and mainly focused on price, which leaves little room for product differentiation or other innovation strategies [Pries & Janszen, 1995], although the focus on the lowest price slowly gets less intense; environmental concerns are being incorporated more often [Ministerie van Infrastructuur en Waterstaat, 2021]. Other factors hinder innovation as well. From the perspective of market parties, an innovation is only valuable, if they can return the investment within the same project, or if they can also apply the innovation in other projects [Arnoldussen et al., 2017]. This, because of the unique character of the projects. Besides, the margin of profit on projects is relatively low, which makes contractors risk averse in developing and applying innovations [Arnoldussen et al., 2017].

Therefore, the business proposition of construction companies doesn't include a focus on product innovation. They dedicate little money to R&D expenditures to improve or substitute their products [Seaden & Manseau, 2001]. However, even if there would be more product innovations, the diffusion of these new products would be low, because of the short term relationships with their supply chain partners, which don't foster learning and the diffusion of innovation.

Because of these characteristics, the general construction industry is mostly being perceived as non-innovative [Davis et al., 2016] and as supplier dominated. The construction industry has little focus on learning, research & development and collaboration for product innovation. Besides, it also has a strong focus on the lowest price [Pries & Janszen, 1995]. However, in the past, several innovations have been succeeded within this supplier dominated sector. The question than is, how did these innovations succeed? In order to structure the factors motivating innovation within the construction industry, Winch created a model dividing the construction market into three levels: the superstructure, the system integrators and the infrastructure [Wamelink & Heintz, 2015]. In figure 3.3 the belonging organisations are being visualised.

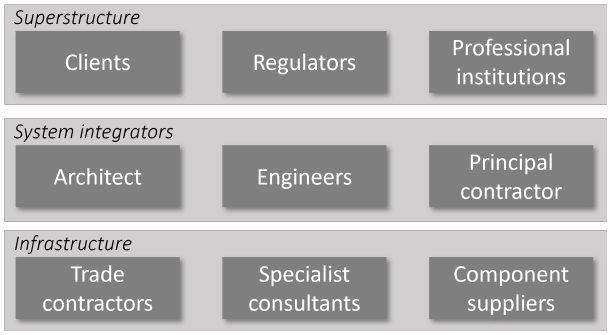


Figure 3.3: Winch's model of innovation structures in the construction industry (Winch, 1998)

The superstructure is responsible for specifying the demand, setting the boundaries with regulations and supply knowledge processes and tools to the system integrators. The system integrators assemble complex system products, make use of the products which are being supplied by the companies within the infrastructure level [Wamelink & Heintz, 2015]. On the infrastructure level, there is often no

initiative towards innovation [Wamelink & Heintz, 2015]. The main motivators for innovation in the construction sector are the parties within the superstructure. With innovations in the past, they only were being diffused within the industry if important clients formulated a clear demand. The system integrators were the first parties to react to this demand by starting some pilot projects, later on the infrastructure client react to the demand [Wamelink & Heintz, 2015].

Relevant sub markets
The construction industry is not one entity, it has many different sub markets in which innovation can take place [Pries & Janszen, 1995]. In order to check if this attitude towards innovation also can be generalized for the different sub markets, some relevant sub markets will be pointed out. Relevant sub markets will be defined as markets in which impact can be made with the buyer groups. This, because creating impact is the Dutch main goal for sustainable procurement (MVI) program [Ministerie van Infrastructuur en Waterstaat, 2021]. Concerning the CO2 emission, road surfacing, coastal & fairway maintenance and construction works are the three most polluting sub markets [Ministerie van Infrastructuur en Waterstaat, 2020]. When these sub markets are compared towards their amount of revenue, the road and rail industry also gives the largest contribution, with 58% of the total revenue in 2018 [Visser & Nicolas, 2020], followed by the civil concrete market, which generates 27% of the revenue. Coastal and shore works are responsible for a small share of 2% [Visser & Nicolas, 2020]. These numbers differ per year, however it more or less indicates the size of the different sub markets. These three sub markets will be elaborated upon in the following. However, in the case study their won't be a Buyer Groups with a focus on hydraulic engineering, because it doesn't exist yet.

3.2.3 Sub market: Road & Rail industry

The Dutch economic institute for the building industry (EIB) distinguishes two markets within the road and rail sub market; the general road and rail industry and the specialised road and rail industry. The specialists apply marks, nuisance walls, guiderails, mouldwork and similar objects to the roads [Groot et al., 2012].

The general road and rail industry
The general Dutch road and rail industry has many small firms. Only 5% of the firms has a substantial size. Around 70% of the contracting authorities is a full public party, of which the biggest share belongs to the municipalities [Groot et al., 2012]. The focus of the innovation opportunities is on internal business processes. Although, some also see opportunities for product innovation. The main goal of the innovations is to improve the price/quality ratio [Groot et al., 2012].

The relative small size and the focus on process innovations indicate the market structure of supplier dominated.

The specialised road and rail industry
Around 35 companies are part of the specialised road and rail industry [Groot et al., 2012]. Some of these companies are part of a bigger concern. In 2011, half of the revenue was generated within an integral project with the sister company. Around 20% is being executed for another contractor and in the remaining cases, a direct contract with the client has been set up. These different relations with clients, result in different roles for the specialists. With a direct assignment, the influence on the project could be the highest. The type of specialist work also matters; activities influencing the (Economic Most Advantageous Bidding) EMVI-criteria, like traffic measures, generally create more opportunities to innovate [Groot et al., 2012]. However, overall the majority of the specialists think they have limited influence on projects. The influence does increase if they are involved from the beginning of the project. The focus of their innovations is a mix of process and product innovations. The suggested process innovations are however not focused on (price) efficiency, but on creating more support and influence for specialist to increase the quality [Groot et al., 2012]. Therefore, the specialist industry can be compared with the specialised equipment suppliers, although the focus on the quality of the product decreases when the specialist isn't directly hired by the client. Especially, divisions from a large contractor can have influences of a supplier dominated firm.

3.2.4 Sub market: Hydraulic engineering

The hydraulic engineering sector contains, amongst others, firms within the dredging, coastal and shore and civil concrete sub markets. The market is formed by a large group of small and medium sized regional dredging companies, a few big hydraulic departments of the large contractors and two global players. The market share of the international companies is growing, at the expense of the small businesses [Groot et al., 2016]. The demand is being posed by the regional waterboards. The connection between the waterboards and the suppliers is relatively good, compared to other client-supplier relations in the construction industry. Market parties are being contacted early in the processes and there is a certain level of trust. In 2014, the first market vision was being presented, stating the waterboard's ambition for the water sector. A few years later, the market vision was being revised in collaboration with market parties and branch organizations. However, the translation of these ambitions into specific purchasing requirements is lacking. Besides, there is no uniformity among the waterboards; their knowledge, expertise, commitment and investments differ. The current risk distribution also hinders innovation, according to the contractors [Groot et al., 2016]. Innovations which are being implemented have a mixed focus on product and process. With sustainable accountable tender criteria (EMVI), it is tried to shift the focus from a single focus on the lowest price to also incorporating quality within tender criteria. However, the price incentive is still the most influencing factor [Groot et al., 2016].

Because of the sizes of the companies and the focus on the lowest price the most suitable market form would be supplier dominated, although the focus on in-house product development is increasing because of changing tender requirements.

3.2.5 Sub market: Civil Concrete industry

The civil concrete sector is executing the construction and maintenance of construction works for the road, rail, water traffic and water cleaning sub sectors. In 2011, the sector contained 30 companies [Groot et al., 2011]. Around 50% is categorized as a small construction firm with a revenue of less than 30 million, a quart of the companies produces for 30 to 140 million per year and the last quart produces more than 140 million. The two biggest clients are Rijkswaterstaat and ProRail, who together procure 40% of the assignments. Other decentralized public authorities give order for another 35%. The civil concrete sub market executes larger projects than average in the construction industry [Groot et al., 2011].

As a result of the integrated contracts, civil concrete companies all have some experience with designing. However, there is little focus on the creation of new initiatives [Groot et al., 2011]. Barriers for innovations in this sub market are: a bad preparation of the contracting authority and the high level of risks for contractors. Even the integrated contracts didn't boost innovation, because of the predefined execution manner and the stiffness of contracting authorities concerning innovative ideas [Groot et al., 2011]. The ambition of contractors is to develop new initiatives, especially regarding maintenance activities. The focus is more on process innovation, than on product innovation [Groot et al., 2011].

Therefore, the sub market of civil concrete can be characterized as a supplier dominated market, but compared to the other two sub markets, this market also has similarities with a scale intensive market; the scale of the projects is the largest in this sector, there are relatively few small companies and some innovations are being produced in-house.

Summary
The level of innovation within all (sub) markets is low. The general construction industry can be characterised as an supplier dominated sector, because of the many small companies, its lack of learning, research and collaboration tot stimulate product innovation and its strong focus on price competition. The relevant sub markets, which have the highest impact on the level of sustainability, are the road and rail market (general & specialised) and the civil concrete market. The general road and rail market is a supplier dominated market. The specialised road and rail markets has specialised equipment firms and supplier dominated firms. The role depends on the level of influence they have on the design per project. The civil concrete market has characteristics from the supplier dominated market and the scale intensive market.

Propositions for the interviews:

1. In a supplier dominated market system integrators need to be triggered by a clear demand in order to start the development of an innovation;
2. In a supplier dominated market the infrastructure doesn't initiate innovation, they only follow their system integrators.

3.3 BARRIERS FOR INNOVATION FOR CONSTRUCTION COMPANIES AND SUPPLIERS

In order to reach the sustainability goals for 2030 and 2050 the construction sector needs to transition. As being seen in the previous section, the construction sector and its sub markets aren't very innovative; there is a high focus on the business economic benefits and a minor focus on product innovation. In the following section, the reasons for the slow transition will be mentioned; the barriers to step up the innovation game will be discussed. This section is part of answering sub question 2 and it creates more insight in what innovation barriers, clients can help to overcome in order to get away from the status quo. First, the barriers which are a result of the internal structure of the construction market will be mentioned, followed by other external barriers influencing the development of innovation within the construction (sub) markets. The addressed barriers are the ones which were mostly stressed by the literature which was being read.

3.3.1 Construction specific barriers

The construction industry itself has some specific barriers for innovation. This is due to the nature of the construction works, the focus on delivering projects, the uniqueness of every project, the relations within the supply chain and the management of information.

Barrier 1: the need for a robust design creates suspicion towards unproven innovations
Construction works are often large, long lasting and complex. These are not optimal characteristics for innovation. The first characteristic, the large physical size, makes it hard to build and assemble under controlled circumstances, which is needed for some innovations [Slaughter, 1998]. Secondly, the life time of construction works is often large, which requires a low chance of failure and several possibilities for modification [Slaughter, 1998]. The last characteristic, the interdependence with the environment and other systems, increases the chance of disruption when an innovation is being implemented [Slaughter, 1998]. Because of these characteristics, proven methods are often preferred over innovations.

Barrier 2: loose supply chain relations and a project focus hinder knowledge creation and diffusion intra- and inter-firm
Long-term relationships and adaptations beyond individual construction projects are necessary to foster learning and innovation [Dubois & Gadde, 2010]. However, the relations between contractors and other supply chain partners are loose, because of the temporary nature of projects, which offer no guarantee for future collaboration. In addition, the different activities, like designing, fabrication and building, are often strictly distinguished among the different parties, also hindering the diffusion of knowledge [Arnoldussen et al., 2017]. Manufacturers, for example, develop standardized products with which other parties have to deal with. On another lever, the intra firm level, there is also limited space for knowledge sharing between different divisions, because of the main focus on projects results. Often, the time lacks to pass through valuable information. Next to these loose connections, many alternative solutions are being made location specific, which also hinders the diffusion of innovations [Dubois & Gadde, 2010]. In conclusion, this pattern of tight and loose couplings, seems to favour short term productivity within a project over learning, sharing knowledge and innovating for the long term [Arnoldussen et al., 2017].

Barrier 3: (uncertain) return on investment (within one project)
A third barrier is the high costs of developing a new product. Those high costs arise because of technology path dependencies, lock-in effects and high entry costs in some markets [OECD, 2011]. Besides, the benefits of an innovation doesn't always lead to an economic benefit for the initiator. Often the innovation brings more risks, resulting in an uncertain revenue. Secondly, it can also be hard to internalise revenue and benefits, because the benefits of an innovation can fall apart to another stakeholder [Arnoldussen et al., 2017]. In order to have a good return on the investment, a higher scale of demand on the innovation can be helpful to spread the innovation costs. However, scaling possibilities

are often limited, because of the many unique projects within the construction industry [Arnoldussen et al., 2017]. Therefore, an investment is often tried to be earned back within one project, which is not realistic for many innovation.

3.3.2 External barriers

Besides the characteristics of the construction industry itself, boundaries created by the external environment also influence innovation.

Barrier 4: building regulations ask for compliance and hinder innovation
One of the main external barriers for innovation opportunities are the codes and regulations prescribing the quality for construction works [Pries & Janszen, 1995]. Because of safety concerns, the load of norms and laws is intense [Arnoldussen et al., 2017]. Furthermore, the incentive to change the norms is beneficial for consultants and the legislature, but it is hindering the consistency in laws, which demotivates innovation [Arnoldussen et al., 2017]. The amount of regulations have also resulted in a focus of contractors to comply with these codes, distracting the focus on clients' wishes [Pries & Janszen, 1995].

Barrier 5: shifting political priorities creates uncertainty
Another environmental influence is the political cycle of four years, which results in short term policies and varying budget available for the different sub sectors. These cause dynamics in the market volume of the sub sectors and uncertainty of demand [Visser & Nicolas, 2020] [Arnoldussen et al., 2017]. This effect is dominantly present, because more than 80% of the total revenue is being derived from assignments for public clients [Pianoo, ob]. This discontinuity in volumes of the sub sectors, and the uncertainty as a result of it, hinders the formulation of a strategical vision which can stimulate innovation [Visser & Nicolas, 2020].

Barrier 6: the risk-averse attitude of contracting authorities hinders the adoption of unproven innovation
The attitude of contracting authorities can also hinder innovation [Edler et al., 2015]. A risk-averse attitude, a preference for short-term budgetary considerations over long-term goals, a mismatch between the people writing political ambitions and those executing policies, minor communication about future needs, executing bureaucratic tender procedures and demanding solutions with rigid requirements are all examples of the public way of working, hindering innovation [Edler et al., 2015]. Specifically for the construction industry, the risk averse attitude with the highest impact is that clients are restraining to adopt an unproven innovation [Arnoldussen et al., 2017]. This can also be deducted to the low transparency of product performance, making it unclear whether a product or an organisation is reliable to work with [Arnoldussen et al., 2017].

Barrier 7: barriers within procurement, like: too much emphasis on the price
Within procurement procedures, suppliers also experience barriers for innovation (see: figure 3.4). These are: too much emphasis on the price and a restraining attitude from new alternatives. Too much emphasis on the price can be caused by a risk averse attitude of the contracting authority, however there is also a lack of transparency in product specifications and performance, making it harder to judge the best qualitative offer [Arnoldussen et al., 2017]. A restraining attitude from new alternatives is a barrier bundling underlying barriers, which are: no interaction to explore new variants from (other) suppliers, opting for the proven method, prescriptive specifications, no uniformity among the specifications and a strong focus on equal treatment of participants [Edler et al., 2015] [Groot et al., 2012] [Arnoldussen et al., 2017]. The lack of interaction among suppliers and clients will be further mentioned as barrier 7.1.

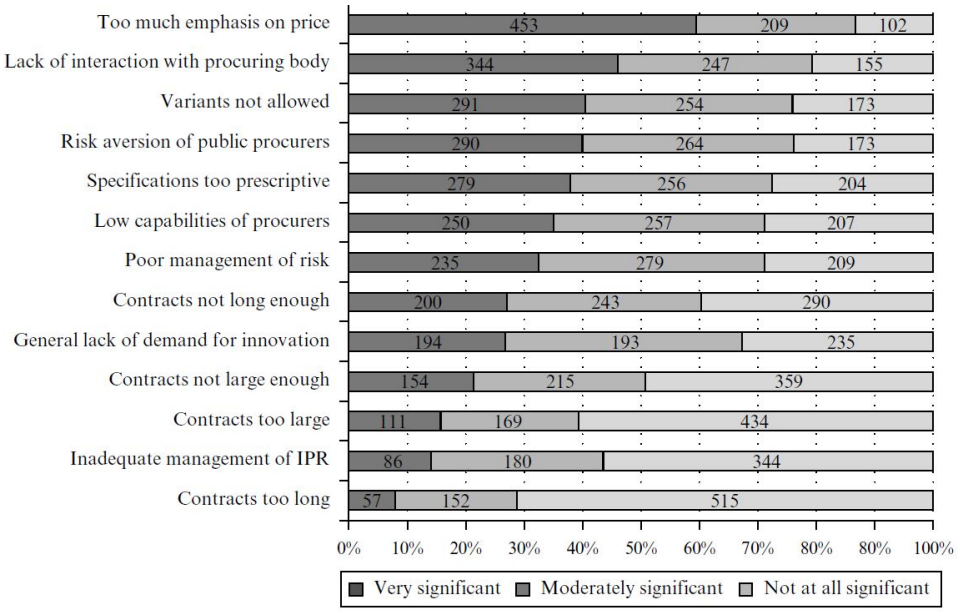


Figure 3.4: Experienced barriers for innovation within procurement procedures by suppliers (Edler, Georghiou, Uyarra, Yeow, 2015)

Another barrier within procurement mentioned by Arnoldussen et al. is the lack of uniformity within the tender requirements and the used definitions.

Barrier 7.1: a low level of interaction between clients and suppliers leads to a mismatch of products and (future) needs
The low level of interaction between suppliers and their clients is one of the three characteristics making the European market innovation unfriendly [OECD, 2011]. Some clients don't exactly know what their needs are, or they aren't in the position to communicate them. Therefore, products are being developed which don't match the user's preferences. On the other hand, the lack of interaction also results in insufficient knowledge at contracting authorities on the innovations which are already present in the market [OECD, 2011]. Sometimes solutions to problems already exist, but are not being demanded or purchased because the lack of interaction and knowledge. Besides, better knowledge of market innovations could also result in more realistic requirements and selection criteria in the procurement process. This problem, and its possible solution will be further explored in paragraph 3.5.

3.3.3 The Buyer Group as a reaction to (some of) these barriers

The aim of the Buyer Groups is to harmonize their demand to write a market vision, which can indicate a future technology direction. In order to reach such vision, a purchasing strategy will be written as well. During this process, the market will also be consulted. These four elements of the Buyer Groups can potentially overcome several of the innovation barriers; mainly, the third, fifth, sixth and seventh barriers (see: figure 3.5):

- Barrier 3: with indicating a desired future, certain innovation alternatives are being denied and some are being highlighted. Therefore, the uncertainty of future demand decreases for several innovations, which gives a higher chance on a return of investment. Besides, the involvement of multiple clients, makes it more likely, that an innovation doesn't need to be returned within one project;
- Barrier 5: the shifting political priorities, the national budget will still vary over the years, but this effect can be reduced if other contracting authorities will have an opposing, widely supported, consistent policy with a long horizon;

- Barrier 6: the risk-averse attitude of contracting authorities will decline with the formulation of a vision and a strategy and the communication of this towards the market. Besides, contracting authorities can incorporate a collective knowledge sharing about the technical product specifications of new alternatives. A third aspect, which can reduce the risk-averse attitude is the market consultation. More transparency in product specifications and life cycle information can reduce the risk averse attitude;
- Barrier 7: concerning the barriers in procurement the buyer groups can stimulate by exploring or shifting towards less traditional criteria or procurement methods within their market vision. Besides, the interaction with the market can be improved by, for example, market consultations.

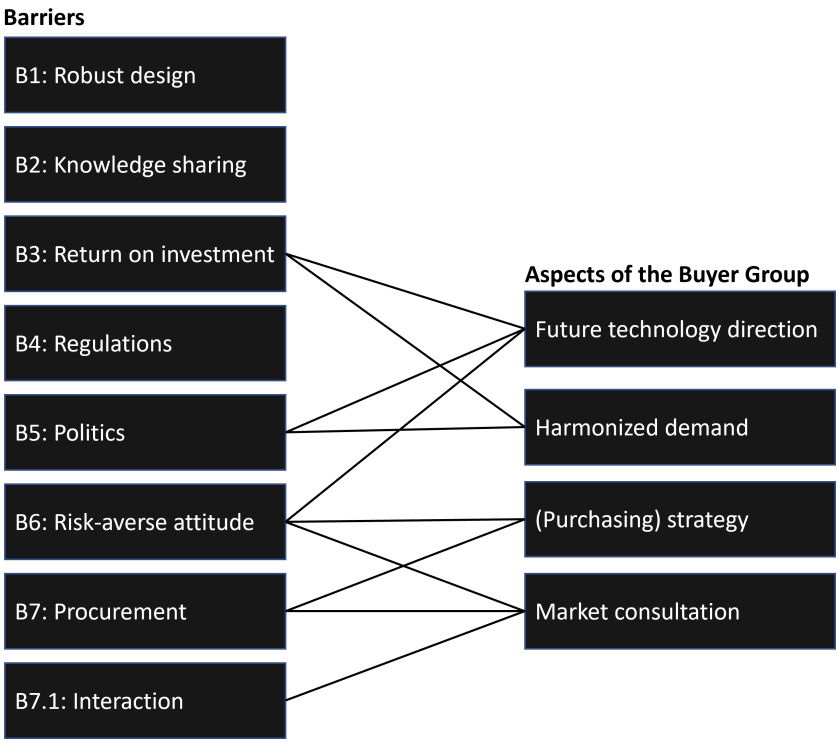


Figure 3.5: Overcoming barriers with the Buyer Groups (own figure)

The other barriers aren't directly addressed with the Buyer Groups. However, in order to be most effective, these barriers also need to be tackled, one way or the other.

- Barrier 1: because of the robust design, the Buyer Groups within the construction sector will have to take into account that it can take a while for some innovations to have a proper level of quality for implementation;
- Barrier 2: there is little knowledge sharing and collaboration within the construction industry. Therefore, the Buyer groups also have to give special attention to the stimulation of innovation in the entire supply chain, and over different projects;
- Barrier 4: contracting authorities aren't responsible for regulations. However, the Buyer Groups can only stimulate innovation if all barriers can be overcome. Therefore, it can be an opportunity, if a Buyer Group with a sufficient extent, can lobby for a change in regulation.

Questions for the interviews

1. What barriers hinder the most and does this differ per type market?

3.4 APPROACHING THE TRANSITION

The construction sector needs to transform in order to reach the sustainability goals for 2030 and 2050. In order to do so, the construction companies and their suppliers need to innovate their products. However, the construction industry and its sub markets are conservative and experience many barriers to innovate. Barriers, resulting from the structure of the construction industry and from external parties. The Buyer Groups have the potential to overcome some of these barriers and to step away from the status quo. However, in order to make the transition, the industry needs to be steered towards the desired future state. To give more background on how the Buyer Groups can do so, two transition theories well partly be mentioned. This paragraph is part of the answer to sub question 2 about persuading market parties to innovate.

As being described in paragraph 3.1, in order to fundamentally change (a subsystem) of society, a transition needs to take place to change perceptions, norms and values, social networks and interactions and power relations. In paragraph 3.1 the main thought of the transition theory has been explained. In this paragraph, it will be explored how the Buyer Groups can steer and overcome some of the innovation barriers while stimulation the transition. The central question within this paragraph is: how do we make the transition and get away from the status quo?

The transition theories are relatively new. In The Netherlands, four different transition theories have been developed. van der Minne et al. [2021] described and compared those four theories. All approaches include an active role in the transition process for (public) clients. The two approaches which will be elaborated upon in this paragraph are: 'Sustainable Market Transformation' and 'Small Wins'. These give specific starting points for contracting authorities to guide the transition processes. The other two Dutch transition approaches are 'Transition Management' and 'Innovation Systems'. These respectively focus on interventions based on the product substitution process and on the seven processes of the 'systems of innovation' perspective [van der Minne et al., 2021].

3.4.1 Transition as a multi-actor process with four stages

According to the Sustainable Market Transformation of Simons & Nijhof [2020] the unsustainable outcomes of markets are a result of four different processes or loops, like they call it. First of all, the market dynamics determine the behavior of parties and also how they can be rewarded and stimulated. Secondly, the enabling environment can influence these outcomes by laws and regulations. The third loop is about the question if the effects of certain acts can be redirected to the entity responsible for the initiation (internalization of benefits). Lastly, the question is being asked if there are robust sustainable alternatives, which can replace the old product or process. These loops and the system which determine the level of sustainability within different sectors is visualized and further explained in figure .4 of appendix 2. Based on the insights this model gives about the dynamics in a certain sector, policy measures can be made suitable for this particular market.

When there is insight in the rules of the game within a sector, the following question comes to play: 'How do we solve this?' The answer of Lukas Simons and André Nijhof is: by a gradual, deliberate, well-informed and well-managed process that goes through four phases of change [Simons & Nijhof, 2020]. The process of market transition, they say, is like growing up, with different goals, actions, skills and important actors for each maturity phase (see: figure 3.2). The four distinct maturity phases are [Simons & Nijhof, 2020]:

1. The inception phase: the start of this phase is often a crisis which generates awareness for the challenges. The first reaction of stakeholders on this crisis is often a denial of the crisis and its implications. However, frontrunners, on the contrary, increase the awareness and start the transition with pilot projects. At the end of this phase, the problem is being recognised and the key elements for the solution are being discovered. The aim of the inception phase is about stimulating new alternatives. Therefore, success factors are: a sense of urgency, pressure on market actors, rewarding for frontrunners, stimulating laggards and collecting lessons learned [Simons & Nijfhof, 2021];

2. The competitive advantage phase: the start of this phase is a continues confrontation with the problem, which needs a solution with more impact. Early adopters create new business models around viable alternatives and their competition differentiates their solutions. At the end of this phase, there is chaos because of the differentiation in alternatives and because of the hindering boundaries set by the enabling environment. The competitive advantage phase is influencing the market dynamics. Success factors are: competition, rewarding early adopters with advantages, chase laggards and setting a future direction [Simons & Nijfhof, 2021];

3. The pre-competitive collaboration phase: after the competition phase in which numerous alternatives are being developed, a sense for collaboration is increasing because the problem is getting bigger. There is a willingness to scale up, to co-create, to design a vision, to agree on targets and to take responsibility. Barriers to scale are being removed, roles are clear and the scaling can begin. At the meantime, laggards are increasing the resistance. The pre-competitive collaboration phase addresses the enabling environment. Success factors are: multi-stakeholder collaboration on neutral platforms, plenty of resources, enhanced commitment and trust, lobbying and leadership on all levels [Simons & Nijfhof, 2021];

4. The institutionalisation phase is a crucial moment for political leadership. A critical mass is ready for change and laggards who are not adopting, are going to be hurt. At the end of this stage a new normal is in place, or the next crisis is already present. The institutionalization phase is about matching the resulting benefits to the initiator. Success factors are: a well-organized lobby in favor of change and political leadership [Simons & Nijfhof, 2021].

In order to become mature, all stages have to be covered sequentially. The main thought behind this transition perspective is that changes will be made when the right behavior is being rewarded. The industry, governments, NGOs, financial institutions and research institutions are being seen as key actors within this process. Their role for each party in each stage is mentioned in figure 3.2.

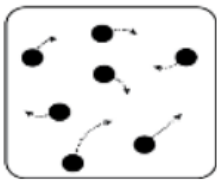
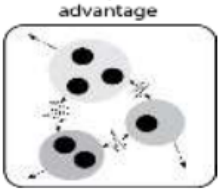
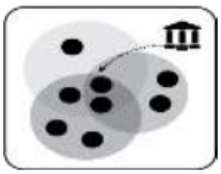
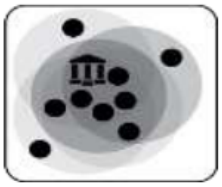
The stakeholder matrix© from Changing the Game (2021) – Lucas Simons & André Nijhof	1. Inception 	2. Competitive advantage 	3. Pre-competitive collaboration 	4. Institutionalization 
Industry	• Stop denying the issue • Partner with NGOs • Pilots, CSR projects • Identify solutions	• Business models • Use labels • Engage value chains • Rankings and benchmarks	• Communicate a non-competitive agenda • Join platforms • Be inclusive • Sector strategy	• Lobby new normal • Recognize politicians • Comply legislation • Take on subsequent issues
Government	• Embrace the crisis • Long-term vision • Experiments and fund projects • Solution principles	• long-term vision • Challenge companies • Launching customer • Recognize leaders	• Develop measures • Support platforms • Influence behavior of consumers • Tax incentives	• Political leadership • Announce legislation • New normal • Remove the laggards
NGOs	• Raise awareness • Join projects • Campaign against laggards • Argue for next steps	• Reward first movers • Support frontrunners • Name and shame • time to move on	• Engage frontrunners • Join platforms • Be a watchdog • Transparency about desired future	• Lobby • Policy developers • Monitor progress • Shift attention to new issues
Financial Institutions	• Donate to charity • Finance projects • Apply negative screening • Clear positioning	• Provide funding • Financial benefits • Engage all clients • Best-in-class screening	• Join platforms • Collaborate • Create financial solutions for scaling • Invest long-term	• Lobby • Investment criteria • Exclude clients • Potential risks linked to new issues
Research Institutions	• Prioritize issues • Study system loops • Study practices • Identify good practices	• Showcase good practices • Investigate failures • Develop benchmarks • Research agenda	• Change agenda • Be objective • Calculate potential impacts • Scientific evidence	• Provide overview • Argue policies • Monitor impact • Identify new and emerging issues

Table 3.2: Maturity stages in the transition process (Simons, Nijhof, 2020)

All actors play a role in each stage. However, within the inception phase the center of gravity is with the front runners in the industry. They are the ones who have to start experimenting and have to explore new technological alternatives. For the Buyer Groups, the role of the Government is the most important, because contracting authorities within the construction sector, are mainly public clients. During the entire transition timeline, the role of clients and governments get more and more important. In the second phase the most important question is: 'What is the market rewarding?'. Governmental organisations can be instrumental by being the lead user, incorporation sustainable criteria in tenders, recognize first movers and continue to highlight their future vision [Simons & Nijfhof, 2021]. Towards the third precompetitive collaboration phase, clients should stop buying products from laggards, focus with all means on the desired future, stimulate collaboration and remove barriers to scale up [Simons & Nijhof, 2020].

The role of the Buyer Groups within the four transition phases

With these stages and the role of the government in mind, the question is: when can Buyer Groups play an important within this process? The purpose of the Buyer Groups is to make impact and thus to scale up working innovative solutions. Practically, this means that the Buyer Groups are there to guide innovations from the inception phase, through the competitive advantage stage, towards the third scale-up, and the fourth institutionalization stage. Therefore, it would make sense to start Buyer Groups within sectors in which there is already a breeding ground with a sense of urgency and some parties who already started experimenting with alternatives. The main impact can probably be made within the competitive advantage stage; the first initiators are trying innovative solutions and the competition of

early adopters is differentiating. The Buyer Groups can help the industry with developing alternatives by recognising, challenging and rewarding the frontrunners [Simons & Nijhof, 2020]. This can be done by putting the market vision and strategy into practice and by clearly communicating their long-term vision. Within the pre-competitive phase, more systematic measures are needed, which go further than the buyer - supplier relationship. Taxes, consumer behavior, collaboration with knowledge and financial institutions, the industry and other contracting authorities are necessary to delete barriers for all parties to come on board and make a collaborative impact within the system [Simons & Nijhof, 2020]. Therefore, the Buyer Groups can't just focus on their own market vision and strategy, they also need to cooperate with the industry and research and financial institutions to fulfill the transition. For the fourth phase, the buyer groups can help with the institutionalization and the monitoring procedures.

Thus, in summary, the Buyer Groups should start in sectors with a sense of urgency, be a lead user, reward frontrunners and set a direction with their market vision in the second stage and towards the third phase the Buyer Groups should practice what they preach, attach other clients to their market vision, while also trying to remove barriers from the enabling environment by collaborating with knowledge and financial institutions and the industry. In the fourth phase they can help the government with institutionalizing the new way of working.

3.4.2 Transition by an accumulation of Small Wins

Being a lead user, reward frontrunners and set a direction with their market vision are specific actions. However, the second transition theory, the Small Wins approach gives some more detailed directions on how to perform these activities. The transition theory 'Small Wins' aim to continuously move the process forward with a continuous process of small changes (small wins). The Small Wins ought to be more innovative and radical than quick wins and best practices, because the aim is to deeply change values, institutions and systems [Termeer & Dewulf, 2017]. Small Wins can be recognised by its tangible results for direct stakeholders and by its power to overcome corresponding resistance and barriers [Termeer et al., 2019]. Because one Small Win can be executed relatively unnoticed, the Small Wins approach is also appropriate for systems with a high level of resistance, like, for example the conservative construction market.

The Small Wins approach suggests three groups of intervention measures to stimulate the initiation, the spreading, the widening and the deepening of Small Wins [Termeer et al., 2019]. These three groups of intervention measures are: 1.) Formulating, maintaining and improving a provocative ambition; 2.) Recognising, valuing, provoking and initiating small wins; 3.) Understanding and activating drivers. [Termeer et al., 2019]. Because this research mainly focuses on stimulating market parties with a market vision, just the first intervention measure will be elaborated upon.

Formulating, maintaining and improving a provocative ambition
An provocative ambition is important for encouraging people and creating commitment. The challenge in formulating such an ambition is finding a balance in focus. Too much or too less focus can lead to paralysis of the market parties [Termeer et al., 2019]. A good provocative ambition represents a desired future, steers, challenges the status quo and is embedded in the way of working of the sector. Table 3.3 shows these four characteristics, including its (contra-) indicators [Termeer et al., 2019].

Characteristics provactive ambitions	Indicator	Contra indicator
Represents a desired future	• Positive and clear framing • Has meaning • Connects people with a higher goal • Is doable to reach	• Doom scenario • Focus on the unpreferred future
Steers, without hindering innovation	• Ambiguity • Inspires varying people to different actions	• Detailed (sub)goals • Roadmap to reach the ambition
Challenges status quo	• Stimulates reflection on current values, believes and routines • Organises resistance and discomfort	• Disconnected from the current situation • Comfortable and safe
Embedded	• Incorporation of best practices	• Abstract

Table 3.3: Four characteristics of a provocative ambition, with its (contra-)indicators (Termeer, Dewulf, Metze, Wiegant, 2019)

An important side note is that a provocative ambition always will be formulated with many different actors. Therefore, the challenge is to inspire a great bunch of these varying actors [Termeer et al., 2019]. Another author, writing on specific details of ambitions, is saying that especially long term visions, stretching beyond four years, can create stability and thus, a beneficial investment climate [Arnoldussen et al., 2017].

Propositions for the interviews

1. The needs of market parties from contracting authorities is different in each phase of the transition process;
2. The Buyer Groups can only make a difference when there is already a sense of urgency;
3. The main impact can be made in the competitive advantage stage, followed by the pre-competitive collaboration phase;
4. The Buyer Groups can steer in the competitive advantage phase by being the lead user, create a long-term vision and recognise leaders
5. An ambitious market vision needs to represent a desired future, needs to steer and overcome barriers, needs to challenge the status quo and needs to be embedded;
6. In markets with much resistance, stimulating small wins is most effective.

3.5 INTERACTION BETWEEN CONTRACTING AUTHORITIES AND SUPPLIERS

One of the main innovation barriers within the procurement procedures, is the lack of interaction between suppliers and their clients. Therefore, the Buyer Groups also incorporated contact with market parties as an element within the design of the Buyer Groups. In this sub paragraph, first the reason behind the necessity of more market contact will be further explained. Furthermore, in the second sub paragraph, the concept of preliminary market consultation is being explained based on the existing codes and legal principles. The fitting of market consultations within the Forward Commitment Procedure will be elaborated upon, because this is the only formal procurement procedure with an embedded market consultation. Different ways of performing market consultations and the lessons learned from the Big Buyer Initiative will also be mentioned in the second sub paragraph. The third sub paragraph is about the role of intermediating parties, who might be in the position to smoothen the conversations between clients and market parties. Theory on intermediation is being incorporated because of the role of the coordinator and the involvement of consultants in the Buyer Groups. At last, another form of conversation is being mentioned as well, namely a platform with solely suppliers. This is being mentioned, because such a form could be useful in some phase of the transition process and because PIANOo is also investigating Buyer Supplier Groups.

3.5.1 The necessity of early market contact

Often, a discrepancy exists between clients' needs and the capacities of their suppliers [Edler & Georghiou, 2007]. This discrepancy has several causes; on the one hand, contracting authorities often lack essential knowledge on the (future) capabilities of suppliers and therefore don't adapt their needs to the (future) opportunities, while on the other hand, suppliers hamper in giving early signals to their clients. This often results in supply chains which aren't capable of meeting the future demands [Edler & Georghiou, 2007]. Based on these problems more interaction among suppliers and clients is being suggested as a solution. The sooner this interaction, the better it stimulates innovation. In figure 3.6, Edler et al. [2015] asked suppliers from different sectors about the influence of different demand measures on their encouragement for innovation. Their answers indicate, among others, that early interaction between suppliers and their contracting authorities is a better stimulus for innovation than interaction during the procurement process in the form of a competitive dialogue or negotiated tender [Edler et al., 2015].

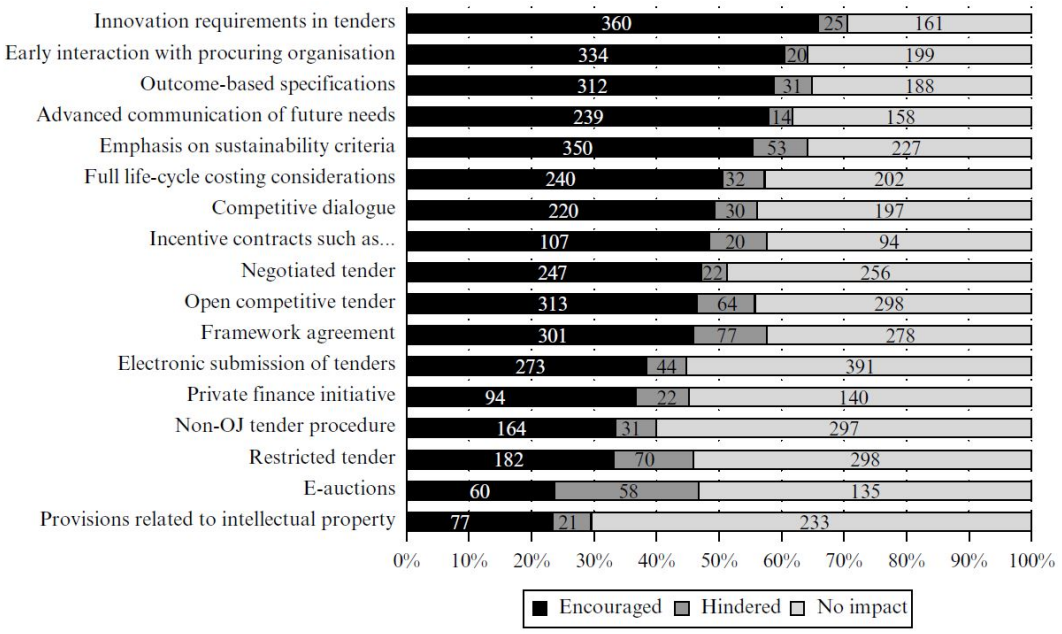


Figure 3.6: The impact of various procurement methods on innovation (Edler, Georghiou, Uyarra, Yeow, 2015)

The reason for early conversations to be fruitful for innovation, is because of their character of ambiguity. Markets for innovation still have to be formed and directed. Conversations with actors from different backgrounds could be a breeding ground for innovative ideas, shaping these markets [Uyarra et al., 2017].

3.5.2 Preliminary market consultations

The institutionalised conversation with suppliers and contracting authorities is called the preliminary market consultation, which has been covered in Directive 2014/24/EU article 40 of the European Parliament and Council [Lenderink et al., 2019] and sideways being mentioned in the Dutch procurement law (Aanbestedingswet). A market consultation is an organised information exchange, with interested parties for a planned tender [PIANOo, 2016]. The aim of a market consultation is to gather information on the capacity, capability and willingness of the supply chain to deliver an innovative solution. This information can be used to optimise the specification of the requirements and the award criteria [Big Buyers Initiatives, 2020a]. Besides, it also helps contracting authorities in determining the appropriate level of ambition, when it comes to the effectiveness of the contracting authority's ambition [Big Buyers Initiatives, 2020a]. Thirdly, the interaction can also provide procurers with information on other innovation barriers for suppliers, like juridical barriers. The thought is that, if potential suppliers are included in such formulation and translation processes, the likelihood is higher to define demands concretely enough to be fulfilled by the industry in the future [Edler & Georghiou, 2007]. Market parties benefit from the consultation by gaining extra information on clients' future needs, through which their innovation risk decreases [Lenderink et al., 2019].

In short, the obtained information about the capacity, capability and willingness of the supply chain can help in optimising the tender requirements, setting the appropriate level of ambition and help in identifying barriers. To give something back, contracting authorities have to give more insights in their future needs and plans.

Legal principles
The legal principles which have to be obtained in the process of consulting the market are the principles of 'transparency' and 'non-discrimination'; the competition position while tendering needs to be equal for all suppliers, whether they did or did not participate in the consultation [European Commission, 2018]. But, any client who ensures that the given information is equal for everyone, gives enough time to place a bid, doesn't show any preference and makes agreements upfront about the confidentiality of competition-sensitive information can, in principle, exchange all wanted information [PIANOo, 2016].

Market consultation within the Forward Commitment Procurement
The procurement procedure of Forward Commitment Procurement embeds market consultations within its process. The Forwards Commitment Procurement aims to decrease the 'Valley of Death', in which there is too limited (financial) support from clients in the middle of the product development process. The solution of Forwards Commitment Procurement is credible articulated demand and guaranteed future sales. The method covers three stages: 1.) Identification of the needs to create backing support within the entire contracting authority; 2.) Market engagement; 3.) Procurement [Whyles et al., 2015]. The methodology therefore also aims to get a better focus from contracting authorities on formulating their needs. To engage the market, the method prescribes two options: a market sounding and a market consultation. The market sounding involves remote consultation with the use of a response form, while the market consultation involves direct contact [Whyles et al., 2015].

Different forms of market consultations and market contact
As being seen in the Forward Commitment Procurement procedure, market contact can be performed in different variations. The level of interaction can differ, but also the way of contacting can vary. Apart from the method of Forward Commitment Procurement, Veekman & van Loon [2021] distinguish five different forms of market contact with the all different levels of interaction:

Market analysis - Market exploration - Market scan - Market dialogue - Market consultation

In respective order of the lowest level of interaction with the market towards the highest level of interaction. Market analysis is paper work. For a market exploration or scan also some meetings can be attended. A market scan might be compared to the market sounding. Market dialogue is a conversation with one or more market parties and a market consultation is also about asking for feedback while trying to incorporate the situation in the entire industry [Veekman & van Loon, 2021]. The form of contact depends on the needed information and the level access to this needed market information.

Also, market consultation can be executed in various forms: open or closed, written or oral, one-on-one conversations or an interactive consultation [PIANOo, 2016]. With an closed consultation the parties are thoughtfully selected upfront. This can be beneficial for situations in which the question is very specific. With an open consultation, the chance is higher to get notified for new potential solutions. Written consultations can occur when the questions are relatively easy and interaction is not preferred. Oral consultations can be useful for complex or sensitive subjects. A disadvantage of interactive oral consultations is the possibility for a more chaotic capturing of information for the report. It is also possible to perform multiple forms. For example, first a written consultation and then an oral consultation [PIANOo, 2016].

Lessons learned from the Big Buyer Initiative
The European Big Buyer Initiative dealing with Heavy Duty Electrical has already shared some of their experiences. The market consultation of the European Big Buyer Initiative dealing with Heavy Duty Electrical was going in-depth on the specific product characteristics. A systemic market consultation with a set of standard questions suited such a consultation and it provided a convenient comparison of the products [Big Buyers Initiatives, 2020b]. Furthermore, they experienced that technical specifications and future plans, are more likely to be shared in a physical, bilateral environment than in digital meetings with a high attendance of competitors. Their third lesson, was that suppliers were also keen to receive feedback on their products. On the product itself, but also on its effects [Big Buyers Initiatives, 2020b]. Regarding the buyers' needs, suppliers were particular interested in procurement plans for the coming five years. For such dialogues it also holds that these are easier being executed bilaterally [Big Buyers Initiatives, 2020b].

Propositions for the interviews:

1. The content of the market consultations should be about the capacity, capability and willingness of the supply chain to deliver an innovative alternative and the future needs of the contracting authorities;
2. Market consultations help in identifying the (future) needs;
3. Market consultations help with optimising the tender requirements, setting the appropriate level of ambition and help in identifying barriers;
4. Market parties expect to get more insight in future needs, plans and projects within market consultations;
5. For creating a market vision, market contact in the form of a market consultation is most desirable;
6. Open invitations create a better market overview;
7. Interactive, oral market conversations create a better market overview;
8. Digital meetings hinder the quality of the market consultations.

3.5.3 Participating parties and intermediation

Based on the goal of the conversation, a decision can be made about the invitation of the participants. The amount of participants is important, but also the type of participants. Which market parties

need to be included? Would it also be useful to incorporate scientific parties and consultants? Non-industrial partners, with no direct interest, can function like neutral network brokers to smoothen the debate [Cunningham & Ramlogan, 2012]. On the other hand, it is recommended too keep the level of diversity of participants' interests low, because different (conflicting) interests can hinder the networks outcome. Conflicting interests can slow down the process or result in a market vision which is not specific enough to motivate suppliers [Cunningham & Ramlogan, 2012].

Intermediating parties and their activities
To further elaborate on the non-industrial partners, these parties are called intermediaries and they have been increasingly recognised as an important link in co-shaping innovations [Edler & Yeow, 2016]. Intermediation enables linkages between heterogeneous actors with complementary qualities by opening up conversations, being an independent negotiator and try to reduce resistance by creating a better understanding [van Winden & Carvalho, 2019]. The importance of these linkages can be derived from the systems of innovation perspective and the focus on knowledge sharing to stimulate the generation of innovation [Edler & Yeow, 2016]. In Amsterdam's Start-ups in Residence program, intermediating parties ensured that contracting authorities reformulated their needs, language barriers were reduced, conversations took place between market parties and the clients on alternative solutions and the willingness to take risks was increased [van Winden & Carvalho, 2019]. Besides, intermediating parties can help with: "technology assessment and evaluation; arbitration and brokering; facilitating learning and collaboration in networks; managing and allocating financial and human resources; prototyping and piloting; accreditation and setting standards; attracting attention and resources; articulating visions; investment appraisal and business planning, and training, education and communication" [van Winden & Carvalho, 2019].

However, although the above role of intermediating parties seems promising, it didn't lead to many new contracts for innovations in Amsterdam. The level of knowledge was increased among all parties, however the size of the market parties (start-ups) didn't suit the challenges the city was facing. Therefore, it can be concluded that intermediating parties can help smoothen the relationship. However, in the end, the relationship itself has to be valuable to stimulate innovation.

Proposition for the interviews:

1. A market consultation is most effective with parties who have more or less the same direct interests;
2. Intermediating parties can stimulate a smooth conversation between clients and market parties, by reducing language barriers, stimulating knowledge sharing etc.;

3.5.4 Conversations among suppliers

Preliminary market consultations can overcome barriers for innovation. However, other (in)formal conversations can also serve in stimulating innovation. Whyles et al. [2015] mentioned the idea for public organisations to facilitate networking amongst suppliers, because companies almost never innovate in isolation. The development of innovations are rather being executed by inter-organization cooperation. This cooperation could be possible between organizations stemming from the same supply chain, but the cooperation can also go beyond the own supply chain [Whyles et al., 2015].

Proposition for the interviews:

1. In order to develop innovation, market parties are in need for a platform with other market parties from the own, or from other supply chains.

3.6 THE DESIGN OF THE BUYER GROUPS

An effective market strategy is going to be formulated by the participants of the Buyer Group. Therefore, these participants have an influence on the effectiveness of the market strategy. In this paragraph, first the level of innovation adoption by clients and the linked characteristics of the Buyer Group participants will be elaborated upon. Lastly, different internal roles at contracting authorities will be examined.

3.6.1 Different characteristics of buyers and their stimulation for innovation

In this sub paragraph the characteristics of the clients who suit a participation in the Buyer Group will be explored. Their attitude towards adopting innovations and the type organisations will be explored (public vs. private and national vs. local).

Different types of Buyers: the velocity of adopting innovation
In order to write an ambitious market vision, ambitious parties with a positive attitude towards innovation, are probably needed. Therefore, the Buyer Groups have to make a selection of suitable participant. When it comes to the level of adopting innovations, Rogers made a classification of five different types of buyers, ranking them according to their velocity in adopting an innovation [Rogers, 1962] [Matschoss et al., 2015] (see figure 3.7).

1. Innovators or lead users (2.5%): the enthusiastic risks takers who have faith in the new technology and are curious what is does. They can give financial support and, it would be helpful for further diffusion if they show opinion leadership;
2. Early adopters (13.5%): only adopt the innovation if, based on their own calculation, the benefits outweigh the costs. When they adopt, they have an influential communication position. They test the innovation for the majority and therefore, are key in the diffusion process;
3. Early Majority (34%): are also technology experts, interconnected within their system. However, they need a longer innovation decision time. Recommendations from the other two groups help in adopting.
4. Late Majority (34%): are skeptical. Sometimes, they adopt because of economic necessity or because of pressure from peers.
5. Laggards (16%): are traditional and many are nearly isolated in their own system.

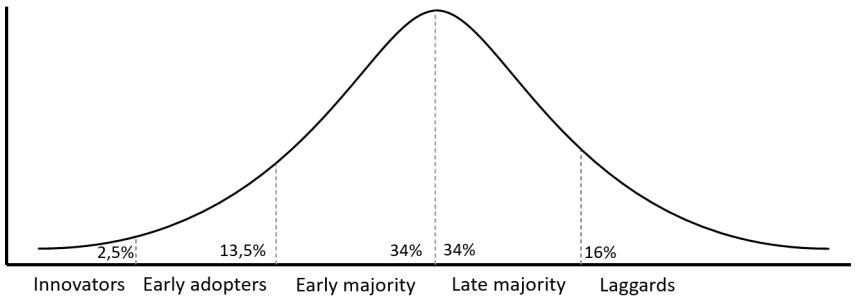


Figure 3.7: Innovation adoption model by Rogers (2010)

The percentages in figure 3.7 indicate the size of the different groups. However, these are just based on the normal distribution and its mean and standard deviation. The rate of adoption can be measured by the period within which a certain percentage of users the innovation has adopted.

The Buyer Groups want to steer the market and create more impact by widening the scale of demand. Based on the theory of Rogers, it is therefore most likely for the Buyer Groups to incorporate

the early adopters. They are willing to form a deliberate strategy, which is going to meet their (future) challenges. Besides, they are experts. The innovators, on the contrary, are more likely to stimulate new techniques for the reason that is all progression. They engage into a wide range of different alternatives, which also contributes to the development of innovations. However, the early adopters make a choice for a technology path, which the early majority can adopt when the direction has proven itself. Thus, the early majority is strategical and independent. It depends on the type of innovation, whether these clients are already existing or new clients. When an innovation is sustaining (embedded improvements), the early adopters are usually the existing enthusiastic clients. However, when an innovation is more disruptive (because an extra dimensions has been added), new clients are more likely to adopt the innovation as well [Reinhardt & Gurtner, 2015].

For the adoption by the early majority, opinion leadership is an important feature for innovators and early adopters. Parties who lead the opinion have: "an unique involvement with market topics. Compared to non-leaders in a particular area, opinion leaders read more media about related new consumer product developments; they participate more often in related consumer activities; and they derive greater satisfaction from those activities." [Bloch, 1986]. Thus, in order to engage the early majority, or the interested parties for the market vision, opinion leadership is important [Matschoss et al., 2015].

Different types of Buyers: public versus private buyers
Edler et al. [2015] asked suppliers, who deliver to public an private clients to compare those clients to their level of innovation-friendliness. The results of this research indicate that public clients are being considered as less innovation-friendly; they are less open to new idea, less well placed to buy an innovation, less likely to demand an innovative alternative and less willing to take risks. Thus, although the public sector has great potential to stimulate innovation, also with spill-over effects, this potential is not fully being used [Edler et al., 2015]. For the buyer groups this implies that more attention should be given to create a innovation-friendly attitude within the public organisations, compared to the private clients. Especially, because the majority of clients within the Dutch construction sector are public clients [Pianoo, ob].

Different types of Buyers: national versus local contracting authorities
In literature, the focus to enhance innovation is mainly on central governments. The role for local governments has not often been specified, or is considered limited because of less scale, budget and technical competence [van Winden & Carvalho, 2019]. However, cities are increasingly being seen as place where innovation challenges occur, representing wider, societal challenges [van Winden & Carvalho, 2019]. According to Uyarra et al. [2017] cities are great platforms to engage in conversations between contracting authorities and local market parties. Also for the consistency in demand policy, it is beneficial if multiple layers of public organisations are being involved in the formulation of a long-term market strategy [Arnoldussen et al., 2017].

Propositions for the interviews:

1. The most suitable participants of the Buyer Groups are the early adopters, who strategically adopt innovations based on their own calculations;
2. Opinion leadership is important to widen the group of interested parties and to further diffuse the market vision;
3. Internal innovation-friendliness of public participants influences the effectiveness of the market vision;
4. Local contracting authorities have less capabilities and possibilities to stimulate innovation;
5. The involvement of local contracting authorities is necessary for the consistency in demand policy over multiple levels of the Dutch administration.

3.6.2 Different roles within contracting authorities

One task for the coordinator of the Buyer Group, is to attach the right organisations to the Buyer Group. However, the internal role of the participant within that organisation can influence the input to the market vision and the support such organisation will give to the end result. Therefore, different roles are being explored.

At the organisation of contracting authorities, different roles have an interest in sustainable procurement. During the purchasing process these are: the manager, the budget holder and the purchaser. With further activities also the contract manager, the facility manager and the policy advisor come in play [Zwaans & Damen, 2007]. Table 3.4 describes the roles and their interwoven relations and responsibilities.

Function	Activities
Public Manager	• Sponsor and responsible for procurement • Internal encouragement to opt for sustainable solutions • Provides support for procurement officers with policy frameworks, knowledge and capacity • Creates awareness for best practices
Budget holder, Internal client	• Owner of sustainable procurement • Challenges the procurement officers • Informs public management with a financial risk analysis • Complies with sustainable procurement policies
Procurement officer	• Facilitates budget holder with procurement needs • Advises budget holder on the creation of impact with sustainable procurement • Stimulates internal client to concrete action • Provides monitoring information to public management
Facility manager, contract manager, end-user	• Stresses the importance of sustainability among shared service centers • Ensures the availability of more sustainability options for the internal client
Policy advisor, Experts	• Provide knowledge on recent developments for internal clients and procurement officers • Create a toolbox for internal clients and procurement officers

Table 3.4: Internal roles and their relation within contracting authorities (Derived from: Zwaans, Damen, (2007))

Buyer Groups need participants with a high level of knowledge to create an effective market vision and a central position within the contracting authority to create commitment within the entire organisation.

The role with the most strategical position is the public manager. Within this position, it is also easier to realise a commitment through the entire organisation for the market vision. However, limitations of incorporating such a role might be: time constraints and not having enough specialised knowledge to deliver a substantive contribution. A second potential role to join the buyer group would be the internal client. They have decisive power regarding the sustainable procurement policies, can direct their procurement officers and also have insights in implications of suggested policies. This could be beneficial for the Buyer Groups. The procurement officer fulfills a less strategical role, but is facilitating many other roles in their needs and therefore in the position to energize many other people in the organization, next to the practical knowledge they can contribute. A disadvantage of incorporating procurement officers is that it is harder to commit the organisation to the market vision, because they are not responsible for the vision an organisation has. Therefore, the role of internal client might be best suitable for the buyer group.

Propositions for the interviews:

1. The role of internal client seems most suitable to participate within the Buyer Group;

3.7 THE FOUNDATION FOR THE CASE STUDIES

The propositions stemming from literature have formed the base for the interview questions. An overview of all propositions can be found in appendix 3. In table 3.5 the link between the propositions and the themes for the interview questions is being made.

Propositions	Interview questions
Steering mechanisms for different type of markets	- Description market - Business' motivation to innovate - Business' goal with innovations - Business' manner of innovating - Preferred stimulation in the innovation process (by contracting authorities)
Reaction to demand	- The need for a market vision in the innovation process
Innovation flows within the supply chain	- Innovation initiator within market - Velocity of diffusion within market - Adoption of business' innovation by others - Collaboration to innovate
Most important barriers per market type	- Barriers in innovating
Buyer Groups within the different transition phases	- Place innovation within market - Resistance towards innovation
Strategies of Buyer Groups within the different phases	- Innovation within the markets - The need for a market vision in the innovation process
Requirements for a market vision	- Needed content within a market vision - Focus of market vision - Ambition level market vision - Time frame - Formulation by contracting authorities or together with market parties - Credibility market vision
Content of the market consultation	- Relationship buyers and supplier - Barriers in highlighting the innovation to the client - Knowledge about client needs & communication of development potential - Preferred content of market consultation - Performed market consultation - Added value of the consultation - Missing information after consultation - Selection participants - Incorporation feedback
Practical execution of the market consultation	- Suitable participants consultation - Functions participants - One-on-one or group consultations
The role of intermediating parties	- Difficulties during the process - Activities coordinators
Platform with solely market parties	- Platform with solely market parties
Requirements' participants Buyer Group	- Current structure Buyer Group - Requirements' participants Buyer Group - Influences on ambition level market vision - Motivation and commitment participants - Internal roles of participants
Requirements participating organizations Buyer Group	- Requirements participating organizations Buyer Group - Motivation and commitment contracting authorities
Opinion leadership to diffuse the vision	- Activities for diffusion market vision

Table 3.5: Linkages between literature themes and interview themes

4 CASE DESCRIPTIONS

To test the propositions stemming from the theoretical framework, case studies are being performed. The research methodology has already been discussed in chapter 2. In this chapter, a description of the performed interviews will be given by elaborating on the discussed themes and the participants of the interviews. Next, the Buyer Groups as the cases will be described. However, first, the choice for these specific cases will be explained, followed by a description of the cases. Within this description, the cases will also be analysed based on the discussed theoretical themes of Pavitt's firm typology, the innovation flows within the sector and the stage within the market transition process.

4.1 DISCUSSED THEMES WITHIN THE INTERVIEWS

The interviews are the most important mean to perform the case studies. The five discussed themes in the interviews were the following:

1. Market dynamics and innovation within the market (market parties & contracting authorities)
2. Innovation within the internal organisation (market parties)
3. Effective design of the market vision and creating impact with the market vision (market parties)
4. Effective design of the market consultation (market parties, contracting authorities & coordinators)
5. A design of the Buyer Group which can produce an ambitious and effective market vision (market parties, contracting authorities & coordinators)

Not all themes have been discussed with all parties. This depended on the objective of the interviews with the different types of interviewees, as stated in chapter 2. After the interviews had been conducted, the interviews were being transcribed and analysed. An overview of the mentioned themes (axial codes) stemming from the analysis of the transcripts is being in appendix 4. This appendix also includes the frequency a topic has been mentioned by participants stemming from a particular Buyer Group.

4.2 THE PARTICIPANTS OF THE INTERVIEWS

18 interviews have been conducted, without counting the validation interview. For the Buyer Groups of Asphalt and Concrete four people are being interviewed, for the other two Buyer Groups (Schools and Road Signs), five people. For each Buyer Group two different type of market parties, the coordinator and one or two participants are being interviewed. Thus, in total, four coordinators, eight market parties and six participants of the Buyer Groups were being interviewed (figure 4.1).

Buyer Groups	Participants interviews
Asphalt	1x Coordinator 1x Participant Buyer Group 2x Market parties
Road signs	1x Coordinator 2x Participant Buyer Group 2x Market parties
Concrete	1x Coordinator 1x Participant Buyer Group 2x Market parties
Schools	1x Coordinator 2x Participant Buyer Group 2x Market parties

Table 4.1: An overview of the differentiation in interviewees

4.3 DESCRIPTION OF THE BUYER GROUPS

Four Buyer Groups have been investigated as cases. In this section, first the choice for these Buyer Groups will be explained. Secondly, the cases themselves will be elaborated upon. A description of the groups themselves will be given, but also, hooking in to sub question 1 and the first part of the theoretical framework, the manner of innovating within the different sub markets, the flows of innovations and the phase of the market transition, will be mentioned.

4.3.1 The choice for the investigated Buyer Groups

Out of the 16 Buyer Groups, the four investigated Buyer Groups are: asphalt, road signs, concrete and circular schools. These cases are being chosen based on three arguments. Firstly, they are all related to the construction (or building) industry, which is part of the scope of this research. The second reason for choosing these Buyer Groups was their difference in scope and type of market, because the focus of this research is to discover if Buyer Groups need to operate differently to be effective in different type of markets. The differentiation in type of markets has been based on the typology of Pavitt [1984], which also has been mentioned in the theoretical framework (figure 4.2). Lastly, the choice has been practically based on the progress the Buyer Groups had made. All Buyer Groups were fine-tuning the concept versions of their end product(s) and most of them did a market consultation to check the concept version in the observation period.

4.3.2 Description of the Buyer Group: Asphalt

The Buyer Group of Asphalt consists out of three groups; the core, executive group consisting out of Rijkswaterstaat and four provinces who together formulated the market vision and the market strategy. The second group is a steering group consisting out of management positions of the same organizations. Their approval is being asked about the results. The third group contains the contracting authorities, who didn't actively contribute, but are interested in the outcomes, so they can implement the vision and strategy within their own organisation. They were being asked for feedback on the end results (Interviewee 1, 2021). The structure of this Buyer Groups is graphically represented in figure 4.1.

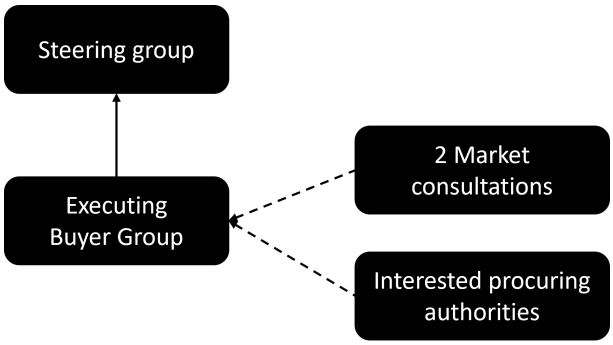


Figure 4.1: The structure of the Buyer Group: Asphalt

Their focus was only on the road element of asphalt. Therefore, their focus group of market parties are the asphalt plants, often in possession by a contractor.

The Buyer Group performed two market consultations. One, in the beginning, to talk about innovation barriers, chances in the supply chain and the need for new texts for selection criteria. Within the second market consultation the concept version of the market vision was being presented. The relationships among clients and markets parties are varying, because of the difference among clients in the level of openness towards innovation. Also, issues of trust and control have been mentioned. However, is such markets with a relative close contact with contracting authorities, it is relatively easy to get an overview of the existing products. This does not mean that the development plans for new sustainable alternatives are also known by the contracting authorities.

The concept market vision incorporated a definition for circularity, a preferred judgement method of bids (MKI), the stimulation of beneficial ways of working and the discouraging of materials which are toxic. Next to the market vision, a purchasing strategy has been formed with standard requirements for UAV and UAV-GC contracts. Besides, awarding criteria have been written for both these types of projects. The awarding criteria are being written on three different ambition levels. The first ambition level is suitable for contracting authorities who are new to using innovations. This ambition level is demanding just below industry average. The most ambitious level is the front runners approach of RWS, in which the demanded MKI level is being based on the performance of the best three market parties. Besides, extra insights are being given to deal with innovative asphalt mixes.

4.3.3 Description of the Buyer Group: Road Signs

The Buyer Group of road signs consists out of two groups; A core group of Rijkswaterstaat, the national organisation of road signs and four purchasing advisors of municipalities who together formulate the market vision and the market strategy. The second group is constituted out of a few contracting authorities who are interested in the end result. The structure of this Buyer Groups is graphically represented in figure 4.2.

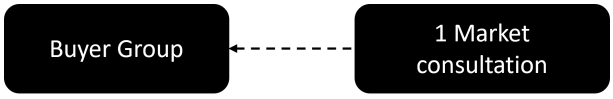


Figure 4.2: The structure of the Buyer Group: Road signs

The focus of the Buyer Group was only on the plate of the road signs, because the complexity of the techniques behind the different alternatives. In a possible follow-up of the Buyer Group, other elements can be chosen, to write a market vision for.

Regarding the market consultations, most municipalities had just performed their own market consultations, resulting in one late market consultation to check the concept market vision. The relationship among the market parties and the contracting authorities is like the asphalt industry: varying, because of the difference among clients in the level of openness towards innovation. Besides, the is-

sues of trust and control were being mentioned. For the sub market of road signs, the contracting authorities do know what products exist on the market, however there is a lack of LCA information for all alternatives. Besides, the development potential of the suppliers is also unknown (Interviewee 11, 2021).

In conclusion, within the product markets it is relatively easy to get an overview of the existing products. For the other type of markets this information is harder to grasp. However, knowing which products exists does not mean that the impact of the product is known and what its development potential is.

The concept market vision is indicating a future preference of using the MKI method. However, since qualitative data is lacking for this product in the Nationale Milieu Database, it was chosen to postpone the use of MKI within tenders. Instead, a purchasing strategy is presented with a preference purchasing order for road signs. So, for example, the reduction and the reuse of roads is preferred over new road signs. The reaction of the market parties to this, was that the market vision lacked foresights and ambition. Therefore, the strategy can be implemented at this moment. The need within the market was to give an answer to the growing number of alternatives and to make sure the signs with impact would be rewarded the most. Therefore, the signs should have been tested for their Life Cycle impact on circularity, according to the market parties. This feedback during the market consultation has not been processed within the market vision, because of time reasons (Interviewee 4, 2021).

4.3.4 Description of the Buyer Group: Concrete

The Buyer Group of concrete has another format in which market parties play a more prominent role. This group hasn't been initiated by Pianoo, but it is a continuation of the Dutch concrete covenant which has been signed by several contracting authorities, contractors and suppliers. The structure of this Buyer Groups is graphically represented in figure 4.3. The first group, are the seven execution teams, who are elaborating on seven themes following out of the concrete covenant. The participants of these groups are a mix of contracting authorities and market parties, stemming from several layers of the supply chain. The second group is the steering group with representatives of all types of parties included. They make the final call. The third group are the contracting authorities and the fourth group is a collaboration of the contractors. In this fourth group, market problems, with for example, different ways of procuring are being expressed and solutions to overcome these problems are being sought. In meetings between the contractors and the contracting authorities, these problems are also being stressed and potential solutions are being discussed.

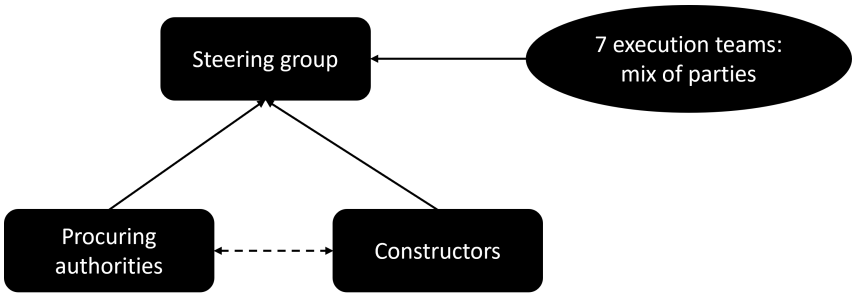


Figure 4.3: The structure of the Buyer Group: Concrete

The focus of the Buyer Group is on a material level, incorporating the entire supply chain. After the Concrete Covenant, in which the general goals have been set, the seven execution teams produced: 1.) a roadmap for CO_2 Reduction; 2.) a document for circular design; 3.) means to stimulate reuse of concrete rest streams; 4.) an inventory to measure the impact on natural capital; 5.) an investigation of the preferred MKI per product group and its development; And lastly, 6.) approaches for sharing knowledge between projects and 7.) for educational purposes.

Because of the constant participation of the market parties, there were no market consultations within this Buyer Group. Concerning the relationship among market parties and their contracting authorities,

it can be said that the material producer is not dependent on the individual demand of some clients. However, clients frequently ask for information on new innovations, which are than given to them (Interviewee 18, 2021).

4.3.5 Description of the Buyer Group: Circular Schools

The Buyer Group of circular schools consists out of two groups; A core group and a group with interested contracting authorities. The core group consists out of six schools, three municipalities and one advising party. Some schools also hired housing consultants to help them in the process of building a new school. Those parties were also part of the Buyer Group, representing the school they had been hired for. The Buyer Group also invited experts to tell about an innovate school, or an innovative way of procuring which has been executed in practice. The structure of this Buyer Groups is graphically represented in figure 4.4.

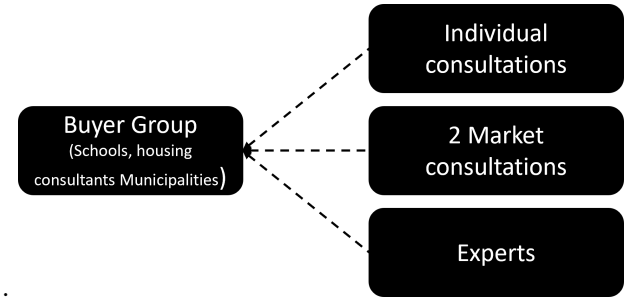


Figure 4.4: The structure of the Buyer Group: Circular Schools

The focus of the Buyer Group was on a system level; focused on a type of building. The market which was focused on were all developers of products which could be applied in and around a school. This wide scope and the inexperience with building of the schools didn't result in harmonizing their demand, but in harmonizing the way of working as schools.

Regarding the market consultations, two market consultations have been performed. The first to check whether there was a need for a harmonized demand and the second to talk about innovation barriers and proper ways of demanding innovation. A third market consultation about the concept version of the market vision is taken into account.

The relationships between contracting authorities and market parties differ for the schools. However, in general there is not much contact between contracting authorities and the product developers; clients aren't familiar with product specifications and are dependent on the knowledge of the architect for innovative alternatives. The traditional bidding process, which brings in the product developers at an late stage, is also not beneficial to build up the needed knowledge for innovation.

The concept market vision is focusing on helping schools with formulating a sustainable demand. An ambition framework is indicating which aspects can be incorporated to better build a sustainable school. The level of ambition for each of these aspects can be determined by the school itself. Besides this tool, several inspirational essays have been written with innovative practical examples to give some insights in new techniques or business models.

4.4 INNOVATION WITHIN THE MARKETS OF THE BUYER GROUPS

In this section, the markets of the Buyer Groups will be compared with the theory of Pavitt, which indicated several types of firms dealing in a different manner with innovation. Secondly, the markets are being analysed to determine their position within the transition process, which has been described by the Sustainable Market Transformation theory, stemming from Simons & Nijfhof [2021].

For a short recap, the figure with the table of Pavitt's market structures and their sectoral patterns, are being visualised in figure 4.2.

Category of firm	Examplaric sectors	Size firms	Innovate?	Drive	Focus	Development	Innovation diffusion
Supplier dominated	Traditional housing	Small	No, adopt from suppliers	Price sensitive	Process	Supplier research; Demand; Government-financed research; Extension services	Low; within supply chain
Scale intensive	Bulk materials	Large	Yes, for suppliers	Price sensitive	Process	Own production engineering;	High; within supply chain
Specialised suppliers	Machinery; Instruments	Small	Yes, for customers	Performance sensitive	Product	Development in relation with clients	Low; to other supply chains
Science based	Electronics	Large	Yes, for suppliers	Mixed	Mixed	Own production engineering;	Low; within High; to other supply chains

Table 4.2: Market structures and sectoral patterns (based on Pavitt (1984))

4.4.1 Innovation within the market of Asphalt

Category of firms and their way of innovating
The size of the firms aren't small, but the companies with a coating plant have a medium or large size (Interviewees 2 & 10, 2021). Besides, their clients are, just as in the entire construction industry, mainly focused on the price. However the quality is becoming more important, because some clients ask for a better quality. Some suppliers focus on innovation, which is often product innovation. The reason for their in-house innovation is because of the demand from their customers (Interviewee 2, 2021). However, the innovations aren't caused by selection criteria for one project, like the trend is in the construction industry. This is because the time to develop a new asphalt mix, takes a substantial amount of development time (Interviewee 10, 2021). The amount of Research and Development for this sector is relatively high compared to other sub sectors within the construction industry (Interviewee 10, 2021). Based on this information, it can be concluded that the asphalt plants are a mix of scale intensive firms and specialised suppliers. The companies are relatively large and the clients have a high focus on the price. However, the main driver for innovation does stem from a changing demand for sustainable asphalt mixes and the new competitive power field as a result of this. Therefore, in the rest of this research the asphalt industry will be referred to as an specialised supplier.

Innovation flows within the sub sector
A distinction can be made between contractors who exploit an asphalt plant and others who don't (see figure 4.5). The latter category purchases the asphalt from the contractors who can produce asphalt (Interviewee 10, 2021).

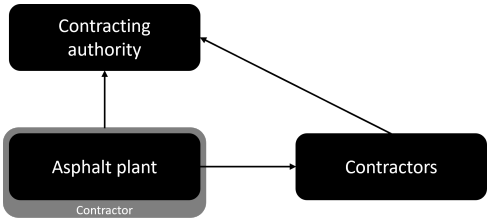


Figure 4.5: Asphalt supply chain (own figure)

Thus, the contractors with an asphalt plant are the initiating parties within the sector and also produce for the supplier dominated contractors.

Phase of transition
Several new mixes have been developed. However, not all mixes have a proven quality (Interviewees 2 & 3, 2021). Many initiatives have been set up to guide the developments within the asphalt sector (Interviewees 1 & 2 & 3, 2021). Therefore, the transition is beyond the inception phase in which a few frontrunners are experimenting. Instead, the sub sector is in the competitive advantage stage. Sev-

eral alternatives are being developed. However, more time is needed to further experiment and prove certain innovations.

4.4.2 Innovation within the market of Road Signs

Category of firms and their way of innovating
The market consists out of two types of companies. Some develop and produce their own signs, some only develop their own signs, but outsource the production. A third group is producing signs by using existing aluminium plates, others just purchase and sell their products, with some modifications. This indicates a different level of influence sign deliverers can have on their own product. There are several alternatives in the market; next to the standard aluminium signs, many bio-based alternatives have been developed. Some signs are still in the pilot phase, or don't have the required certifications Stasse [2020]. The competition in the market is fierce and very much focused on the price (Interviewees 14 & 15, 2021). The focus of innovation is on product and process. For the new alternative materials the focus is more on product innovations. The main driver for innovation, is the market position and the own vision. However, the first cause for starting to think about new developments are signals from clients, but feedback to the existing products or materials specifications from newly developed material. All these characteristics together lead to the qualifications of a specialised supplier.

Innovation flows within the sub sector
The innovation initiators are both the established and the new production firms. In some cases, the specialised suppliers are dependent on their scale intensive material suppliers (Interviewee 14, 2021). The signs are directly purchased by the road authorities, without passing another party (see figure: 4.6)

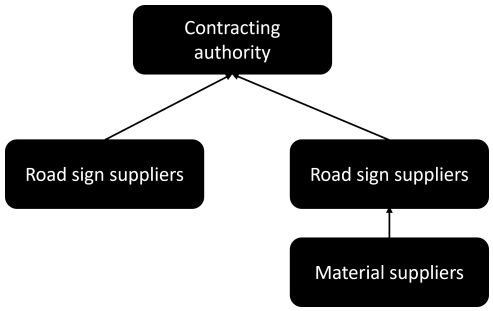


Figure 4.6: Road signs supply chain (own figure)

Thus the innovation markets parties which innovate most easily are the road sign suppliers who produces their own road sign.

Phase of transition
There are already multiple sustainable road signs in the market, which indicates the pass of stage one of the transition process. Besides, the competition is fierce. However, not all alternatives have been fully developed and there is no sign of willingness to collaborate with other parties. Although, there is a certain sense of dissatisfaction about the quality of all the different solutions. Therefore, the sub market for road signs is probably in the middle of the competitive advantage stage and will probably go to the pre-competitive collaboration phase, if more alternatives are fully developed and the dissatisfaction is growing.

4.4.3 Innovation within the market of Concrete

Category of firms and their way of innovating
Innovation within the market of concrete is, among others, determined by the material suppliers. In The Netherlands most materials are being imported by a few large companies. They are focused on process and product innovation (Interviewee 18, 2021). Sustainability goals, are their reason to innovate.

However, above all the innovation needs to be profitable. The source of innovation is their in-house production engineering department, who start innovating because of management directions and because of oft-recurring demand within projects (Interviewee 18, 2021). Thus, demand of individual clients doesn't have an impact on the business operations of these multinationals. However, when working on sustainability goals is incorporated , a strong demand from clients can be the extra push to put the vision in practice by developing a certain technique (Interviewee 18, 2021). Besides, the openness to innovation by Dutch clients, has resulted in the label of 'experimentation field' for The Netherlands, by one of the large material suppliers (Interviewee 12, 2021). The parties higher in the supply chain, like contractors and prefab element suppliers, are strongly dependent on the innovations of material suppliers (Interviewee 17, 2021). There are many small concrete plants spread over The Netherlands, because of the low maximum transport distance. For these companies, the characteristics of the general construction industry are again applicable: many regional companies with a strong focus on the price, who only innovate a little if clients incorporate MEAT criteria within their tenders, and thereby change the competition field. Concerning the level of innovation per organisation, it holds that it is easier for larger construction companies to innovate, compared to smaller firms. Therefore, the expectation stemming from the literature study is true; the first party in the chain is a typical scale intensive firm, except for the part that they have a mixed focus on process and product innovation. Besides, the next stage in the supply chain, which has been described in the literature review, has more characteristics of a supplier dominated market.

Innovation flows within the sub sector

The first party in the chain are the material and binder producers (see figure 4.7). They deliver their materials to contractors with their own concrete mortal plant and to the prefab suppliers. Last in the supply chain, are the recycling companies [Betonakkoord, 0]. If material suppliers have their own R&D department, the innovation is most often being initiated by themselves. However, if they don't have such knowledge in-house, large contractors can also take the initiative in the collaboration with their suppliers to work towards a new innovation (Interviewee 17, 2021). Contractors are also very much depending on other concrete plants, because the highest possible transport distance from the plant to the project is 30 km (Interviewee 2, 2021). Therefore, they have to purchase the goods at one of the +/- 100 concrete plants in The Netherlands [Betonhuis, 0]. Some concrete plants can adapt their receipt to the wishes of the contractor, however others don't (Interviewee 2, 2021).

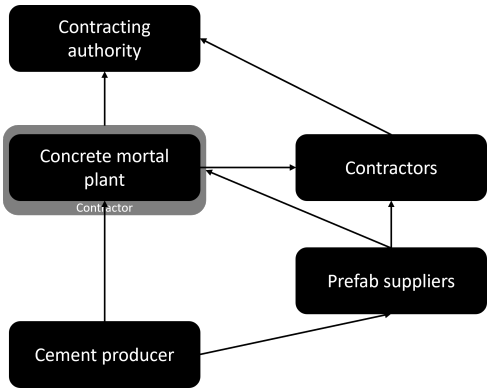


Figure 4.7: Concrete supply chain (own figure)

Innovation can take place in many different places of the supply chain, but the most important parties are the material producers, in this case.

Phase of transition

The impact of and the focus on concrete is high. However, alternatives which make the difference aren't on the market yet. There are several ideas to improve concrete, pilots are being done and there is a willingness to collaborate with other parties to develop new technologies. However, the big solutions aren't there yet. The problem is more and more being recognised, but the technical key elements for

the solution are not being discovered yet. Therefore, the sub market of concrete is still in the first inception phase.

4.4.4 Innovation within the markets producing products for Schools

Category of firms and their way of innovating
The group of market parties involved in building a school is divers. Numerous product types are involved and there is also a wide variation in market parties. The market parties are, amongst others: contractors, sub-contractors, wholesalers and product suppliers. Besides, also the architect is playing an important role in the implementations of innovations within the design for schools (Interviewees 8 & 9, 2021). Because the focus of this Buyer Group is so wide, it is hard to tell something about the innovation of products for schools. However, just like the market for housing, many products are stemming from small market parties, who aren't very much focused on product innovation and R & D. The choice for this scope, is being made because schools have more or less the same specific design requirements, which differ from other buildings. Furthermore, the procurement procedure is also more or less the same for all schools (Interviewee 9, 2021). For example, all schools have to make sure they offer a stimulating indoor climate e.g. Besides, the procurement is being influenced by the inexperienced commissioning of schools, who also don't have full control, because municipalities are the ones funding the (new) school (Interviewee 8, 2021). The funding by municipalities has as a downside that the funding is often a fixed amount of money per class room. This makes it hard to reserve some extra money to implement some sustainable innovations in the building (Interviewee 8, 2021). Because of these characteristics, the focus of the Buyer Group Circular Schools is not on stimulating innovation for specific product categories stemming from the supplier dominated firms, but on helping schools to better demand an innovative design and thus, indirectly stimulating all their market parties to come up with more innovative solutions.

Innovation flows within the sub sector
Product innovation stems from the specialised product developers or the scale intensive material producers, who deliver their material to the product developer. Spreading the innovation can happen in different ways (see: figure 4.8). The first manner is by selling the product to a (sub-) contractor, with or without the intervention of a wholesaler. The second manner is by the incorporation of the product into the design by the architect (Interviewees 8 & 16, 2021). Per product it differs what the most common way is. However, the level of innovation can also play a role in this. For example, a paint deliverer indicated that for the well-known paint the manners of diffusion where equal; 50 percent of the sales is being incorporated within the design and the other half is being sold by the purchase of (sub-) contractors (Interviewee 16, 2021). However, for his new, more biological paint, 90 percent of the sales is being incorporated in the design and only 10 percent is being purchased by the (sub-) contractor. This is due to the risk averse attitude of mainly the painters (Interviewee 16, 2021). The risk with depending on an architect to implement the product, is that enough architects need to know about the existence of the product (Interviewee 8, 2021).

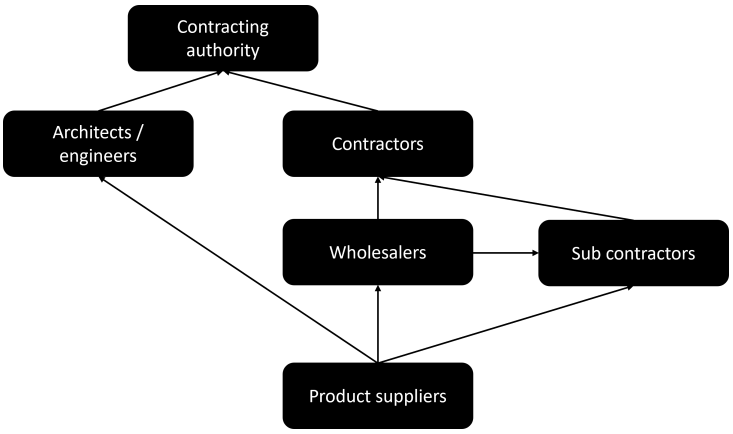


Figure 4.8: Supply chains to build a school (own figure)

Thus, the product suppliers innovate their product, but the innovation needs to pass several stages of the supply chain to be implemented.

Phase of transition
The phase of transition is hard to tell with such a differentiated scope. However, in general it can be said that because of the changing political environment, companies slowly start to think about options to improve their products. Of course, some companies are ahead of the market, however they don't experience much competition on alternatives yet (Interviewees 6 & 16, 2021). The level of innovation is also not being stimulated by the fixed public funding and the fact that two clients need to be on board to stimulate the level of sustainability of the school (Interviewee 8, 2021). Therefore, it can be concluded that the transition is still in the first, inception phase.

5 FINDINGS OF THE CROSS-CASE ANALYSIS

Within this chapter the four Buyer Groups will be compared with each other to draw some conclusions about an effective market vision, a belonging market consultation and a suitable Buyer Group, within sub markets which are dominated by: suppliers, scale intensive firms and specialised suppliers.

5.1 AN EFFECTIVE MARKET VISION

5.1.1 Incentives and barriers for innovation

First, the source of motivation to start innovating will be discussed. Followed by experienced barriers within the innovation process and the needs during this process. An overview per case is given in table 5.1.

Motivation to innovate
A business economic benefit/ protecting the market share and the own vision were being mentioned as drivers for innovation, by all 8 market parties. Furthermore, only in the markets of supplier dominated firms and specialised suppliers the motivation to innovate is stimulated by demand. The scale intensive firms are relative insensitive towards demand.

Barriers in the innovation process
The 8 market parties were asked about their barriers within the product development and diffusion process. The barriers for innovation for the Buyer Groups of asphalt, road signs and concrete are more or less the same. For the Buyer Group of schools, these were different. First, the barriers for the first three group are described.

The first and the second barriers are about the lack of knowledge from contracting authorities about, both, sustainable procurement methods and the product itself. This was being mentioned three times. The lack of technical knowledge, results, among others, in no reliability checks of the bids and no validation checks when a project is finished. Some market parties take advantage of the gullibility of contracting authorities, according to several market parties. For the markets of asphalt and road signs, this is partly being caused by having much municipalities as their client; these purchasers have to deal with a wide variety of products, making it almost impossible to gain a detailed level of technical knowledge. The lack of knowledge about sustainable procurement has resulted in tenders which were improperly formulated. This is a problem in all four of the markets.

The third barrier is about the wish of contracting authorities to have a level playing field while awarding a bid. This procurement barrier has been mentioned three times, mainly by large frontrunners in markets with a severe competition of many more (smaller) companies. Procurement officers want competition, to treat every party in an equal manner (interpretation of the tender laws). Besides, when more similar alternatives exists, the chance is higher, the product is effective and mature enough to implement. The implication is that an innovation developed by a frontrunner, won't be awarded until competition is present.

The fourth barrier is about the main focus on the lowest price while awarding the tender. Even though incorporating MEAT (Most Economically Advantageous Tender) criteria helps in stimulating innovation, unless it is properly being used. This barrier hinders in all markets.

The fifth issue is about the lack of a long term vision. This barrier has been mentioned three times in the markets of asphalt, road signs and concrete. Without a long term vision, it is not clear how and if a investment will be returned.

The sixth barrier is about the low level of willingness to pay an extra price for sustainable alternatives, to return the investment. This has been mentioned as a barrier by four market parties. This barrier is also stemming from the fact that positive sustainable effects are hard to internalize for the developing market parties, resulting in few, or none business economic benefits.

The barriers for the Buyer Group of Schools are different and mainly caused by the structure of the market. Product developers don't usually have direct contact with the client, and are therefore always dependent on the parties higher in the supply chain to incorporate their product within their product range (wholesalers) or within the design of a construction work (architect/engineer). Therefore, the first and second barriers within this market focus on the conservative character or the lack of knowledge of other parties within the supply chain. The last barriers which is being mentioned, is regulations which are based on existing methods or materials, hindering other innovative applications.

Needs in the innovation process

As a follow up question to the barriers in the innovation process, market parties were asked about how contracting authorities could help in overcoming these barriers. Several needs are answering the barriers, however there are also other needs that don't correspond with the previously mentioned barriers.

A proper tender formulation, which is consistent, stimulating and feasible is needed within all four markets.

The second need is about the validation of the delivered projects by the contracting authorities. Tenders are awarded based on plans and promises. However, the real impact is being made when these sustainable alternatives are actually being implemented in a correct manner. This is also important to stimulate fair competition.

The third motivational aspect is to reward frontrunners for developing a sustainable alternative, although the competition is still absent. The question of frontrunners is to be less strict in the interpretation of the tender laws and focus on stimulating innovation. This aspect has been mentioned by two large companies within markets with a fierce competition on the price with smaller regional parties, and not that many sustainable solutions yet. These parties, are also positively speaking about the frontrunners approach of RWS, and are curious what it will yield.

The fourth need is to apply MEAT selection criteria within tenders to shift the focus from the lowest price to a higher level of sustainability. Some contracting authorities have incorporated these criteria, but to make impact and to sooner return the investments, more organisations should apply MEAT criteria. This is a need which has been mentioned by five parties, in all four markets.

The stimulation of the presence of a long term market vision has been mentioned five times within the markets of asphalt, road signs and concrete. It is especially important that the long term vision is an integral vision, incorporating all relevant goals within the sector for the coming period. This reduces a shifting political focus every year (Interviewee 10, 2021).

The most hindering barrier was a low return on investment. Therefore, the most helpful motivation, which has been mentioned in all markets is business economic feasibility. Whether this is by a higher purchasing price, a subsidy, investments, emission costs or less monitoring costs; the financial balance for sustainable solutions needs to improve. Especially, when market parties need to change their production process because of another technology direction, compensating investments or subsidies are a boundary condition.

The following three measures which stimulate innovation, are just positive measures, which don't compensate a barrier. The seventh incentive to stimulate innovation is focusing on early collaboration between clients and market parties during projects. A more dynamic and earlier starting relation is being mentioned three times within the markets of asphalt, concrete and schools. Two-phase contracts, for example, are being seen as an opportunity to stimulate innovation in collaboration.

The eighth incentive is a connection with sustainable goals, which was being mentioned four times by the market parties within the asphalt and schools industries. However, although this is being mentioned as an incentive, this is not the most stimulating measure. Like a market party within the asphalt industry said: we are being triggered by tender criteria, return on investment and sustainability goals, in this order (Interviewee 10, 2021).

The last incentive is particular for the school industry, which is supplier dominated. There are few innovative product developers within this sector and the ones who are present, experience hindrance of the traditional attitude of the parties within their own supply chain. The product developers don't have direct contact with the clients of the project and are therefore dependent on other parties within the supply chain, like wholesalers. In order to cope with this situation, it would be stimulating if the market vision could also find a measure to enhance supply chain collaboration, according to one market party within the schools industry.

	Asphalt	Road signs	Concrete	Schools
Motivation to start innovating	1. Business economical 2. Own vision 3. Demand	1. Business economical 2. Own vision 3. Demand	1. Business economical 2. Own vision 3. -	1. Business economical 2. Own vision 3. Demand
Barriers for innovation	1. Insufficient sustainable purchasing knowledge of purchasers 2. Insufficent technical knowledge of purchasers 3. No selection without competition as frontrunner 4. Clients who still focus on the lowest price 5. No long term vision 6. Low financial rendement	1. Insufficient sustainable purchasing knowledge of purchasers 2. Insufficent technical knowledge of purchasers / No checks of reliability biddings 3. - 4. Clients who still focus on the lowest price 5. No long term vision 6. Low financial rendement	1. Insufficient sustainable purchasing knowledge of purchasers 2. - 3. No selection without competition as frontrunner 4. Clients who still focus on the lowest price 5. No long term vision 6. Low financial rendement	1. Codes based on current techniques 2. Difficult to diffuse innovative products to conservative parties in the same supply chain 3. Architects need to know the product
Motivational measures innovating	1. Proper tender formulation 2. Validation of the delivered project 3. Reward frontrunners 4. MEAT selection 5. A long term vision 6. Return on investment 7. Earlier collaboration in projects 8. Sustainability goals	1. Proper tender formulation 2. Verification of the biddings 3. - 4. MEAT selection 5. A long term vision 6. Return on investment 7. - 8. -	1. Proper tender formulation 2. Validation of the delivered project 3. Reward frontrunners 4. MEAT selection 5. A long term vision 6. Return on investment 7. Earlier collaboration in projects 8. -	1. Proper tender formulation 2. - 3. - 4. MEAT selection 5. - 6. Return on investment 7. Earlier collaboration in projects 8. Sustainability goals 9. Stimulation of chain collaboration

Table 5.1: Motivation and needs within the innovation process

5.1.2 The market vision

For the market vision, there has been a focus on the scope of the vision, on the needed content, the period for which it needs to be written and characteristics which cause impact. Table 5.2 gives an overview.

Scope of the market vision
All market parties were content with the scope of their Buyer Group. For the Buyer Group of road signs and asphalt, elements with impact where chosen (the plate of the road sign and the asphalt layer of the road). This is especially useful if the product itself or the technology behind it is complex. Later on, the scope and the vision can be widened to other elements of the product.

The Buyer Group of Concrete focused on a material, which is more difficult to manage for the coordinator. Besides, the eventual impact of a Buyer Group is harder to measure because of the incorporation of the international supply chain. To make real impact the Buyer Group thus needs to set an international transition in motion, which is a big challenge, which needs stamina. However, all clients and market parties are convinced it is necessary to have a buyer group for concrete, because of its environmental impact. Besides, The Netherlands is currently being used as an experimental area for at least one of the big material suppliers (Interviewee 12, 2021), because of a relative high level of willingness to innovate by contracting authorities and market parties.

The Buyer Group of Schools has focused on the entire building with all its different systems and products. The market parties, the participants and the coordinator don't see another way of dealing with

the challenges for schools, because of the special and harmonized building requirements for schools. Therefore, the focus is not on improving individual products. Instead, they focus on better equipping inexperienced school boards on demanding a sustainable school. Besides, the two market parties and also a participant of the Buyer Group would prefer a focus on integral parties to make a higher impact, compared to focusing on product develop.

Content market vision
The first thing to be expected from a market vision is clarity, because this reduced the innovation risk. The following three aspects contribute to the level of clarity.

First of all, an integral set of goals has to globally indicate for a longer period what aspects are going to be important. The level of detail depends per market. When there are several alternatives, there is a higher need for specific norms to specify the goals (road signs). These norms need to be communicated clearly and upfront (Interviewee 17, 2021). When new innovations need to be developed yet, market parties within the concrete, asphalt & schools industries have a preference for global specifications to ensure the needed freedom to experiment.

Secondly, insights in what clients mean with circularity, which parameters will be incorporated and how these will be measured also determines the result of an awarding procedure. Market parties can adapt their product to these parameters.

Lastly, clarity about the testing method which is going to be used is also very important. Besides, transparency about the period this testing method will not change is also preferred by market parties. This is important for all markets because investment decisions are being made based on this information.

Concerning a technology direction, there are different thoughts among the cases, depending on the stage of development of alternatives in the market. The market for road signs has already numerous alternatives in the market and is in need of a specific technology direction of the clients. The asphalt and concrete industries are still developing new alternatives and, therefore, want to discuss the future technology direction together. When the technology direction is not clear yet it is wise to have a focus on the short term and on the long term. On the short term, to do several pilots, which can be monitored and create input for the long term solutions. Concerning the Buyer Group for schools, the scope is wider and their focus is therefore less on a technology direction for a specific product.

However, independent of the stage of development of alternatives, all four markets have the preference for clients to gain a deep understanding of the technology and the life cycle results of different alternatives and as a result stop buying technologies which don't make a real impact on the long term.

Besides the vision, five market parties also stressed the importance of the translation of a vision into a strategy. This strategy can indicate tender specifications, an advice to purchase products who at least meet certain standards, or an investment plan. For the Buyer Group of Schools this strategy is going to help schools to express their wishes and to try new forms collaboration during a project.

Another remark about the strategy was to make a distinction in stimulating measures for frontrunners and the peloton, if this distinction is present within the market. In order to stimulate the peloton a lower (MKI) limit, which gets more ambitious over the years, will probably do. A boundary condition is that the development of this limit is being communicated in a transparent manner to the market parties. However, no one has the golden idea yet to best stimulate the frontrunners. What must be avoided in the market vision is an upper limit indicating which level of sustainability needs to be reached at maximum; This is not desirable, because sometimes market parties can do better, but they won't because they have reached the upper limit already. Doing better should therefore be rewarded.

Time horizon market vision
Of the four market parties, who answered the question about the time horizon for the market vision, three parties indicated that the minimum time horizon should be five years. The fourth party, operating in the market for schools, mentioned 10 till 15 years. But all had in mind that the transition is working towards 2030 and 2050. Therefore, the market vision should preferably give some global foresights towards 2030.

	Asphalt	Road signs	Concrete	Schools
Scope of the Buyer Group	1. Element with impact 2. Focus on steering market parties with demand 3. - 4. -	1. Element with impact 2. Focus on steering market parties with demand 3. - 4. -	1. Material level 2. Focus on steering market parties with demand 3. Focus on all stages of the supply chain 4. Be an experimental area	1. System level (specific type of construction) 2. Focus on better equipping the inexperienced clients & on sytem integrators
Content of the market vision	1. Vision: integral set of goals 2. Parameters for circularity 3. Clarity about the future judgement method 4. - 5. Distinctive measures to stimulate the frontrunners and the peleton 6. Strategy to realise the vision	1. Vision: integral set of goals 2. Parameters for circularity 3. Clarity about the future judgement method 4. LCA information & Technology direction 5. Distinctive measures to stimulate the frontrunners and the peleton 6. Strategy to realise the vision	1. Vision: integral set of goals 2. Parameters for circularity 3. Clarity about the future judgement method 4. - 5. Distinctive measures to stimulate the frontrunners and the peleton 6. Strategy to realise the vision	1. Vision: integral set of goals 2. - 3. - 4. - 5. Distinctive measures to stimulate the frontrunners and the peleton 6. - 7. Helping clients with alternative tenders/ contracts 8. Stimulating supply chain collaboration
Time horizon market vision	1. At least 5 years 2. Focus on 2030 / 2050	1. At least 5 years 2. Focus on 2030 / 2050	1. At least 5 years 2. Focus on 2030 / 2050	1. At least 10 years 2. Focus on 2030 / 2050

Table 5.2: Drivers and the market vision

5.1.3 Making impact with the market vision

For the market vision to make impact, the market parties gave these four aspects as an answer: put this (1) ambitious market vision (2) without ambiguity, (3) in practice now and (4) make sure all contracting authorities are going to use it in the end. An overview of the remarks per market, has been given in table 5.3.

Ambitious market vision
The market parties in all markets indicated the need for a high ambition (mentioned four times in all markets). Within the market of road signs, the market parties were missing ambition. However, the interviewees found it difficult to indicate a certain level of ambition or a time frame within which ambitions need to be reached. The aspects which market parties did preferred to be incorporated within the vision were an integral set of goals for the coming five years, which have to be communicated in a transparent manner. Besides, market parties wanted to get rid of old ways of working of contracting authorities, hindering innovation.

Unambiguity
Unambiguity within the market is one of the most important elements of stimulating an innovation-friendly environment. Clarity gives more certainty, reducing the risks while innovating. The following three aspects are being mentioned to enhance the level of unambiguity.
1. No adaptions, while implementing the market vision
The first aspect to reduce ambiguity is an implementation of the market vision by all contracting authorities without making further adaptions. When other versions are going to be created, this hinders the positive effect of the demand harmonization on innovation development. This has happened in the past, resulting in reactions of market parties opposing such practices.

2. Linkages with other initiatives
Half of the market parties (especially the medium and smaller companies) asked for a better link of the Buyer Groups with other initiatives in the market. Also, to create a harmony between the directions of those different initiatives too. Besides, in the market for road signs, there are relative few market parties and many different contracting parties and initiatives, all asking for extra input, causing a dislike to cooperate and to give input.

Besides the market parties, also the participants of the Buyer Groups experience hinder of the lack of linkages with other initiatives. Especially, in the asphalt industry many other initiatives exist. Although some participants of this Buyer Group also participate in the other initiatives, confusion is present about each other's activities and about the mutual relations. Besides, the link of the Buyer Group to the transition paths of RWS is not entirely clear for all participating parties. Concerning the Buyer Group of Concrete, this Buyer Group is partly an effect of the Concrete Covenant, making the Buyer Group more embedded within the sector in The Netherlands. This results in more clarity for all parties what is being done and who to address with questions.

3.Unambiguity in laws
Laws and regulations are often being made for the existing techniques. However, if alternatives are being developed, regulations should sometimes be adapted to let an alternative grow from a pilot to a full-fledged alternative. Regulations for a certain specific material or alternative, but also regulations for sharing innovative ideas, or obliging contracting authorities to purchase the more sustainable alternatives were being mentioned by the market parties.

Put it in practice now
If a market vision has been formulated, put it in practice, was the argument of market parties, mainly referring to Rijkswaterstaat. Rijkswaterstaat is an important client for construction industry and also for many Buyer Groups focused on the construction industry. Their contribution of knowledge within the Buyer Groups is high, but it is hard to implement the visions within the internal organisation.

However, also other contracting authorities have to act according to the market vision, also to set an example for other contracting authorities (Interviewees 6 & 10). This helps in attaching more contracting authorities to the market vision.

The diffusion to other contracting authorities
All market parties have the opinion that all contracting authorities should use the market vision in the end. First, the most important contracting authorities in the sector should adopt the vision, followed by the rest of the clients. Besides, a regional spread is also preferred in the market of schools, where most of the market parties are regional parties.

The biggest concern among market parties, but also in the buyer groups. is the diffusion towards the municipalities and other inexperienced clients. This because they often lack capacity to gain a certain level of knowledge. When a market vision has been written, the buyer group needs to make sure the municipalities do understand the vision. Besides, it needs to be clear how to put this in practice. For example, the municipalities need to understand if and how certain prescribed selection criteria can be applied to their own situation.

Within the Buyer Group there is not much attention for the diffusion of the market vision. Often, only the coordinator has an overview of the interested parties. In one of the Buyer Groups nobody took the initiative to also focus on extending the group of interested parties. The coordinator didn't do so, because it wasn't incorporated within the existing culture when she stepped into the process (Interviewee 4, 2021). In other Buyer Groups the extension goes slowly, because a political mandate needs to be given. Or, it is unclear when and how to involve this group into the process. Although the Buyer Groups find it hard to incorporate other contracting authorities during the writing process, it is a very determining factor for the effectiveness of the market vision. One market party even mentioned it discouraging that the number of interested parties was not explicitly known and / or increased in the period between the two different market consultations.

Another suggestion is to use other initiatives or platforms to diffuse the market vision. Often mentioned platforms are the CROW (Centrum voor Regelgeving en Onderzoek in de Grond-, Water- en Wegenbouw en de Verkeerstechniek) and / or the VNG (Vereniging van Nederlandse Gemeenten), for example.

	Asphalt	Road signs	Concrete	Schools
Ambitious	1. Preferred level of ambition is uncertain	1. Preferred level of ambition is uncertain	1. Preferred level of ambition is uncertain	1. Preferred level of ambition is uncertain
Unambiguity	1. No adaptions to the market vision 2. Linkages with other initiatives 3. -	1. No adaptions to the market vision 2. Linkages with other initiatives 3. Unambiguity in laws	1. No adaptions to the market vision 2. Linkages with other initiatives 3. Unambiguity in laws	1. No adaptions to the market vision 2. Linkages with other initiatives 3. Unambiguity in laws
Put it in practice now	1. Implementation 2. Be an example	1. Implementation 2. Be an example	1. Implementation 2. Be an example	1. Implementation 2. Be an example
Diffusion to other procuring authorities	1. Goal: all clients 2. Start with the most important ones 3. - 4. Attache inexperienced clients 5. Also diffuse via other platforms	1. Goal: all clients 2. Start with the most important ones 3. - 4. Attache inexperienced clients 5. Also diffuse via other platforms	1. Goal: all clients 2. Start with the most important ones 3. - 4. Attache inexperienced clients 5. Also diffuse via other platforms	1. Goal: all clients 2. Start with the most important ones 3. Start with a regional spread 4. Attache inexperienced clients 5. Also diffuse via other platforms

Table 5.3: Making impact with the market vision

5.2 AN EFFECTIVE MARKET CONSULTATION

The market consultations of the Buyer Groups were different from each other. Some Buyer Groups executed multiple consultations, other a single, or the market parties were constantly involved. They discussed topics also varied from innovation barrier, to feedback on the concept versions. Also the form of the consultations differentiated: most consultations were performed with a group, however also individual consultations have been executed. An overview is being presented in table 5.4.

Content of the market consultation
Most market parties want to discuss two things: 1) The starting points, like: what is going to be the set of goals and the definition of circularity within the sector? 2.) The practical implications of the concept version of the market vision. One parties in the asphalt industry also want to talk about a testing method suitable for this definition of circularity. Discussing this before the formulation of the market vision can create insights in benefits and downsides of these testing methods. Besides, the Buyer Groups which performed an early market consultation benefited from talking about barriers within the market. Often, the contracting authorities had a general idea, which has been fine tuned in the market consultations and incorporated within the market vision. In the Buyer Group of road signs no market consultation was being performed in the beginning, which could be a reason for the lack of ambition within the market vision. The participants of this Buyer Group were not aware of the product development potential, for example. The market parties regret this lack of ambition and had hoped to receive more thorough questions about the material specifications and the production processes; information which is needed to build an LCA.

Participants of the market consultation
For the Buyer Group of asphalt, road signs and concrete the market parties preferred to incorporate parties out of the entire supply chain, from the material supplier to the demolition company. However, within the Buyer Group of schools product developers of many different goods and some contractors were invited. However, this was not effective, because it partly resulted in sales pitches of product suppliers, instead of a focus on the sector. Therefore, the preference of the market parties and a participant of the Buyer Group was to invite parties with a more integral perspective in a following initiative. All market consultation used an open invitation to invite for the market consultation. In the Buyer Groups of asphalt and road signs this resulted in the preferred group of participants. For the Buyer Group of Schools it didn't; parties with creative ideas were hoped to have a higher attendance.

There is some hesitance at market parties and participants of the Buyer Groups to incorporate advising parties within the market consultation, as intermediating parties. Especially within the Buyer Groups of Concrete and Schools. This, because advising parties can easily dominate the conversation. Besides, sometimes a tension is present among the two different types of parties, because of conflicting interests. This can result in group conversations in which not all arguments are being put on the table. One market party within the asphalt industry, did mention to prefer the presence of an advising party, who could understand both sides and therefore smoothen the debate (Interviewee 2, 2021).

Concerning the internal roles of the participating market parties several interviewees mentioned it is wise to invite people who have a high ambition and can also focus on a broad perspective, next to their companies own interests.

Group discussion or individual discussions
In the market consultation of road signs and asphalt the group of market parties was quite homogeneous. The preference of both the market parties and the contracting authorities, was to perform group conversations for transparency and to see if some discussion could take place. In the market consultation of the Buyer Group for schools, many different parties were present, making it hard to come to a meta discussion. Therefore, the individual conversations were valuable. The other two Buyer Groups didn't perform individual consultations because of the interpretation of the transparency principle within procurement law.

Digital vs. physical
Although the Buyer Groups and the market parties were happy with their choice for individual or group discussion, it was also noticed that group discussions didn't always give a representative overview. This could partly be described to the fact that body language is hard to read in digital meetings, according to three coordinators.

Difference between market consultations and a constant participation
In the Buyer Group of concrete the market parties were also involved in writing the end products, in contrast with the other Buyer Groups. According to a market party who participated in the execution teams of the Buyer Group of concrete, their addition to the contracting authorities was to make sure the practical implications were also incorporated in the end product (Interviewee 18, 2021). Therefore, such implications are incorporated from the start instead of as feedback on the concept version. Another benefit of the incorporation of the market parties is that the support of the participating market parties is higher, compared to the situation of solely market consultations (Interviewee 18, 2021). A disadvantage, however, is that some end products of the execution teams didn't have that much ambition, according to the coordinator and the public participant of the Buyer Group. However, this was being compensated by the opposing ambitious view of the network of contracting authorities. The deciding steering group, which is a representation of all parties, have weighted both arguments and have heightened the level of ambition.

	Asphalt	Road signs	Concrete	Schools
Topics for the market consultation (s)	1. Definition of circularity. 2. Choice for and implications of different evaluation methods. 3. Innovation barriers 4. - 5. Practical implications of the market vision.	1. Definition of circularity. 2. - 3. - 4. Thorough material and production process questions when the market has already developed multiple alternatives. 5. Practical implications of the market vision.	1. - 2. - 3. - 4. - 5. Practical implications of the market vision.	1. Definition of circularity. 2. - 3. Innovation barriers 4. Giving more insight in the product + potential product development 5. Practical implications of the market vision.
Participants & their functions	1. Market parties from the entire supply chain 2. - 3. Someone who can transcend the own product	1. Market parties from the entire supply chain 2. - 3. -	1. Market parties from the entire supply chain 2. Avoid advising parties 3. -	1. Markt parties with an integral product, or a central position 2. Avoid advising parties 3. Someone who can transcend the own product
Moment to perform a market consultation	1. Before writing the market vision 2. To check the concept version 3. Leave some time to implement suggestions	1. Before writing the market vision 2. To check the concept version 3. Leave some time to implement suggestions		1. Before writing the market vision 2. To check the concept version 3. Leave some time to implement suggestions
Group vs. inidividual discussion	1. Group discussions for transparancy	1. Group discussions for transparancy		1. Also individual discussion
Digital vs physical		1. Physical		1. Physical
Market consultation vs. constant participation	1. Nice to formulate a vision without market parties 2. A higher ambition		1. Direct incorporation of implications 2. Ambition: middle of the road (however, was being compensated) 3. A higher level of support from market parties	

Table 5.4: Market consultation

5.3 AN EFFECTIVE BUYER GROUP

An effective Buyer Groups is also being formed by the participants of the Buyer Group. Therefore, the characteristics of suitable participants have been investigated. Including their commitment to the Buyer Group. Besides, it is being investigated whether the incorporation of a platform with just suppliers, within the structure of the Buyer Group, would help in stimulating the transition. The overview for these aspects can be found in table 5.5.

Participants with a high level of ambition, knowledge and experience

The most important factor for an effective Buyer Group is a high level of ambition of the participating contracting authorities, according to the 8 market parties and the coordinators. Also, because this is one of the main barrier for the market parties. With a high level of ambition, the level of knowledge and experience of an organisation is usually also higher, resulting in qualitative content input for the market vision and strategy, according to the coordinators. However, some clients with few or none experiences, but with a high ambition can also contribute to the process, if they have valuable knowledge in, for example translating policies to strategies. However, the boundary condition is that there need to be at least two other parties who have already some experience with innovative procurement methods and the recently developed innovative alternatives. The parties with less experience can help in implementing the market vision within the own ambitious organisation (Interviewee 1, 2021).

Varying roles

Another important factor for a successful Buyer Group are the functions participants have within their own organisations. The proposition was that the internal client would be most suitable to participate within the Buyer Group. However, a diversification of functions and knowledge works best. Next to some people with knowledge about the pre-procurement process (procurement, contracting, checking the compliance with selection criteria), it is also beneficial to have some participants in the group who have more technical product knowledge (execution, maintenance) and thirdly, knowledge from the sustainability aspects. These three knowledge areas have been named multiple times by participants and coordinators as useful or as lacking, depending on the Buyer Group (asphalt, road signs, schools). In the Buyer Group of asphalt the expertise of policy making and translating strategical goals to tactical goals was also found very useful.

Commitment
A boundary condition for not having participants with central functions within their own organisation, is that the internal structure of the contracting authorities needs to be solid, to spread the work of the buyer group over the internal organisation (Interviewee 1, 2021). For a high level of commitment of the participating organisations top management support and support from other department within the organisation is needed. Tangible results can help in this (Interviewee 11, 2021). To commit participants to the Buyer Groups, frequently mentioned aspects by the participants were, knowledge sharing and a doable time investment.

Platform with only market parties
From past and current initiatives and from the execution teams linked to the Buyer Group of Concrete, the lesson can be drawn that one network with a mix of contracting authorities and market parties often doesn't produce a product with a high ambition. However, two independent networks, who have regular meetings together might be a better opportunity. Contracting authorities want to share knowledge and come up with an ambition themselves and in the concrete and asphalt sectors some market parties are being positive about a network with market parties. For example, within the asphalt industry, most plants are at the end of their life cycle. If the future is with another technology direction than the current way of working, than all plants should be designed accordingly to this new direction (Interviewee 2, 2021). Because of the technical knowledge and the amount of needed investments, a platform of market parties, discussion these issues with the contracting authorities, is necessary. This can also be done, after the contracting authorities have set an ambition.

Within the Buyer Group of Concrete there is a network of contractors discussing the most important innovation barriers. Besides, they are writing a proposal for the contracting authorities to cope with these barriers (Interviewee 17, 2021). Because the barriers and the proposal are being supported by multiple market parties, the contracting authorities also have a better view of what (a part of) the market is hindering and hoping.

However, within the Buyer Groups for Schools a market party was against such network, because it might result in a focus on individual economic benefit (Interviewee 6, 2021). Within the market of road signs an industry association is already present.

	Asphalt	Road signs	Concrete	Schools
Character of the participants	1. Ambitious participants with a high level of knowledge	1. Ambitious participants with a high level of knowledge	1. Ambitious participants with a high level of knowledge	1. Ambitious participants with a high level of knowledge
Functions	1. A diversifiaction, including all knowledge fields below	1. A diversifiaction, including all knowledge fields below		
Knowledge fields	1. Preprocurement process 2. Product specifications 3. Sustainability & innovation 4. (Policies)	1. Preprocurement process 2. Product specifications 3. Sustainability & innovation		1. Preprocurement process 2. Technical knowledge 3. Sustainability & innovation
Commitment	1. Commitment of departments 2. Top management commitment 3. Show tangible results 4. - 5. -	1. - 2. Top management commitment 3. Show tangible results 4. Learn from other participants 5. Reduce time burden by larger groups	1. Commitment of departments 2. - 3. - 4. - 5. Reduce time burden by larger groups	1. Commitment of departments 2. - 3. - 4. Learn from other participants 5. Reduce time burden by larger groups
Platform with suppliers	1. Positive, to discuss the technology direction	1. Negative, because of existing industry association	1. Positive, to discuss barriers and measures to stimulate innovation	1. Negative, because of the tempt to focus on business economical benefit

Table 5.5: The Design of the Buyer Group

5.4 LESSONS BASED ON THE CROSS-CASE ANALYSIS

Based on the cross-case analysis of the four Buyer Groups, general conclusions are being made and recommendations are being written for Buyer Groups in general, within markets with specialised suppliers, scale-intensive firms or supplier-dominated firms. However, some lessons can benefit all Buyer Groups and are thus not further specified per type of market. Next to the market types, some effects are being described to specific stages of the transition process. Some of the recommendations were being suggested by interviewees themselves, others have been based on the given problems.

5.4.1 SQ2: Markets' needs & the market vision

First, general lessons and recommendations are being drawn about the needs of different market parties. First, conclusions will be drawn for the motivational aspects per type market. Next, the focus of Buyer Groups within the different types of markets will be the subject. The third category of conclusions are about the Buyer Groups within different phases of the transition process. The last category conclusions for sub question two is about the market vision.

Motivational aspects in the different types of markets

			Specialised supplier	Scale-intensive firm	Supplier dominated firm	Dependent of transition phase	
Motivation to innovate	1. Business economical concerns		++	++	++		
	2. Own vision		++	++	++		
	3. Demand		+	--	+/-		
Barriers and belonging needs	Barriers	Needs				Barriers	Needs
	1. Low financial return	1. Return on investment	++	++	++	Begin phase 2: No awarding as single frontrunner	Reward frontrunners
	2. No technical long-term vision	2. A long-term vision	+	+			
	3. Insufficient sustainable purchasing knowledge of purchasers	3. Proper tender formulation	+	+	+		
	4. Insufficient technical knowledge of purchasers	4. Validation of the delivered projects	+	+		End phase 2: No checks of reliability of biddings	Verification of the biddings
	5. Still focus on the lowest price	5. MEAT selection	++	++	++		
	6. Minor contact with the client	6. Earlier collaboration in projects	+/-	+/-	+		
	7. Traditional chain partners	7. Supply chain collaboration			+		
	8. Regulations focused on the old practice or not embedded within European laws	8. -	+/-	+/-	+/-		
		9. Sustainability goals	+		+		

Table 5.6: Motivation to innovate

The first noticeable aspect within table 5.6 about the motivation to innovate, is the motivation within the scale intensive sector; they are not being motivated by demand at all. Supplier dominated firms who participated within the interviews, did indicate a reaction to demand to innovate, however, as being seen in literature by the model of Winch (figure 3.3) most product developers only react on demand via an impulse of contractors, architects or engineers. Specialised suppliers are in direct contact with their clients and therefore react relatively sensible to a demand from their clients. However, for all three markets demand is not the only aspect to motivate to innovation. Business economic concerns and the own vision also contribute in the investment decision. Therefore, the first conclusion is:

C1: For all market parties, the business economic position and the own vision are determinants of their innovation activities. Market parties who focus on a product are most responsive to a demand as motivation to innovate. The supplier dominated sector can react to demand, if being purposed via the system integrators. However, scale intensive firms don't react to demand from their clients.

When looking at the barriers and needs of the market parties, these can be grouped into two categories, for the specialised suppliers and the scale intensive firms.

C2: The two biggest barriers for innovation are:

1. *A low or uncertain return of investment for the innovation;*

2. *A lack, an improper or inconsistent incorporation of sustainability criteria within tenders.*

The supplier dominated firms have to cope with extra barriers.

C3: For supplier dominated firms, the barriers for innovation are:

1. *An indirect contact with their clients;*
2. *A traditional attitude of partners higher is the supply chain, hindering innovation;*

Focus for the Buyer Groups in the different markets

The type of market of a Buyer Group determines for a large part, which level of scope will be the subject. Table 5.7 indicates the determinants for the market vision per type of market. It also indicates how to make impact with the market vision, but that is almost equal for the different types of markets.

Market vision			Specialised supplier	Scale-intensive firm	Supplier dominated firm	Dependent of transition phase
Focus and target parties	Focus of the Buyer Group	Target market parties				
	1. (Element of) product	1. Supply chain	+			
	2. Material	2. Supply chain		+		
	3. System / building type	3. System integrators			+	
Goals	1. Vision for the product / material chain / building		++	++	+	
	2. Better equipping inexperienced clients to incorporate sustainability in tenders		++	++	++	
	3. Enhance supply chain collaboration				++	
Content	1. Integral set of goals for the coming period		++	++	++	Begin phase 2:
	2. Parameters for circularity		++	++	++	No technology direction
	3. Clarity about the future judgement method		++	++	++	
	4. Distinctive measures to stimulate the frontrunners and the bunch		+	+	+	End phase 2:
	5. Hands-on strategy to put the vision in practice		+	+	+	LCA of alternatives →
	6. Stimulation of collaboration (supply chain or with client)				+	Technology direction
Horizon	Minimal five years & with a time path to 2030 to 2050 in mind		+	+	+	
Making impact with the market vision						
High ambition			+	+	+	
Immediate application			+	+	+	
Unambiguous	1. No adaptions to the market vision		+	+	+	
	2. Linkages with other initiatives		+	+	+	
	3. Unambiguity in laws		+	+	+	
Wide diffusion	1. Goal: all clients		+	+	+	
	2. Start with the most important clients		+	+	+	
	3. Extra attention for municipalities and other unexperienced clients		+	+	+	
	4. Also diffuse via other platforms		+	+	+	
	5. Ensure a regional spread from the start				+	

Table 5.7: Market vision

A focus on a product leads to specialised suppliers, who develop these products. They are also the target market party for these Buyer Group, however demolition or recycling companies can also have an impact on the level of sustainability of an product. Therefore, it is wise to incorporate the entire supply chain. The same holds for the scale intensive markets. A focus on a type of building, results in many different markets parties. It is unrealistic to incorporate all those different markets. Therefore, the focus should be on system integrators, also to enhance collaboration within the market. The fourth conclusion is that:

C4: Buyer Groups can write a market vision in all three types of markets. However, the market vision of supplier dominated firms should not focus on stimulating innovation for a product, or within one supply chain. Instead, it should focus on an ambitious vision for the type of building, with system integrators as market in mind.

Because a major innovation barrier in all markets is the immaturity of purchasers to incorporate sustainability within their tenders, the fifth conclusion is that:

C5: A substantial part of the end product of the Buyer Groups should focus on better equipping inexperienced contracting authorities to incorporate sustainability aspects within their tender.

Buyer Groups within a supplier dominated market focus on a type of building and should therefore focus on system integrators. However, system integrators barely develop product innovations, but can motivate their suppliers to innovate, especially when their relations become closer. Therefore, the sixth conclusion is:

C6: Buyer Groups within supplier dominated markets should also focus on enhancing supply chain collaboration in order to stimulate innovation within this market.

Within scale-intensive markets, the responsiveness to demand is very low and innovations are only being initiated by business economical concerns and the own vision. Therefore, in order to motivate these large material suppliers, the seventh conclusion is:

C7: Buyer Groups within scale intensive markets can motivate the material suppliers by:

1. *Incorporating these market parties within their network to lower the resistance and to increase the commitment of these parties to the market vision.*
2. *Incorporating market parties from the entire supply chain, to improve the level of sustainability of the material during its entire life cycle, and to also put pressure on the material suppliers by their own supply chain.*

Incorporation of market parties, within the Buyer Groups has to happen with caution, because a mix of contracting authorities and market parties often doesn't lead to a high ambition. Therefore, a design of the Buyer Group, like the Buyer Group of Concrete should be applied, to create an opposing force, keeping the level of ambition high. The following conclusion is:

C8: When market parties participate within a Buyer Group, they should be excluded of determining the ambition. They can add value by indicating practical implications of the strategy, following out of the ambitious vision.

The Buyer Group in different phases of the transition process
As being seen, the motivation of market parties to innovate is not solely focused on demand, but also stemming from their own vision and business economical concerns. Because, because demand is not the only trigger, the nineth conclusion is:

C9: Buyer Groups can only effectively be started, if there is already a certain sense of urgency within the market.

When a sense of urgency is present, the following step of the transition process is to develop sustainable alternatives. With these developments, several technology directions are being explored and freedom to experiment is needed. Therefore, the tenth conclusion is:

C10: When a market still has to, or is developing multiple alternatives, a high ambition is needed to stimulate these developments. However, a technology direction should be excluded from the market vision, within this phase of the transition.

When multiple alternatives have been developed, tests need to be done to check the sustainable impact of the alternatives. After these tests, the solutions with the highest positive environmental impact can be stimulated.

C11: When many sustainable alternatives are developed within the market, a Buyer Groups should perform LCA's (or make sure the data within the National Milieu database gets more precise) in order to disclose ineffective alternatives and stimulate the effective alternatives.

The market vision
Because of the importance of business economical concerns for innovation, the market vision needs to

create a future perspective, on the base of which calculations for investment decisions can be made. Therefore, the next conclusion is:

C12: The most important aspects of a market vision, to stimulate innovation, are:

1. *An integral set of goals for the coming years;*
2. *The sector's definition of circularity: the linked parameters and their calculations;*
3. *Clarity about the future testing method, preferably for a given time period.*

A market has market parties with varying levels of ambition and with varying possibilities to develop sustainable alternatives. Frontrunners in a market can discover new technology directions, and therefore lead the motion of change. Therefore, in order to effectively stimulate the market, frontrunners should be challenged and awarded for taking the lead. However, in order to make impact, the entire market needs to transform. Therefore, also the rest of the market parties needs to be stimulated. A measure as lowering the MKI value could be suitable for such purpose. Although, the communication of this lowering should happen up front and be transparently. Besides, with lowering the barrier it is also wise to know if suitable alternatives already exist, or if the demanded level of MKI is realistic. This, because lowering the MKI is should be used as a measure to stimulate the peleton, instead of on creating new alternatives. Therefore, the conclusion is that:

C13: Buyer Groups have to differentiate their purchasing strategy towards frontrunners and the rest of the market.

A transition is a change of a (sub) system of society. In order to reach that change, a market vision needs to make impact within the entire market. Market parties think a market vision is credible if it ticks the following four boxes.

C14: A market vision can make impact, if:

1. *The level of ambition is high;*
2. *The participants actually implement the vision within their own practice;*
3. *The vision is unambiguous;*
    a) *No adaptions of the market vision by individual purchasers;*
    b) *Conformity with other initiatives, networks and platforms within the same market;*
    c) *In harmony with laws and regulations.*
4. *The vision will be diffused to (all) contracting authorities.*

The first aspect is the incorporation of a high ambition. With a high ambition for the future, a direction is given, to which market parties can act accordingly. However, because market parties found it difficult within the interviews to indicate how high the level of ambition should be, the market consultation could get better insights in this by asking in-dept questions about the technical specifications and the sustainable development potential of the different alternatives (paragraph 3.5). Better insights in the future technical possibilities, makes it easier to determine a realistic ambition.

Secondly, the vision and the following strategy have to be used in order to generate an effect. Also, when the vision is being used by some contracting authorities, an example is being set for other contracting authorities.

The third aspect is about unambiguity, which has been divided into three sub aspects. The first is: no adaptions to the own practice, by other the contracting authorities. Otherwise, the harmonized effect will be reduced. This also challenges Buyer Groups to write a strategy which can be applied within many different contexts. The second aspect to reduce the level of ambiguity is coordination with other initiatives in the markets. Making sure no extra work is being done and no contradictory sounds are being spread, also creates more harmony in the market. Thirdly, harmony has to be sought with

legislation. Often, another interpretation of the legislation suffices. However, it can happen that laws and codes are in line with the traditional way of working, hindering other techniques to be applied. Therefore, the Buyer Groups need to know how to set in motion a change of regulation.

Fourthly, the vision has to be diffused to other contracting authorities and become mainstream within the market. The diffusion enhances the power of demand towards market parties. Within the current way of working, the focus on diffusion is low. More attention could be given to communication, also during the writing process by showing some intermediate results, sharing outcomes of the market consultations etc. However, according to the typology of Rogers [1962] in paragraph 3.6, the early majority adopts new innovations by opinion leadership of early adopters. Therefore, to easily diffuse the vision, the interested group of contracting authorities, can be gathered before the market vision is going to be implemented, to make them enthusiastic about the vision and to easily show the effects of the implementation to a wide group of enthusiastic contracting authorities.

These requirements to make impact with the market vision, ask for acts within the Buyer Group. For example, for extra activities for the coordinator. These will be mentioned later on. In figure 5.3 the recommendations coupled to making in impact with the market vision, are being visualised.

A market vision is giving fore sights. The question however is, for which time-path? The preference of market parties is to write for at least 5 years, with a view to 2030 / 2050. This is also overarching the political cycle of four years, making the vision less dependent on political priorities (barrier 5 in paragraph 3.3). However, contracting authorities are not enthusiastic about such a fixation. Their questions are: what if the goals have already been reached within these five years, or what if other insights are coming in play? However, market parties do understand slight changes in the strategy, if it is clearly communicated upfront. However, the general goals, are being expected to be held for five years. A view towards 2030 and 2050 is always preferred by all type of parties. Therefore, the fifteenth conclusion is:

C15: A market vision must be written for at least 5 years, with a view to 2030 / 2050. Because of practical implications the strategy can be adapted within this period of five years, however the main thought should remain the same.

5.4.2 SQ3: The market consultation

The market consultation is a form of interaction between the Buyer Groups and the market. However, for different market types, there are different needs for this interaction (see: table 5.8). The first conclusions, will deal with these differences within the different types of markets, followed by some general conclusions for the form of market consultations.

Market consultation		Specialised supplier	Scale-intensive firm	Supplier dominated firm	Dependent of transition phase
Type of involvement	1. Marketconsultation	+		+	
	2. Constant collaboration with markets		+		
Focus	1. Practical implications of the market vision	+	+	+	End phase 2: Thorough LCA (material & production) questions of all alternatives
	2. Innovation barriers	(+)			
	3. Definition of circularity	+			
	4. Impact of awarding methods	(+)			
	5. Development potential	+	+	+	
Participants	1. Market parties from the entire supply chain	+	+		
	2. System integrators			+	
Characteristics participants	1. Able to transcend the own product	+	+	+	
Form of the market consultation					
Moment	1. Before writing the market vision	+		+	
	2. To check the concept version	+		+	
	3. Leave some time to implement suggestions	+		+	
Group vs. individuals	1. Group discussions	+		+	
	2. Individual discussions			+	
Digital vs. Physical	1. Physical	+		+	

Table 5.8: Market consultation

As being indicated earlier, the responsiveness to demand is different in the varying types of markets. Specialised suppliers react most easily to demand. Supplier dominated firms react via the system integrators. However, within the scale intensive markets, the responsiveness towards demand is very low. Therefore, in order to raise the acceptance of the market vision by scale intensive firms, the conclusion is:

C16: In a Buyer Group for a scale intensive market, market parties should be continuously involved in the process, to raise the acceptance of the market vision. In Buyer Groups for specialised suppliers and supplier dominated firms, a market consultation should be held.

The most important aspect for the market parties was to give insight in practical implications of the market vision. Therefore, one market vision should be held after the concept version has been written, to point to the practical implications. In the process, some time needs to be reserved to include the received feedback and find suitable solutions.

Other topics which can be included within the market consultation are about aspects which will be incorporated within the market vision, like the definition of circularity, the impact of awarding methods and all other aspects mentioned in table 5.8. These topics are especially being mentioned within the sectors specialised suppliers, probably because of the tighter relation with the clients. These topics needs to be discussed before the market vision will be written.

C17: For the Buyer Groups for specialised suppliers, at least one market consultation must be held to indicate the practical implications of a market vision and a market consultation can be held early in the process about innovation barriers, impact of assessment methods, definition of circularity, development potential etc.

The moment within the transition process also influences the need of market parties concerning market consultations. Because the market vision needs to incorporate a more specific technology direction, the expectation of market parties is an investigated for their product specifications and their product process. Or in other words, information which is needed for a Life Cycle Analysis. Therefore, the eighteenth conclusion is:

C18: When there are many alternatives in the specialised supplier markets, it is necessary to ask in detail about production processes and product characteristics that reveal the impact on sustainability aspects.

Concerning the participants of the market consultation, the market consultation within supplier dominated markets should be held with system integrators (contractors, engineers and architects), because this is also the focus of the market vision. Within the Buyer Groups focused on the scale intensive market, the continuous participation should be with all supply chain parties. For the Buyer Groups with a focus on specialised suppliers, the entire supply chain should also be incorporated in a market consultation. This to create an overview of problems within the supply chain, instead of just within the development stage. Beneficial side effects are: more insights in each production stage for each market party. Besides, a shifting of the problem towards another stage of the supply chain, can be prevented.

C19: When market consultations are being held with the entire supply chain (specialised suppliers), it is wise to mix the different layers separate in the consultations, in order to encourage market parties to look beyond their own stage within the supply chain.

For a market consultation it is important to have an open sphere to get a real sense of the innovation barriers and potential manners in which everyone can contribute to the societal goals. Digitally, body language, for example, is harder to read. Therefore, in order to perform a good consultation, physical meetings are essential:

C20: To gather all needed information, physical market consultations are always more effective than digital meetings.

5.4.3 SQ4: The Buyer Group

Out of the requirements to produce an effective market consultation and to perform an effective market consultation, certain specifications for a Buyer Group arise (see table 5.9).

Buyer Group		Specialised supplier	Scale-intensive firm	Supplier dominated firm	Dependent of transition phase
Character participants	1. Ambitious with a high level of knowledge	+	+	+	
Needed knowledge	1. Preprocurement process	+	+	+	
	2. Product specifications	+	+	+	
	3. Sustainability & innovation	+	+	+	
	4. Policy knowledge	+	+	+	
Commitment partcipants	1. Commitment of departments procuring authority	+	+	+	
	2. Top management commitment	+	+	+	
	3. Tangible results	+	+	+	
	4. Knowledge sharing with other participants	+	+	+	
	5. Lower time burden by larger groups	+	+	+	
Platform with suppliers			+		

Table 5.9: Design of the Buyer Group

In order to write a market vision with a high and realistic ambition, the ambition on the participants needs to be high. A good feasibility is easier being realised when the participants also have a high level of knowledge and experience with the subject. Which knowledge is needed, will be elaborated upon, for the next conclusion.

Next, to aiming for a high ambition, the implementation of the market vision was also an aspect in making impact with the market vision. Therefore, it is also important to have an organisation behind the participant who is willing to implement the vision, when it has been finished. Therefore, an organisation with a certain level of ambition, a vision to contribute to a more sustainable society, available resources for this purpose and may be some experiences underpinning their words, could be indicators of an organisation likely to implement the finished vision.

C22: For a realistic market vision with a high level of ambition, it is necessary that participants in the Buyer Group:

1. *Are ambitious & have a high level of knowledge and experience;*
2. *Have an ambitious organization behind them.*

As being said, a high level of knowledge is contributing to a feasible and high ambition. A mix of several knowledge fields is needed within the Buyer Groups. These are, knowledge about the (pre)procurement process, like the formulation of requirements, awarding criteria and contract texts. Besides, technical knowledge is needed on the product or the material, to help in determining the ambition e.g., but also in conversation with market parties. Knowledge about incorporating sustainability and stimulating innovation helps in finding stimulating measures for market parties. Administrative knowledge is useful in translating a vision into a strategy. This knowledge is useful, however not essential.

In paragraph 3.6, internal roles of a contracting organisations were being mentioned. These roles, are less important for the quality of the market vision, as long as these knowledge fields are still being included.

C23: Within a Buyer Group it is wise to have a mix of knowledge in the following areas:

1. *Preliminary process of tenders;*
2. *Technical product knowledge;*
3. *Sustainability and innovation knowledge;*
4. *Administrative knowledge;*

With incorporating all these knowledge fields, it might be possible that not all participants have a central position within their own organisation. Therefore, commitment of the entire organisation is important to put the market vision in practice. For a high level of commitment of the participating organisations, top management support and support from other department within the organisation is needed, according to several participants and coordinators. To stimulate top management support, the Buyer Group of Asphalt has formed a steering group with managers of the participating organisations to secure top management commitment. Besides, other internal staff members were being asked to give feedback to the concept version of the market vision, raising the commitment from other departments of the organisation (Interviewee 1, 2021). Another idea is to do a workshop, showing executive people the new alternatives. Tangible (concept) results of the Buyer Groups also heightens the internal commitment, according to some of the participating contracting authorities within the road signs and asphalt industries.

C24: To keep participating organisations committed to the market vision, it is wise to ensure the following aspects:

1. *Commitment from the top management layer;*
2. *Commitment from the other organizational layers (e.g. execution);*
3. *Produce tangible results.*

At last, the level of commitment of the participants also needs to be kept high, to stimulate the commitment of the organisations and to get input for the market vision. Two factors, which are being mentioned by the participants of the Buyer Groups were knowledge sharing and a doable time burden. Five participants who continuously need to give input with a meeting rhythm of twice per month is being perceived as quite hectic by the participants of the Buyer Groups of Asphalt and Road Signs. The Buyer Group of Concrete has 10 participants with a high level of knowledge, resulting in committed participants who can deliver their knowledge without over-asking them, according to their coordinator. However, the advice of the other graduation thesis on the Buyer Groups by Van de Vliert [2021] was to keep groups with homogeneous and experienced participants around four participants, for an efficient harmonization process. Therefore, the high time burden should be clearly communicated with these groups, before they start.

C25: To keep participants committed to the Buyer Group, it is wise to ensure the following aspects:

1. *Sharing knowledge with other participants;*
2. *Clear communication of doable time burden, up front.*

Coordinator of the Buyer Group

Impact has to be made with the market vision. Therefore, some activities have to be added to the task list of the coordinator. Besides, some extra beneficial aspects for (the implementation of) the market vision have been mentioned about the role of the coordinator (see table: 5.10).

Corodinator		Specialised supplier	Scale-intensive firm	Supplier dominated firm	Dependent of transition phase
Activities	1. Coordination Buyer Group processes	+	+	+	
	2. Extending the 2and group during the process	+	+	+	
	3. Coordination with other initiatives	+	+	+	
Characteristics	1. Highly ambitious drive	+	+	+	
	2. A high social position for lobbying		+		
	3. The received budget helps	+	+	+	
	4. No change of coordinator	+	+	+	

Table 5.10: Role coordinator

Next to the role of coordinating the writing process and the researches the Buyer Groups gave order to, the coordinator can also focus more on extending the group of interested parties and coordinate

with other initiatives in the sector. These two activities have been examined as being essential for the impact a market vision will make, but have been underexposed in the Buyer Groups.

Regarding the communication to other initiatives, coordinators could contact other chairs of networks to enlighten the purpose of the Buyer Group and the wished end-result. Besides, updates can be given, double work can be prevented and substantive connections can be made. Also other initiatives or contracting authorities might be interested in the same information (Interviewee 15, 2021). Therefore, it is wise to clearly and widely communicate the results of the researches and the market consultations.

Regarding the extension of the group of interested parties, most Buyer Groups are uncertain about the moment and the way of incorporating them within the process. There are Buyer Groups in which the interested parties participate in the regular meetings. Dividing the group, when some decisions have to be made, is difficult (Interviewees 4 & 5, 2021). A very useful involvement, is to ask for feedback on the market vision, which has been done by the Buyer Group of Asphalt. Depending on the involvement of the interested parties, the moment to start attracting this parties can be determined. This has to be done careful, because starting too early with attaching interested parties could also be a disadvantage; When there are no specific results for a while, because the Buyer Groups is still determining their purpose and their way of working, for example, the chance of dropping out is higher (Interviewee 5, 2021). In spreading the news, other platforms, or participants could help in making rumour for the Buyer Group, as well. One of the market parties mentioned a clear communication of the growth of the amount of extra interested parties as stimulating, creating more trust in the Buyer Group and the market vision (Interviewee 2, 2021). Special attention needs to be given to the attraction of municipalities (if they are an important client for the sector). This group of contracting authorities often lacks knowledge and experience, which causes a risk averse attitude. The promise of spreading much valuable knowledge (and living up to that promise) and making the end results suitable for them to apply directly, could persuade them.

C26: In addition to guiding the process, the activities of the coordinator should also focus on:

1. *A continuous expansion of the 2nd layer (the group of interested parties);*
2. *Coordination with other initiatives in the market.*

Unambiguity of laws was also a determining factor for the impact of the market vision. In the process of changing laws, it helps to have a coordinator with a certain societal position to lobby. Also, a coordinator with a highly ambitious drive can influence the end result positively. These two characteristics of a coordinator were mainly positively mentioned by the participants of the Buyer Group of Concrete, who have an exemplary coordinator following these characteristics for the concrete covenant. An aspect which is not a qualification, but which is beneficial for the Buyer Groups is the budget coordinators bring with them. This budget can be allocated to do some researches or to hire extra people to reduce the amount of work. Many participants are public bodies, who have often allocated their budget already for other purposes. Besides, the researches which are being executed, contribute to the level of knowledge of the Buyer Group, resulting in a more effective market vision.

C27: It is particularly important for the materials markets that the coordinator has an influential position within the Dutch administration, in order to be able to initiate changes to any conflicting regulations.

A disadvantage for the Buyer Group is the change of coordinators during the process. If the group has formed a culture already, it is easier for the coordinator to go with the existing flow. For example, in one Buyer Group there wasn't much focus on elaborating the second group, because it was just not the culture. In this case it hindered the diffusion of the market vision. But also, if more executive roles participate in the implementation phase, it might be wise to have a coordinator who has been involved from the start, as a constant factor.

C28: The Buyer Groups within all markets benefit from no change of coordinator, during the process, if a coordinator is qualified to guide in all stages of the process.

Coherence lessons learned
These 27 recommendations don't stand alone. Some aspects have strong influences on different elements of the Buyer Groups. In order to provide a clear insight in these linkages, the following figures have been created (figures 5.1, 5.2 & 5.3).

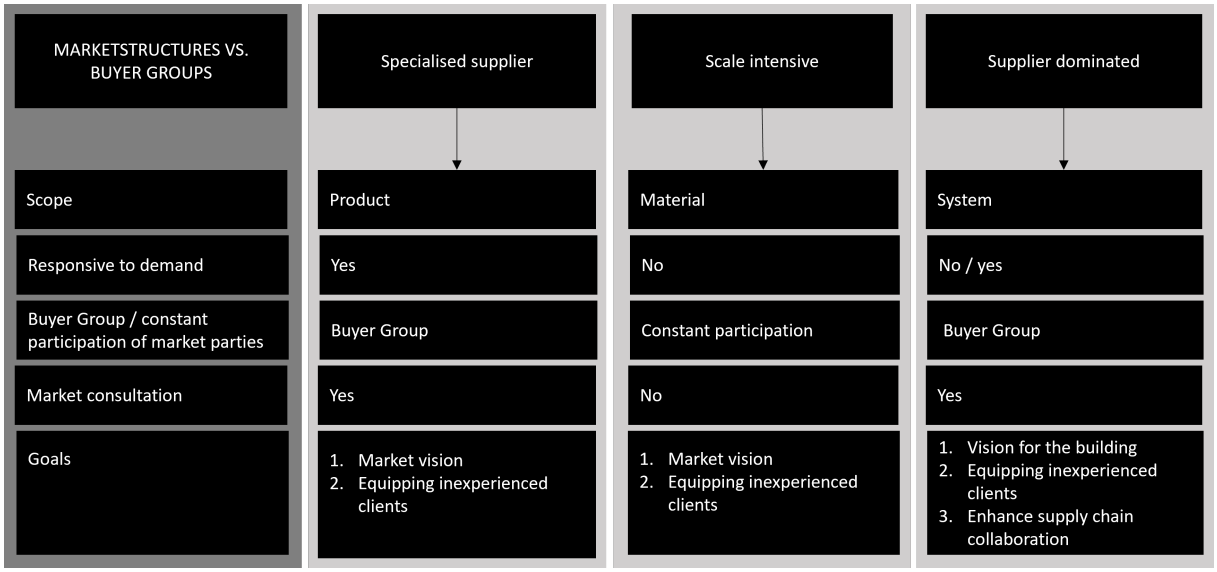


Figure 5.1: The different approaches for the Buyer Groups in different sectors

The first overview with linkages is focused on the impact of the market structures. The market structures have their main impact on the scope of the Buyer Group, the level towards a markets responds to demand measures and as a consequence how the interaction with market parties should be. At last, the goals of the Buyer Groups also differ per market structure.

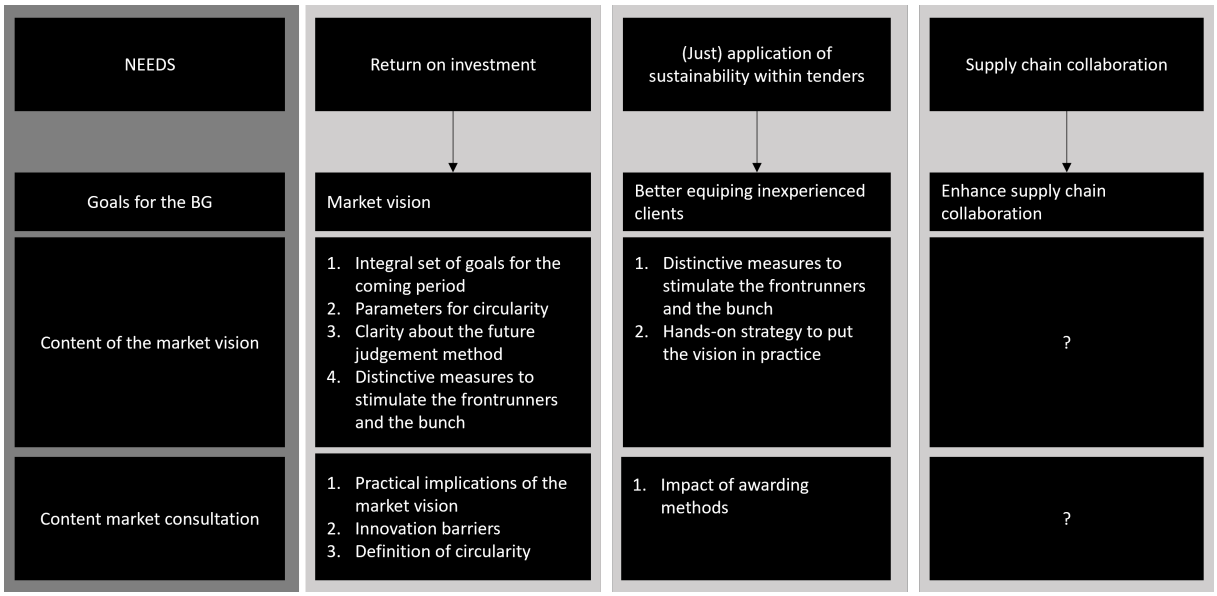


Figure 5.2: The barriers and the belonging strategies in overcoming them

The second scheme with linkages focuses on the barriers and needs of the market parties and their influence on the goals for the Buyer Group and the following requirements for the market vision and the market consultation.

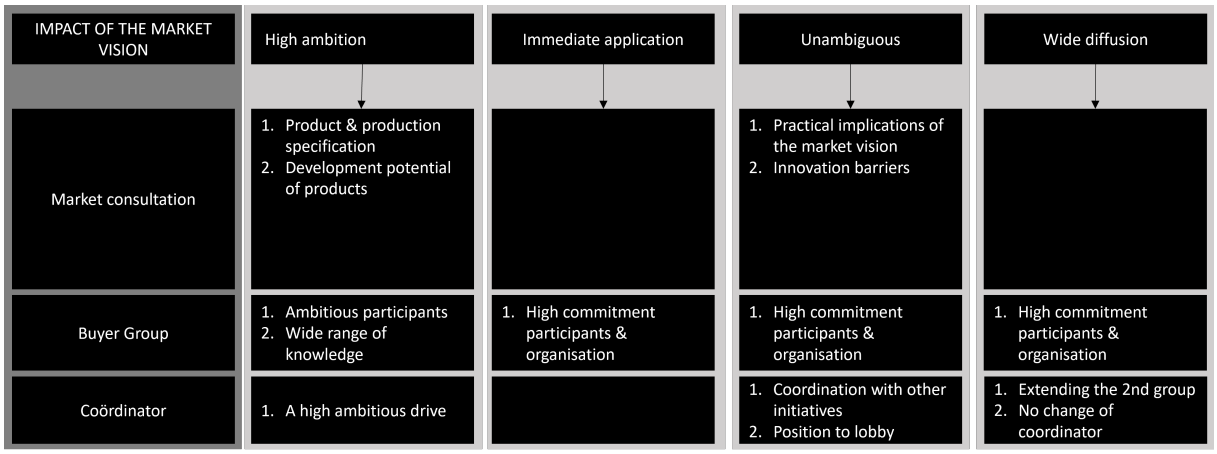


Figure 5.3: Making impact and the belonging strategies

For making impact with the market vision, four aspects have been mentioned. Those four aspects have their influence on: 1.) the discussion of certain topics during the market consultations; 2.) The requirements for the Buyer Groups; and 3.) The activities of the coordinator.

6 VALIDATION

To check the preliminary conclusions, two validation interviews have been conducted. The objective of the validation interviews was to check whether the conclusions based on the cases were more or less representative for other markets, in the building and construction industry, with the same structure. 27 preliminary conclusions have been submitted to the two interviewees, which can be found in appendix 5. The two interviewees were deployed by the ministry of Internal Affairs and the knowledge institute CROW. They both had central positions in the link between the market and the public sphere and had extensive knowledge about the dynamics within the building and construction industry.

Stimulating innovation
Concerning the motivation to innovate, they stressed that business economic concerns as a reason to innovate, also focuses on the continuation of business and not only on generating more revenue (validation interviewee 2, 2021). Secondly, not applying sustainable tender criteria (in a correct manner), is also related to a inconsistent way of applying those criteria, among the different contracting authorities (validation interviewees 1 & 2, 2021). Thirdly, they stressed the lack of response to demand within the supplier dominated markets and confirmed the important role of system integrators in stimulating innovation within these markets (validation interviewees 1 & 2, 2021).

Buyer Groups within the different types of markets
Concerning the focus of the Buyer Groups, they agreed with the focus on products for Buyer Groups focused on specialised suppliers (validation interviewees 1 & 2, 2021).

However, for the supplier dominated markets they recognised the difficulty of writing a market vision for the scope on a system level, however they were convinced about the importance of such Buyer Groups, because of the impact it can make (validation interviewees 1 & 2, 2021). Especially, on supply chain collaboration. With generating more insights in other stages of the lifetime of the building, products can be optimized for the entire lifetime, instead of for the phase which has the focus of the market party. Besides, fixed collaborations between contractors and sub-contractors or product suppliers could also lead to a collaborative innovation, which can be applied in multiple projects.

The need to focus on better equipping inexperienced clients, was being recognised. However, a side note was added to make a manual, as user-friendly as possible, because many procuring manuals already exists. A document with many different options to choose wouldn't be helpful. Standard product descriptions, functional criteria for the products or very hands-on tips with few choices, would better should the purpose of helping inexperienced purchasers (validation interviewee 2, 2021).

The Buyer Groups within the different phases of the transition process
Concerning the importance of Buyer Groups within the different phases within the transition process, they disagreed with the preliminary conclusion that Buyer Groups can only start within a sector which already has a certain sense of urgency (because business are not solely triggered by demand). Instead, the buyer groups could also be a mean to stimulate this sense of urgency, within their opinion (validation interviewees 1 & 2, 2021). There was agreement about the conclusions of the roles of the Buyer Group in the beginning of the second and third phase of the transition process; when many alternatives still have to be developed, buyer groups can steer with an integral set of goals, without determining a technology direction. When numerous alternatives exist in the market, the Buyer Groups should make sure LCA comparisons can be made between the alternatives, to distinguish the alternatives with a high sustainable impact of the less contributing alternatives (validation interviewees 1 & 2, 2021).

An effective market vision

Concerning the content of the market vision they agreed with the suggested topics; an integral set of goals, parameters to define circularity and clarity about the method of judging and awarding the bids (validation interviewees 1 & 2, 2021).

Concerning the strategy of the market vision, they agreed on differentiating measures for frontrunners and for the rest of the market (validation interviewees 1 & 2, 2021). One interviewee also mentioned a shift focus among these measures in different phases of the transition process; when alternatives still need to be developed a higher focus can be applied to stimulating front runners. While alternatives are being developed the focus can gradually also shift to stimulating the rest of the market (validation interviewee 1, 2021).

Concerning making impact with the vision, they agreed that it is needed to aim for a high and feasible vision, to practice what they preach, the create unambiguity within the market and to make sure many contracting authorities are going to use the market vision and strategy (validation interviewees 1 & 2, 2021).

Concerning the timeframe of five years, both interviewees (2021) were less enthusiastic, because for some products a shorter time span might also be suitable to reach the level of sustainability. However, not the entire market vision and strategy needs to be fixed for five years. Market parties do agree if the market vision is being updated now and then, however as long as the integral set of goals is remaining the same or pointing in the same direction for a longer period. The interviewees did agree with giving a perspective towards 2030 and 2050 (validation interviewees 1 & 2, 2021).

An effective market consultation

Concerning the engagement of market parties within the Buyer Groups one of the two interviewees recognised the need for a continuous collaboration with market parties, when there are just a few suppliers in the market, which is most often the case within scale intensive markets. The thought is that when many market parties exists, there is always going to be one or more market parties willing to act accordingly to the market vision (validation interviewees 1, 2021).

They nuanced the conclusion that a continuous collaboration with market parties would lead to a lower ambition, because some market parties are more ambitious than contracting authorities. Therefore, they agreed to use market contact for the function to create more insight into product specifications and future development directions, to better determine a feasible level of ambition for the market vision (validation interviewees 1 & 2, 2021).

They also agreed with the function of indicating practical implications of the concept version of the market vision and other end products (validation interviewees 1 & 2, 2021).

Furthermore, they agreed with asking for LCA data to make a technology choice when the market had developed numerous alternatives (validation interviewees 1 & 2, 2021).

Concerning the participants of the market parties, it is advised to mix the market parties stemming from different phases of the supply chain. However, mixing different supply chains is not being recommended (validation interviewees 1 & 2, 2021).

The design of the Buyer Groups

Concerning the participants of the buyer groups, there was agreement about the importance of incorporating ambitious and knowledgeable people with an ambitious organisation supporting them (validation interviewees 1 & 2, 2021). However, the term ambitious is not a very smart concept. Therefore, the annotation of 'getting things done' was suggested to be applied to the term 'ambitious' (validation interviewee 2, 2021).

People with knowledge and experience in the pre-procurement process, with technical product knowledge, sustainability and innovation expertise and feeling with writing policies were being agreed upon (validation interviewees 1 & 2, 2021). Especially, technical product knowledge and expertise concerning sustainability and innovation. Besides, thorough market knowledge is also needed.

Concerning the coordinator, the extra tasks of continuously extending the group of interested parties and coordination with other initiatives within the market, were being agreed upon (validation interviewees 1 & 2, 2021). A coordinator who also has the position to influence the change of regulations could be a benefit, however it was not being considered as essential. For example, contacting policy advisors concerned with the sector (via PIANOo) was also being considered as an option (validation interviewee 1, 2021).

Conclusion validation interviews

The most important aspects the two interviewees mentioned were, first of all, the relevance of Buyer Groups for buildings, because of the high impact a Buyer Group can make with such scales. Secondly, the interviewees did see a role for the Buyer Groups in markets in which a certain sense of urgency was not present yet. Their line of reasoning was that Buyer Groups could also create such sense of urgency. Thirdly, they criticised the fixed period of five years to write a market vision for, because some products might reach a goal earlier than expected. Fourthly they nuanced the conclusion that continuous collaboration with market parties would lead to a lower level of ambition. At last, they ranked the field of experiences and knowledge needed within the Buyer Groups.

7 RECOMMENDATION FOR THE BUYER GROUPS

The preliminary results have been validated with two validation interviews. The results have been updated. In this chapter an overview will be given of these conclusions. Besides, a graphical representation of the form of the different Buyer Groups within each market will be given.

The main recommendations

- Make the Buyer Group suitable for the type of market. This determines the structure and the focus of the Buyer Group;
- Determine the transition phase a market is in. Different transition phases need different content within the market vision.
- The market vision should, at least, create clarity about the industry's future definition of circularity and the manner of judging and awarding bids;
- The market strategy should be differentiated towards frontrunners within the market and the rest of the market. The group which needs most attention, also depends on the phase of transition a market is in.
- To make impact, a market vision should be:
  - Ambitious and feasible;
  - Implemented;
  - Diffused to all contracting authorities, in the end;
  - Embedded, in relation to other initiatives and norms within the industry.

  Based on this recommendation, many other recommendations are being made, for example concerning the tasks of the Coordinator;
- Interaction with market parties is required at two moments. The first moment is before the writing process start. During this consultation market parties should be asked about the future development potential of their products, or within the market. This helps in formulating an ambitious and feasible ambition level. The second moment for consulting the market is when the concept market vision is ready. Market parties can then indicate what practical implications will probably rise with the implementation of the market vision.

The structure of the detailed recommendations is like the structure of the rest of the report. First, motivational aspects for different market parties to innovate will be discussed. Secondly, the focus of the Buyer Groups in different markets will be elaborated upon. Next, the Buyer Groups are being recommended about the content of the market vision within different phases of the transition process. The overall content of the market vision, is the next topic for the recommendations. Followed by the topics to be discussed at certain moments in time, within the market consultations. At last, some recommendations will be given on the structure of the Buyer Groups and the role of the coordinator. For PIANOo, a Dutch version of this chapter has been written, which also maintains another structure. This instruction manual is being added in a separate appendix.

Motivational aspects in stimulating innovation

- All businesses start innovating because of their business economical position and their own vision. For some market parties, demand is also a reason to innovate. Specialised suppliers are most

responsive to a demand. The product innovators within the supplier dominated sectors are less responsive to demand. Scale intensive firms don't react to demand from their clients.

- The two biggest innovation barriers for all types of market parties are:
  - A low or uncertain return of investment for the innovation
  - A lack, or an improper, or an inconsistent incorporation of sustainability criteria within tenders
- For supplier dominated firms, additional innovation barriers are:
  - An indirect contact with their clients, making it hard to draw attention for the incorporation of their product;
  - A traditional attitude of partners higher is the supply chain, hindering the diffusion of their innovative product;

The focus of the Buyer Groups

- Buyer Groups are suitable to write a market vision in all three types of markets.
- The focus of Buyer Groups within the markets of specialised suppliers and scale intensive firms should focus on steering product innovation or material innovation. In contrast, the Buyer Groups within supplier dominated markets should focus a higher aggregated vision for a type of building instead of a technical product or material.
- The higher aggregated focus of Buyer Groups within supplier dominated markets should be combined with focus on stimulating supply chain collaboration, to stimulate collaborative innovations beneficial for the entire life time of the building. The market parties suitable as target market for such purpose are the system integrators.
- Because of the innovation barrier concerning tender criteria, a substantial part of the end product of all Buyer Groups should focus on better equipping inexperienced contracting authorities to incorporate sustainability aspects within their tender. This help should not be an extensive guideline with many different directions to choose, but a clear document helping in correctly and consistently
- Because of the irresponsiveness to demand, the low number of supplier and the high level of dependence of contracting authorities on the material suppliers, Buyer Groups within scale intensive markets can motivate the material suppliers for their market vision by:
  - Incorporate these market parties within their Buyer Group to lower the resistance and increase the commitment to the market vision.
  - Incorporating market parties from the entire supply chain, to improve the level of sustainability of the material during it entire life cycle, but also to put pressure on the material suppliers by their own supply chain.
- When market parties participate within a Buyer Group for the scale intensive markets, they should be excluded of determining the final level of ambition. Ambitious market parties can add value by indicating their development potential, helping in determining the ambition.

The different roles of Buyer Groups within different stages of the transition process

- When a market still has to, or is developing multiple alternatives, a high ambition is needed to stimulate these developments. However, a technology direction should be excluded from the market vision, within this phase of the transition.
- When many sustainable alternatives are developed within the market, a Buyer Groups should perform LCA's (or make sure the data within the National Milieu database becomes more precise) in order to disclose ineffective alternatives and stimulate the effective alternatives.

The market vision

- The most important aspects of a market vision, to stimulate innovation, are:
  - An integral set of goals for the coming years;
  - The sector's definition of sustainability and circularity: the linked parameters and their calculations;
  - Clarity about the future testing method, preferably for a given time period.
- Buyer Groups have to differentiate their purchasing strategy towards frontrunners and the rest of the market. Stimulating frontrunners should create the freedom and reward these parties to explore new technology options. Stimulating the rest of the market is (partly) about the diffusion of innovation. This can be done by demanding a minimum level of sustainability.
- A market vision can make impact, if:
  - The level of ambition is high and realistic;
  - The participants actually implement the vision within their own practice;
  - The vision is unambiguous
    - No adaptions of the market vision are individual purchasers;
    - Conformity with other initiatives, networks and platforms within the same market;
    - In harmony with laws and regulations.
  - The vision will be diffused to (all) contracting authorities.
- A market vision should be written for at least 5 years, with a view to 2030 / 2050. Of course the market strategy can be slightly adapted within this period of five years, as long as the suggested direction of goals for the sector remains the same for this period.

The market consultation

- For Buyer Groups within the markets of specialised suppliers and supplier dominated firms, market consultations should be performed to test their plans. However, in Buyer Groups for a scale intensive market, some market parties should continuously be involved in the process, to stimulate these few market parties in developing sustainable solutions.
- For the Buyer Groups within markets of specialised suppliers, two market consultations have to be executed. At least one market consultation must be held early in the process to discuss the development potential of market parties, in order to reach a feasible level of ambition. Other topics which can be discussed during this market consultation are: innovation barriers, impact of assessment methods, definition of circularity etc. After the concept version of the market vision has been written, a second market consultation must be held to indicate the practical implications of the concept market vision.
- For the Buyer Groups within markets of supplier dominated markets, one market consultations has to be executed. At least one market consultation must be held after the concept version of the market vision has been written to indicate the practical implications of the concept market vision. Another market consultation can be held to discuss topics like: innovation barriers, impact of assessment methods, definition of circularity etc.
- When there are many alternatives in the market for the Buyer Groups for products, it is necessary to ask in detail at the beginning about production processes and product characteristics that reveal the impact on sustainability aspects.
- When market consultations are being held with the entire supply chain (specialised suppliers), different stages of the supply chain can join one meeting. However, mixes between varying supply chains are being discouraged, because it easier distracts the focus of the meeting.
- To gather all needed information, physical market consultations are always more effective than digital meetings.

Design of the Buyer Group

- For a realistic market vision with a high level of ambition, it is necessary that participants in the Buyer Group:
  - Are ambitious & have a high level of knowledge and experience;
  - Have an ambitious organization behind them.
- Within a Buyer Group it is wise to have a mix of knowledge in the following areas:
  - Technical product knowledge;
  - Sustainability and innovation knowledge;
  - Market knowledge;
  - (Pre-procurement knowledge);
  - (Administrative knowledge);
- To keep organisations committed to the market vision, it is wise to ensure the following aspects:
  - Commitment from the top management layer, from the start and during the process with the Buyer Group;
  - Commitment from the other organizational layers (e.g. execution), during the process with the Buyer Group;
- To keep participants committed to the Buyer Group, it is wise to ensure the following aspects:
  - Knowledge sharing among the participants;
  - Clear communication of doable time burden, up front.

The role of the Coordinator

- In addition to guiding the process, the activities of the coordinator should also focus on:
  - A continuous expansion of the2nd layer (the group of interested parties);
  - Coordination with other initiatives in the market;
  - Setting in motion a change of law and regulations when these hinder innovation or are in contradiction with the market vision.

Out of the cross-case analysis, lessons have been drawn. These lessons have been validated and updated in the above. For a better insight in in the suggested forms of Buyer Groups within different types of markets, including the position of the interaction with market parties, a graphical representation has been made (figure 7.1)

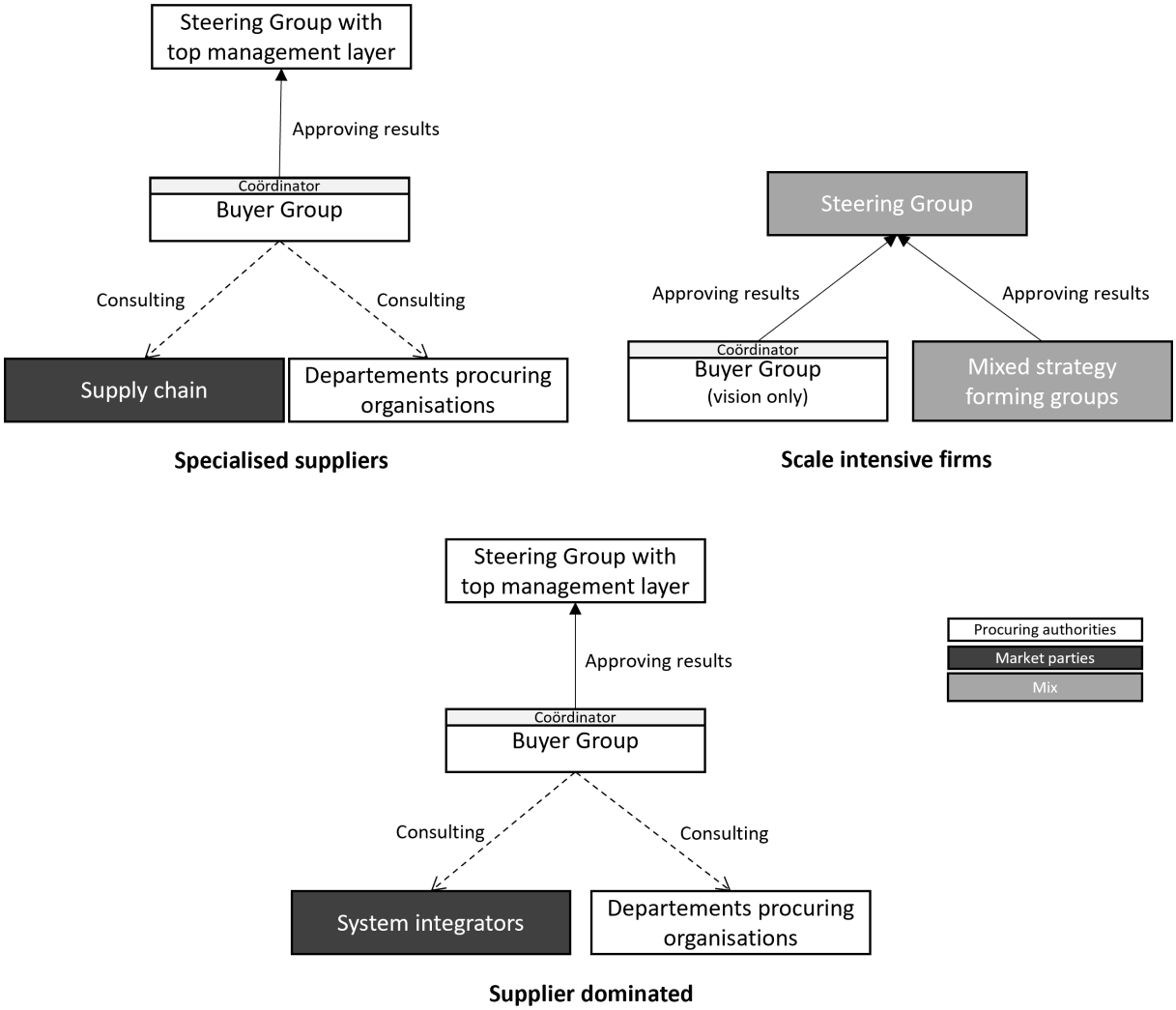


Figure 7.1: Suggested design of the Buyer Groups within different markets

All Buyer Groups have a steering group. Although the steering groups have different functions; within the markets dominated by scale intensive firms the steering group has a mixed background and combines the arguments of both type of groups. The strategy of the mixed strategy group and the ambition of the Buyer Group. The steering group for the other two types of markets are to create top management support. Within these two markets other departments of the participating organisations are also being consulted. However, within the Buyer Groups for the scale intensive firms, the size of the organisation/Buyer Group can get very big, because of the scope and the needed subjects to form a strategy for. Therefore, it is likely that multiple employees of one organisation will already participate within the structure for the Buyer Groups.

8 CONCLUSIONS

In the climate covenant it is agreed that the national governments would make arrangements with decentralised governments to enhance their purchasing power with the aim to work as much as possible in a climate neutral and circular manner on construction projects by 2030. These arrangements should also focus on tenders and standardisation of demand. To reach those goals by enhance the collaborative purchasing power, the Buyer Groups have been initiated as part of the National Plan MVI 2021 - 2025 (sustainable procurement). However, there is not much knowledge on the effectiveness of the Buyer Groups, because it is a relatively new concept. Besides, the construction industry consist out of many different sub markets with their own characteristics, influencing their attitude towards developing innovations and towards demand. Therefore, the main research question for this graduation project is:

"How can Buyer Groups effectively influence relevant construction sub markets towards a climate neutral and circular construction industry in 2030, with a harmonized market vision?"

To answer this question, needs within different markets and several aspects of the Buyer Groups have been investigated. Namely, characteristics of relevant construction sub markets, needs of market parties within the innovation process, requirement for the market vision and the market strategy, a suitable interaction among the Buyer Group and the market parties and the design of the Buyer Group.

Characteristics of the construction sub markets and its influence on innovation
The general construction industry is being known for its conservative character towards innovation. The many small firms don't execute research and development or knowledge sharing activities. Besides, loose relationships within the supply chain reduces the diffusion rate of innovations. However, in the past, some innovations have been spread within the construction industry. These innovations were being demanded by clients and being taken up by the so called 'system integrators'. These characteristics also influence the different sub markets.

The three most polluting construction sub markets in The Netherlands concerning CO_2 emission are the road & rail industry, the hydraulic engineering sector and the market for civil concrete. To analyse the different sub markets, the firm typology of Pavitt (1984) has been used (paragraph 3.2). In short, the used types are: 1.) supplier dominated firms, which are small, focused on the price and barely develop new innovations; 2.) Scale intensive firms, which are large and also focused on the lowest price. They do innovate their products, but not as a reaction to their clients' wishes; 3.) The specialised suppliers, which are small, have a higher focus on the product itself and develop in relation with their customers.

The general construction industry, the general road & rail industry and the hydraulic engineering sector can been characterised as supplier dominated, because of the many small firms, price sensitive clients and a minor focus on product innovation. However, the specialised road & rail industry is being characterised as specialised suppliers. They focus on specific products, produced by themselves, resulting in a higher focus on product improvement. The international bulk material suppliers within the civil concrete sector, do invest in some research and development, but hardly react to demand. Among the most relevant sector for the construction industry, no science based firm is present.

The defining factor for innovation with a market is the presence of R&D and knowledge sharing. However, influencing innovation with demand, is only possible when there is a relationship between clients and market parties. This is present within the specialised markets and with the system integra-

tors of the supplier dominated markets. However, supply chain collaboration is needed to influence the infrastructure parties within supplier dominated market. In order to reach scale intensive firms, the own vision needs to be influenced.

Market parties' needs from contracting authorities in the innovation process
The two most important needs within all markets were: 1.) a certain level of certainty on the return of their investment; 2.) a correct and consistent implementation of sustainability criteria within tenders. Within the supplier dominated sector, market parties have additional needs: a stimulation of supply chain collaboration to stimulate collaborative innovations or innovation diffusion.

The market vision is being legitimised in all markets because of the needs for consistent tender criteria and a higher certainty to return the investment. However, the specialised supplier are more sensitive to demand from clients, than the supplier dominated markets and the scale intensive markets. Therefore, the market vision, the market consultation and the design of the Buyer Groups need to be differentiated per type of market.

The type of market is determining the approach for the Buyer Groups, however, another influencing factor is the market's phase of transition. The presence of alternatives determines whether a technology direction should be chosen and whether frontrunners or the peleton should be stimulated.

The market vision
The focus of the Buyer Groups within market dominated by specialised suppliers should focus on product innovation, with consulting the entire supply chain in formulating the market vision. The Buyer Groups within a scale intensive market should focus on the material chain and incorporate the entire supply chain within their Buyer Group. The Buyer Groups within the supplier dominated markets write a market vision focused on a type of construction work or building and should focus on stimulating system integrators, who, on their turn can stimulate product innovation.

The market vision for all markets should include: 1.) an integral set of goals; 2.) parameters to define circularity; 3.) clarity about the method of judging and awarding the bids. When the market has already developed numerous alternatives, a technology direction also needs to be chosen. The vision should be written for at least five years, with a view towards 2030 and 2050. The strategy can be adapted within this five years. However, the direction of the aggregated goals should remain the same.

To implement the vision, strategies have to be made to stimulate front runners and the peleton, with a gradual shifting focus from front runners to the rest of the market depending on the transition phase of the market. Besides, the strategies also need to be suitable for inexperienced clients.

In order to be effective, the market vision should make impact by; realising a high and feasible ambition, implementing the market vision, creating a vision which is in harmony with other elements in the subsystem (regulations, other networks, consistent implementation)

Market consultations
For the Buyer Groups within the markets dominated by specialised suppliers and supplier dominated firms, the market interaction should be in the form of market consultations. When Buyer Groups deal with scale intensive markets, the Buyer Groups should continuously involve market parties within the Buyer Group. However, in all markets it is important to also have a network with solely contracting authorities, to together formulate their needs and ambitions.

Consulting about potential development plans early in the process to help determining the feasible ambition level. This is recommendable within markets with specialised suppliers. A second consultation about the practical implications of the concept market vision, can be applied within Buyer Groups for specialised suppliers and supplier dominated markets. With the first market consultation also other elements can be discussed in the two markets, like the sector's definition of circularity and innovation

barriers. When many alternatives have already been developed, the first market consultation should also focus on gaining information to build a LCA.

For the scale intensive markets, a continuous participation is needed, because these parties don't respond to demand and the existence of few suppliers increases the dependence of contracting authorities to these firms. However, it is recommended to leave the decisive power about the ambition level with the contracting authorities. In order to make this work, the structure of the Buyer Group of Concrete can be applied to these Buyer Groups (see figure).

The Buyer Group

The participants of the Buyer Group should be ambitious, work for an ambitious organisation with vigour and have some experience with demanding sustainable alternatives. Furthermore a variation of knowledge is necessary; technical knowledge, knowledge about sustainability or innovation aspects and a high level of market knowledge are required within the Buyer Groups. Experience within the pre-procurement process or experience with writing policies and strategies is also nice to have.

The commitment of the participants and their organisations needs to be high, to make sure the market vision and strategy are going to be implemented. Therefore, to commitment the participants, some time should be reserved to share knowledge and experiences. Secondly, the expected time burden should be communicated upfront clearly. To commit the organisation, attention should be given to involve the top management layers, but also other organisational departments.

The coordinator should perform several activities, to make the Buyer Group more effective. The coordinator should bear responsibility to continuously focus on communication and expand the second layer of interested contracting authorities. Secondly, the coordinator should coordinate with other initiatives within the market to reduce confusion within the market, among contracting authorities and the platforms themselves. Thirdly, when the market vision is in contrast with the existing regulation, or regulation hinders innovation, the coordinator should set in motion a change of laws.

9 DISCUSSION AND RECOMMENDATIONS FOR FURTHER RESEARCH

The conclusions have been drawn. However, how reliable are the conclusions and to which situations are they applicable? Such questions will be answered within this last chapter of the report. First the limitations of this research will be mentioned. Secondly, the research methodology will be discussed. Besides, a reflection will be given on whether this research results are an answer to the research question. Fourthly, a comparison will be made between the results of the case studies and the earlier described literature. The results will also be compared with the graduation research of Lennart van de Vliert, who also graduated on the Buyer Groups recently. His research was about the formation of the Buyer Groups and a successful cooperation within the demand harmonisation process. Last, but not least, recommendations for further research will be made.

9.1 RESEARCH'S LIMITATIONS

To mean research limitations will be mentioned. Next, three limitations because of scope choices will be mentioned.

This research is for a great deal based on the market typology of Pavitt [1984]. Even though a market might be dominated by one type of companies, other types of firms who also initiate innovation, often also exists within markets. Markets are more heterogeneous, than it is being presumed within this research.

Secondly, an attempt has been done to describe the most important sub sectors of the construction industry. However, the last publicly open data and reports per sector, which are being referred to, were somewhat outdated. Which is hindering the quality of this research, because the size and the dynamics within different sub sectors change rapidly. To create more actual insights, the interview questions also dealt with this topic. The limitation of this is however, that two different market parties and one or two employees of procuring authorities don't automatically create a representative overview of the market. However, it does create more up-to-date insights.

Limitations of this research because of scope choices, are:

1. this research is limited to the construction (and building) industry. The focus was on the construction industry, but with the incorporation of the Buyer Group for Circular Schools, the building industry was also being incorporated. The market parties within the different sectors have their own innovation barriers and needs, depending on the dynamics within the sector. For example, the need for more supply chain collaboration within the supplier dominated firms, are a result from the focus on projects within the construction and building industry. On the other hand, the used typology of Pavitt, which has formed a base for this research, is general and not specifically being made for the construction industry. It can even be applied to industries focused on services [Bogliacino & Pianta, 2016];
2. Most participants were public organisations, as a result of the focus on the construction industry. These clients need to comply themselves to the Tender law 2012, in contrast to private clients. Besides, organisational cultures can differ. This results in other client - supplier relations and will therefore probably influence the easiness of stimulation innovation with demand;

3. The market visions haven't been implemented yet. Therefore the impact of the Buyer Groups can't be measured yet. The recommendations for an effective market vision have been based on the indicated needs of the market parties.

9.2 DISCUSSION ON THE RESEARCH METHODOLOGY

The research methodology consisted out of two pillars: a literature reviews and case studies. This methods will be discussed including their effects on the reliability of the end results.

Literature review
The Buyer Groups are a relatively new concept. Therefore, not much literature has been written on its effectiveness. Within the performed literature review, concepts related to the Buyer Groups have been examined, with the objective to gain a deeper understanding of the Buyer Group, via these related concepts. First, the different types of construction sub markets have been examined, mainly based on reports of the EIB. To distinguish the different types of construction sub markets the typology of Pavitt [1984] has been used. A discussion of this theory can be found within chapter 3.2. In short, the theory exists for a while. However, the applicability of the theory has been discussed over the years and Bogliacino & Pianta [2016] has concluded that the theory is still valid, even for service industries. Besides this theory, barriers for innovation, transition theories [Simons, 2021] [Termeer & Dewulf, 2017], literature about intermediation and innovation adoption [Rogers, 1962] [von Hippel, 1986] have been investigated. To discuss the topics market consultations and internal roles of procuring authorities, gray literature has mainly been used, because of a lack of scientific literature. These include policy reports, or guidelines by knowledge institutes. Out of the literature review, propositions were being drafted, forming a base for the interview questions which were part of the case studies.

Case study
The means used to perform case studies were: observations, documents and interviews. The observations were being derived by attending a few meetings of the Buyer Groups and some market consultations. Attending those meetings created a better feeling of the hiccups within the Buyer Groups and made it easier to contact interviewees. The documents were two rapports which were being written in assignment of the Buyer Groups. The first report was dealing with the performance of the clients concerning societal accountable purchasing. The second report was a market analysis. Relevant aspects stemming from the observations and the documents were being incorporated within the interview questions, but it also mattered in choosing participants; when a tensions was being felt within the Buyer Groups, because of different visions, two participants of the Buyer Groups were being interviewed instead of one. This increased the reliability of the results.

The semi-structured interviews helped in gaining the needed information to answer the research questions, but also helped in diving into case specific characteristics, like the continuous market participation within the Buyer Group of Concrete. To validate the data stemming from the interviews, the transcripts were being checked by the interviewees. The digital conduction of the interviews made it possible to perform a high number of interviews, also increasing the level of reliability of results. However, for a few (around 2) interviews it might have reduced the level of openness.

Concerning the method of performing case studies, four criteria exist in judging the quality of the research design: 1.) Construct validity; 2.) Internal validity; 3.) External validity; 4.) Reliability [Yin, 2009]. Concerning the construct validity, multiple sources have been used as input to support the results. Besides, the transcripts have been checked by the interviewees themselves and the results have also been reviewed within 2 validation interviews by two experts who didn't participate within the Buyer Group, but who did have extensive knowledge about the building and construction industry. The internal validity has been guaranteed, by seeking patterns among the different cases, but also among the different type of interviewees; market parties, participants of the Buyer Groups and the coordinator. The validation interviews also helped in checking the causality of some relations within the analysed data. Contradicting explanations have been addressed, for example concerning the differ-

ent expectations of the market vision. Besides, the results have been explained using existing models and theories. The external validity has been covered by choosing four cases within the construction and building industry. A disadvantage might be that three of the four cases were contextualised by different types of markets. For the reliability and reproducibility of the research an interview protocol has been developed and used. The strategies to deal with these four criteria are also being based on Yin [2009].

9.3 VALIDATION OF THE RESULTS

The aim of this research was to create insights, to overcome a problem statement. Buyer Groups with a strategic focus are a relatively new concept. Therefore, the problem statement of this research is about the lacking insight in how to effectively use the Buyer Groups and their market vision, to influence the transition towards a climate neutral and circular construction industry by 2030.

The output of this research is: better insight in what market parties need to contribute to that transition in different type of markets and within different phases. Following out of these needs, suggestions have been made for the Buyer Group on how to design their market vision, how to make impact with the market vision, how to involve market parties within the process of writing the market vision in order to create a more effective market vision and how to design the Buyer Group in order to write an effective market vision.

However, aspects which are not being included in this report, but are necessary to overcome the problem statement, are deeper insight in how to stimulate supply chain collaboration as a Buyer Group with a focus on supplier dominated markets. Besides, the effects of the implementation of the market visions has not been measured yet. This, because most Buyer Groups are about to implement the vision. Investigating the implementation phase can create deeper insights in the effectively of a market vision and a Buyer Group. Besides, among the investigated cases was not prototype of the market type dominated by science based firms. Therefore, it is not known how to steer the transition within these markets.

Therefore, the outcomes of this graduation report do give more insight for the problem statement. However, to fully give an answer to the problem statement, further research is needed within the implementation phase, or for some particular types of markets (see paragraph 9.6).

9.4 COMPARISON OF OUTCOMES WITH EXISTING LITERATURE

The literature study is being performed to gain more knowledge about the concepts related to the Buyer Groups. Out of the literature study, propositions have been formulated which were input for the interviews. Some propositions were being confirmed, others contradicted or being declared irrelevant. Also aspects, not being within the literature study were being mentioned during the interviews. This is a benefit, stemming from the semi-structured character of the interviews.

Pavitt's market structures
First, the typology of Pavitt [1984] about the market structures and their impact on innovation. The first remark is that reality is always more complicated than a typology. Thus, for example, the drive of clients is also dependent on societal trends, resulting in a shift towards performance sensitivity also in scale intensive market. However, overall, it is true that specialised suppliers are most sensitive to demand because of their close relationships with their client while developing an innovation and that scale intensive firms do innovate, but are not sensitive to demand incentives. It is also true that innovations within supplier dominated markets, are most of the times being developed somewhere else in the supply chain.

Barriers for innovation

Out of the seven mentioned barriers within the theoretical framework (paragraph 3.3), a bad return on investment and a lack or an incorrect or an inconsistent application of sustainability requirements within tenders were being mentioned by the market parties as most hindering barriers. A lack of knowledge sharing and supply chain collaboration is mostly being mentioned by market parties within supplier dominated markets. The barrier of a robust design has not being mentioned as a barrier, but is rather being seen as a ground condition. Regulations and politics as barriers were being mentioned as barriers, however a higher certainty about the return on investment and proper incorporation of sustainability within tenders was being considered as more important. Another mentioned barrier within the interviews was the ability of purchasers to judge the bids and the construction works on their quality, this to prevent promises which won't be complied.

Transition theories
Two transition theories have been (partly) mentioned within the theoretical framework. First, the Sustainable Market Transformation of Simons & Nijfhof [2021] and the Small Wins theory of Termeer & Dewulf [2017].

The different transition phases of the Sustainable Market Transformation theory are being recognised within the cases. The focus was especially on the second and the third phase of the transition process. The proposition that Buyer Groups can only start when there is a sense of urgency in the market (phase 1) was being contradicted by the case studies. In the second (competitive advantage) phase, creating a long term vision is needed, next to the contracting authorities to act as lead users. However, technical directions shouldn't be given in this phase. Market parties need to be stimulated to experiment and discover a wide range of alternatives which can make an impact. However, within the third (pre-competitive collaboration) phase technical direction needs to be given. This distinction between a long term vision with goals and a technical direction is not being made within the transition theory.

Within this research, a part of the transition theory 'Small Wins' has also been mentioned. This theory includes three types of intervention measures [Termeer et al., 2019]: 1.) Formulating, maintaining and improving a provocative ambition; 2.) Recognising,valuing, provoking and initiating small wins; 3.) Understanding and activating drivers (see figure 9.1). This theory has been incorporated for the clear and detailed description of a provocative ambition, stimulating the transition.

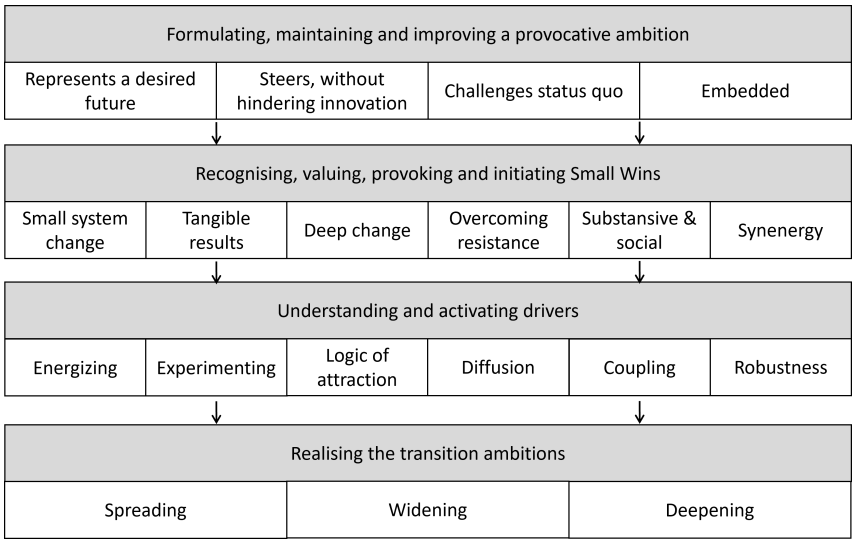


Figure 9.1: An overview of the intervention measures of the Small Wins approach (Termeer, Dewulf, Metze, Wiegant, 2019)

The recommendations for the market vision for the Buyer Groups more or less correspond with the suggestions of Termeer et al. [2019]. The high & feasible ambition and the embedded characteristics are similar. An ambiguous character to not hinder innovation, is especially required within the begin-

ning of a transition and the last character, challenging the status quo is not a specific outcome of this research. However, the aim of a market vision is to set an entire industry in motion. Therefore, this characteristic of a market vision seems reasonable.

Next to formulating a provocative ambition, the Small Wins theory also advises on other aspects which have not been included within this research. For example, to maintain and improve the ambition. Besides, it has not been investigated whether a Buyer Groups should also pay extra attention towards recognising, valuing, provoking and initiating small wins, towards understanding and activating drivers and towards the realisation of the ambitions. It might be a possibility to investigate what role the Buyer Groups can play with these activities. Furthermore, it can be investigated whether the approach of Small Wins might be suitable for a specific type of market or transition phase; because the Small Wins are relatively small and therefore are suitable for situation in which much resistance is presence, it is my estimation that the Small Wins theory can be extra effective in Buyer Groups who focus on market, which are being dominated by scale intensive firms. Next, it is my guess that the Small Wins theory might be extremely useful in the beginning of the Buyer Groups' process, because the realisation of Small Wins needs a distracted environment.

Interaction among Buyer groups and market parties
There is not much scientific literature on market consultations. However, the consultations are being suggested as a solution to the problem that market parties don't know the needs of contracting authorities and contracting authorities have no clue about the future capabilities of market parties in developing sustainable innovations. This is being recognised within the case studies. Market parties want to have a vision to be sure of demand for their innovative solution. Besides, the fact that contracting authorities don't know about the existence of their innovative solution or are not capable to see the extra value in comparison to other alternatives, hinders the diffusion of their innovative solution. With the Buyer Groups, a vision is being created to indicate the needs of contracting authorities. However, in order for market parties to innovate towards that ambitious vision, the vision should also be feasible. A strategy which can help in making the vision feasible is to ask market parties about the development potential of their products, or other alternatives if the innovation is more radical. Out of the case studies, it can be concluded that this aspect has barely been on the agenda. Concerning the form of the market consultation, it would have helped if the market consultations were being conducted physically; to make a connection for an open conversation. One proposition about the invitation of market parties was that an open invitation would create a better overview of the market. However, when the goal with a consultation is to get better insight in the future development possibility and to hear refreshing solutions, a closed invitation with ambitious market parties is more suitable.

Intermediation
Intermediating parties can smoothen the interaction by reducing language barriers and stimulating knowledge sharing. Within the Buyer Groups not many arguments have been given for intermediaries by external advising parties or similar parties. Although these parties were being appreciated by the Buyer Groups to reduce the workload. However, the coordinator also has an intermediating function. Therefore, some other important tasks for the coordinator are derived from the case studies as well.

Platform with suppliers
The case studies didn't focus much on a platform with solely suppliers, however this was being incorporated within the Buyer Group of Concrete. Their collaboration leaded to new ideas to further stimulate innovative ideas. However, a ground condition should be that every party is not focusing on their own business economical concern, but on the market situation.

Participating organisation within the Buyer Group
Within the case studies it has not been mentioned, whether there is a preference for participants of the Buyer Groups to be public or private, or stemming from a certain administration level. Although, a high level of expertise and knowledge is being considered essential for a qualitative market vision. Many municipalities, for example, are, most of the time, not being considered as having the required level of knowledge. A side note to this, is the wide variation among municipalities. However, literature

[Arnoldussen et al., 2017] is suggesting a more important role for municipalities in order to stimulate innovation, to stimulate a more consistent policy throughout multiple administration levels. Making the market vision suitable for all the varying purchasers at contracting authorities, is also a wide concern stemming from the case studies. Therefore, the market vision should be written by experienced and knowledgeable people, who also take into account the applicability of the market vision for inexperienced contracting authorities.

Participants within the Buyer Group
The roles of the participants within their own internal organisations were also being mentioned within literature. However, within the case studies this was being considered irrelevant. More important, was the presence of ambition, knowledge and expertise within the group. The knowledge required for the Buyer Groups is being mentioned.

9.5 COMPARISON OF OUTCOMES WITH THE GRADUATION RESEARCH OF LENNART VAN DE VLIERT

This graduation research is not the only research focused on the Buyer Groups. Recently, Lennart van de Vliert also graduated on the Buyer Groups with a focus on the internal dynamics. First, he focused on different suitable and legitimate forms of the Buyer Groups. Secondly, he focused on important aspects of the design of the Buyer Groups for the demand harmonization process [Van de Vliert, 2021]. This second subject will be compared with the results stemming from this graduation report about the characteristics of the Buyer Groups from the viewpoint of a stimulating innovation (SQ4).

Motivated participant of the Buyer Group
For the formation of the Buyer Groups, the focus of Van de Vliert's work is on finding motivated parties with an organisational mandate, because this will accelerate the group process and increase the qualitative input of the group [Van de Vliert, 2021]. Based on this research, motivated participants also contribute to the implementation and the diffusion of the market vision. Van de Vliert also gives some suggestions to keep participants and their organisations committed [Van de Vliert, 2021]. Thus, selecting motivated parties, with an organisational mandate is both important for a positive group process and for the impact of the Buyer Group.

Type of organisations participating
Within the results of this research no specific attention has been given to the type of participants. Although, this has been mentioned within the literature study. However, Van de Vliert's conclusion about the national governments, who have a high level of knowledge and expertise, but are not easily committed to the market vision [Van de Vliert, 2021], can be shared based on the interviews which were being held.

Expertise within the Buyer Groups
A wide variation of expertise is also recommended within both researches to increase the quality of the market vision. However, a side note of the other report is that large groups can contribute to this wide variation, but is not stimulating the group process of demand harmonization [Van de Vliert, 2021].

Scope
For the calculation of impact, a smaller scope is being recommended [Van de Vliert, 2021]. However, in order to make impact, a larger scope is being advised, if executed properly, which is more difficult for a larger scope.

Making impact by diffusing the market vision
Both researches have stressed the importance of diffusing the market vision to other contracting authorities. Attracting contracting authorities for the second group and frequent communication, help in this.

Conclusion
In summary, many aspects determining the success of the group process within a Buyer Group also have a positive effect on the stimulation of the sustainable transition within the construction industry. Except for the size of the scope; a smaller scope is more clear, however it makes less impact on the sub systems of this society.

9.6 RECOMMENDATIONS FOR FURTHER RESEARCH

Within this discussion, some open ends have been discussed. The following five suggestions for further research are being made, resulting out of these open ends.

First of all, the implementation phase of the market vision is about to start for most Buyer Groups. Therefore, the first recommendation is to measure the real impact of the different market visions. With the results of this investigation, deeper insights can be created to answer the question: how can Buyer Groups stimulate market parties within the sustainable transition? Van de Vliert [2021] has made some suggestions, making it easier to measure the impact of the market vision.

The second suggestion is about the markets outside the construction industry. The scope of this research was focused on construction industry, however Buyer Groups also focus on other industries, in which impact can be made. Therefore, research can be done to investigate how Buyer Groups can be effective in those industries.

Furthermore, the market type of science based firms has not been included within this research because no such construction Buyer Group existed. Therefore, their barriers, needs and preferences still need to be investigated.

The fourth recommendation is to do research into enhancing supply chain collaboration within the Buyer Groups focused on markets dominated by supplier dominated firms. The lack of this collaboration is hindering the development and diffusion of innovative solutions. However, how to stimulate this collaboration has not been indicated by the case studies.

Lastly, it is being recommended to investigate the possibilities the Small Wins theory could create for the Buyer Groups in stimulating the sustainable transition. Especially for markets with much resistance, like for example the markets which are being dominated by scale intensive firms.

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APPENDICES

Several appendices have been included within this report. The first appendix positions the Buyer Groups within the entire range of demand sided measures. The potential of demand sided measures to stimulate innovation is being recognised more and more. In this appendix the qualities of the different forms of measures are being explained. Besides, the Buyer Groups are being compared with the other measures. The second appendix is about the Sustainable Market Transformation. In the main text, the four phases are being discussed. However, before intervention can be applied into a market, first the dynamics within a market need to be clear. In order to come to this clarity, Simons & Nijfhof [2021] created the model of the four loop system, which is being explained in appendix 2. Appendix 3 gives an overview of the propositions stemming from literature. These have been mentioned in the text, but in this appendix a clear overview of them is being given. Appendix four is giving an overview of the axial codes which have been used to analyse all the transcripts. Besides, the frequency of a theme being mentioned is also being shown. The last appendix is also a short overview. This overview gives insight in the preliminary conclusions, which were stemming from the case studies and have been used for the validation interviews.

APPENDIX 1: DEMAND SIDES MEASURES

In order to position the Buyer Group within the range of demand sides measures, this appendix has been written. It first elaborates on different types of demand sided policy measures. Next, a comparison is being made between the Buyer Groups and other demand sided measures.

Different types of demand measures
Established demand-sided policy measures can be divided into three different categories: public procurement supporting private demand, regulation and systemic policies [Edler & Georghiou, 2007]. A complete overview of the demand measures is given in figure .3. Direct support for private demand can be given by subsidies or tax incentives. Indirect support exists out of training, awareness building, giving foresight, e.g. [Edler, 2013]. Regulations can be used to shape a market, to support innovation-friendly private regulation activities or to regulate the product performance, e.g. [Edler, 2013]. Systemic policies focus on the entire supply chain or on clusters within a market [Edler & Georghiou, 2007].

However, the most frequently used measure to stimulate innovation is public procurement. OECD identified three types of public procurement [OECD, 2011]: regular procurement, which can be made more innovation-friendly, strategic procurement to demand new goods or services for societal challenges and thirdly, the procurement of R&D services, using targeted subsidies to trigger the development of new products and services. The latter form of procurement is most often executed in the form of pre-commercial procurement (PCP). Strategic procurement can further be specified into forward commitment procurement, public procurement for innovation, procurement with negotiation possibilities and public procurement of innovation solutions [Lenderink et al., 2019]. The difference between public procurement for and of innovation is that the former type fulfills a specific need and the latter forms has a broader use [Lenderink et al., 2019]. An important element of forward commitment procurement is the preliminary market consultation, which will be elaborated upon in section 3.5. Edler (2013) also distinguishes co-operative and catalytic procurement. Within co-operative procurement, the state actor is part of a group of contracting authorities and within catalytic procurement, the public organisation does not utilise the innovation itself, but it organises the private procurement. Figure .2 gives an overview of the different variants of public procurement.

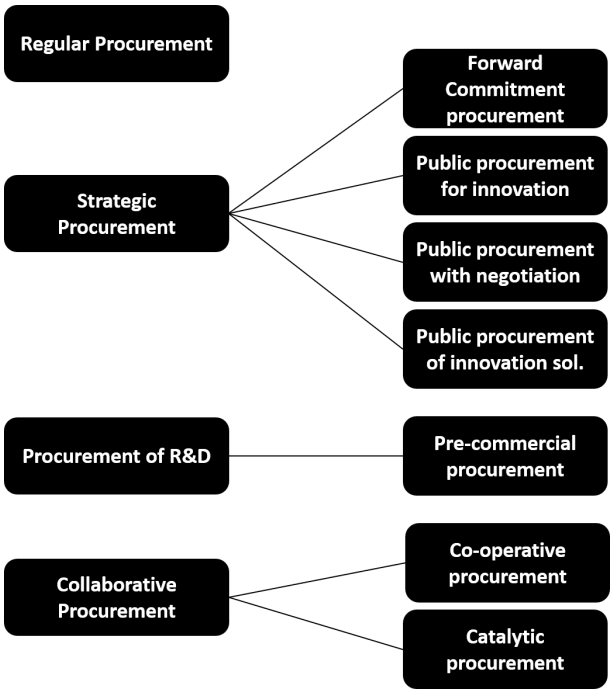

Figure .2: Various forms of Public Procurement

A comparison of the Buyer Groups with other demand measures

The Buyer Groups can not be contributed to one specific category of the four demand measures. The buyer groups have elements from co-operative procurement, demand articulation and foresight and user-producer interaction. The buyer groups are similar to co-operative procurement because of the bundling of clients. However, the participants aren't going to execute a joint procurement. Disadvantages of joint procurement are increased complexity of the purchasing process, loss of flexibility and control, and possibly a less ambitious formulation of the requirements because of adjustments to the "weakest link" within the group [Whyles et al., 2015]. The Buyer Groups do profit from the scale when cooperating to formulate a market vision, however they don't have to deal with these mentioned problems for joint procurement. Although the Buyer Groups can also encounter these problems if they do write future requirements within their market vision. This problem can be encountered by formulating the market strategy with the most ambitious parties, the lead users. The end product of the buyer groups will be a market strategy which articulates needs and gives foresight in their future procurement plans. In order to come to this strategy, or to validate it, the interaction with suppliers will be used. This interaction in the form of market consultations is an element of the Forward Commitment Procurement.

Public Procurement for Innovation (PPI) might be useful in the tenders after the market strategy has been formed, because PPI is particularly relevant in the case of well-defined and agreed upon needs, but without clear alternatives [Uyarra et al., 2020]. If the goal is to further diffuse an existing solution, innovation friendly procurement can be used [Uyarra et al., 2020].

Instrument	Method of functioning
1. Public demand: state buys for own use and/or to catalyze private market	
General procurement	State actors consider innovation in general procurement as main criterion (for example, definition of needs, not products, in tenders)
Strategic procurement	State actors specifically demand an already existing innovation in order to accelerate the market introduction and particularly the diffusion
Cooperative and catalytic procurement	State actors deliberately stimulate the development and market introduction of innovations by formulating new, demanding needs (including forward commitment procurement)
	Special form: catalytic procurement: the state does not utilize the innovation itself, but organizes only the private procurement
2. Support for private demand	
Direct support for private demand	
Demand subsidies	The purchase of innovative technologies by consumers or industrial demanders is directly subsidized, lowering the entry cost of an innovation
Tax incentives	Amortization possibilities for certain innovative technologies, in different forms (tax credit, rebate, waiver, and so on)
Indirect support for private demand: information and enabling (soft steering): state mobilizes, informs, connects	
Awareness-building measures	State actors start information campaigns, advertise new solutions, conduct demonstration projects (or support them) and try to create confidence in certain innovations (in the general public, opinion leaders, certain target groups)
Labels or information campaigns	The state supports a coordinated private marketing activity which signals performance and safety features
Training and further education	Consumers are made aware of innovative possibilities and simultaneously placed in a position to use them
Articulation and foresight	Societal groups and potential consumers are given voice in the market place, signals as to future preferences (and fears) are articulated and signaled to the marketplace. Variations (including constructive technology assessment)
User – producer interaction	State supports firms to include user needs in innovation activity or organizes fora of targeted discourse (innovation platforms, and so on)
Regulation of demand or of the interface demander–producer	
Regulation of product performance and manufacturing	The state sets requirements for the production and introduction of innovations (for example, market approval, recycling requirements). Thus demanders know reliably how certain products perform and how they are manufactured
Regulation of product information	Smart regulation to ensure freedom to choose technologies, but changing the incentive structures for those choices (for example, quota systems)
Process and 'usage' norms	The state creates legal security by setting up clear rules on the use of innovations (for example, electronic signatures)
Support of innovation-friendly private regulation activities	The state stimulates self-regulation (norms, standards) of firms, supports/moderates this process and plays a role as catalyst by using standards
Regulations to create a market	State action creates markets for the consequences of the use of technologies (most strongly through the institutional set up of emission trading), or sets market conditions which intensify the demand for innovations
3. Systemic approaches	
Integrated demand measures	Strategically coordinated measures which combine various demand-side instruments
Integration of demand- and supply-side logic and measures	Combination of supply-side instruments and demand-side impulses for selected technologies or services (including clusters integrating users and supply chains)
	Conditional supporting of user–producer interaction (R&D grants if user involved)
	Pre-commercial procurement

Figure .3: Public demand measures (Edler, 2013)

[Edler, 2013] made an overview and categorized policy measures focused on influencing the demand for products and services (see: figure **??**). The buyer groups have elements from cooperative procurement, articulation & foresight and user-producer interaction.

APPENDIX 2: THE FOUR LOOP SYSTEM OF THE SUSTAINABLE MARKET TRANSFORMATION

According to Simons & Nijfhof [2021] this model in figure .4 enables us to understand why markets are becoming unsustainable and more over, which elements need to be influenced in order to improve the situation.

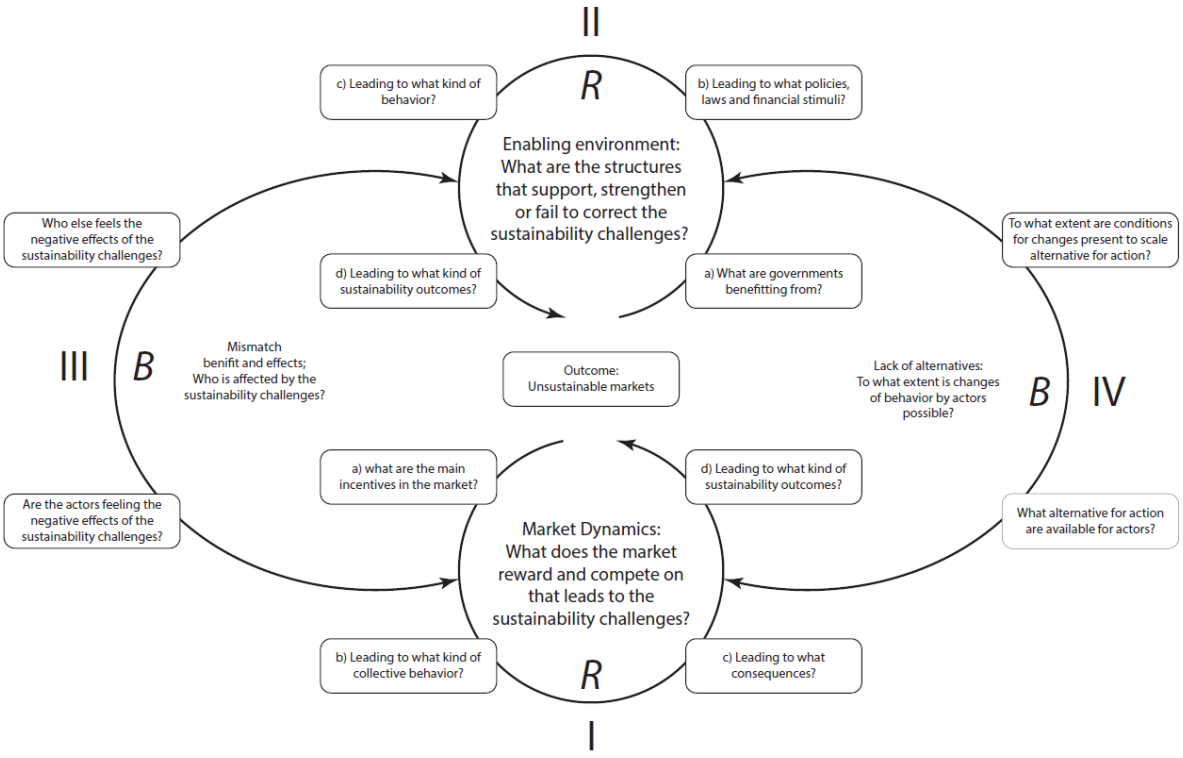

Figure .4: The four system loops that lead to unsustainable outcomes (Simons and Nijhof, 2021)

The first loop, explaining the outcome of a failing system, is the loop of the market dynamics. By understanding the market dynamics the questions can be answered, creating insight in the dominant collective behavior in the market and their consequences.

The second loop is the enabling environment. This loop starts with the interests of governmental institutions, because with their desired benefits in mind, they create an enabling environment which is reinforcing or attenuating the outcome of the first, market dynamics loop.

The third loop is about the match of benefits and effects. Or so to say, the absence or ineffectiveness of it. It shows that the effects of unsustainable behavior are often not felt by the causing (market) actors.

The fourth loop is also a lack or an ineffective phenomenon. It is about the lack of qualitative and affordable alternatives. In order for a system to change, sustainable, upscale-able alternatives need to be present.

The market dynamics and the enabling environment create the drivers for certain collective behavior. Loop three is indicating is the negative consequences incentives the polluting parties to change and loop four indicates the presence of a possibility to get out of this system.

Based on the insights this model gives about the dynamics in a certain sector, policy measures can be made suitable for this particular market.

APPENDIX 3: OVERVIEW OF THE PROPOSITIONS STEMMING FROM LITERATURE

Within this appendix the propositions are being presented, which are being derived from literature. These propositions have been used to make the interview questions. They have been divided according to the literature themes which are being used in table 3.5, which creates an overview of the link between literature and the interview questions.

1. The performance of supplier dominated firms can most easily being steered by improvement of the products of their suppliers (scale intensive firms or science based firms);
2. Specialised suppliers and science based firms react most easily to performance incentives to innovate the performance of their product;

Reaction to demand

3. Especially specialised suppliers are most sensitive to demand from their clients;
4. In a supplier dominated market system integrators need to be triggered by a clear demand in order to start the development of an innovation;
5. In a supplier dominated market, the infrastructure doesn't initiate innovation, they only follow their system integrators.

Innovation flows within the supply chain

6. Scale intensive firms can make the most impact by spreading their new innovations in their own supply chain, followed by science based firms.
7. Science based firms can make the most impact by spreading their new innovations towards other markets, followed by specialised suppliers.

Most important barriers

8. What barriers hinder the most and does this differ per type market?

Buyer Groups within different transition phases

9. The need of market parties from purchasing organisations is different in each phase of the transition process;
10. The Buyer Groups can only make a difference when there is already a sense of urgency;
11. The main impact can be made in the competitive advantage stage, followed by the pre-competitive collaboration phase;
12. The Buyer Groups can steer in the competitive advantage phase by being the lead user, create a long-term vision and recognise leaders

Requirements for a market vision

13. An ambitious market vision needs to represent a desired future, needs to steer and overcome barriers, needs to challenge the status quo and needs to be embedded;
14. In market with much resistance, stimulating small wins is most effective.

Content of the market consultation

15. The content of the market consultations should be about the capacity, capability and willingness of the supply chain to deliver an innovative alternative and the future needs of the procuring authorities;

16. Market consultations help in identifying the (future) needs;
17. Market consultations help with optimising the tender requirements, setting the appropriate level of ambition and help in identifying barriers;
18. Market parties expect to get more insight in future needs, plans and projects within market consultations;

Practical execution of the market consultation

19. For creating a market vision, market contact in the form of a market consultation is most desirable;
20. Open invitations create a better market overview;
21. Interactive, oral market conversations create a better market overview;
22. Digital meetings hinder the quality of the market consultations.
23. A market consultation is most effective with parties who have more or less the same direct interests;

The role of intermediating parties

24. Intermediating parties can smoothen the conversation between clients and market parties, by reducing language barriers, stimulating knowledge sharing etc.;

Platform with solely market parties

25. In order to develop innovation, market parties are in need for a platform with other market parties from the own, or from other supply chains.

Requirements participants Buyer Groups

26. The most suitable participants of the Buyer Groups are the early adopters, who strategically adopt innovations based on their own calculations;

Opinion leadership to diffuse the vision

27. Opinion leadership is important to widen the group of interested parties and to further diffuse the market vision;

Requirements participating organizations Buyer Groups

28. Internal innovation-friendliness of public participants influences the effectiveness of the market vision;
29. Local contracting authorities have less capabilities and possibilities to stimulate innovation;
30. The involvement of local contracting authorities is necessary for the consistency in demand policy over multiple levels of the Dutch administration.
31. The role of internal client seems most suitable to participate within the Buyer Group;

APPENDIX 4: AXIAL CODES AND THEIR FREQUENCY PER BUYER GROUP

For analysing the data stemming from the interviews, the transcripts have been coded and assigned to axial codes, or categories rising from the data itself. The 27 found categories can be found in figure .5, including the frequency this topic was being mentioned in the interviews per Buyer Group.

Axial code	BG: Asphalt	BG: Road Signs	BG: Concrete	BG: Schools	Total
Innovation within the submarket					
1 Supply characteristics	8	13	5	11	37
2 Demand characteristics	8	13	4	8	33
3 Innovation initiator	8	4	1	2	15
4 Innovation flows in the market	8	2	3	15	28
5 Presence of alternatives	3	7	3	3	16
6 Resistance	0	3	2	3	8
Innovation at the market party					
7 Incorporation innovation in business	20	2	3	5	30
8 Way of working while innovating	11	4	9	7	31
Innovation barriers and motivations					
9 Innovation barriers	14	9	7	7	37
10 Source of innovation motivation	7	4	4	7	22
11 Motivational steering mechanisms	11	6	7	11	35
Market vision					
12 Content of the market vision	34	38	23	37	132
13 Checking of the biddings	0	4	0	0	4
14 Financing	4	3	4	3	14
15 Certification / supervision	2	3	1	0	6
16 Type of procurement	10	6	7	3	26
Market consultation					
17 Relationship client and supplier	12	18	8	10	48
18 Market consultation	13	24	12	10	59
19 Participants market consultation	9	2	4	13	28
20 Collaboration with other market parties	4	8	9	4	25
Buyer Group					
21 Design of the Buyer Group	9	28	34	22	93
22 Connection with other initiatives	9	14	9	4	36
23 Market contact within the Buyer Group	9	2	2	5	18
24 Difussion to other purchasers	20	5	11	8	44
25 Commitment to the Buyer Group	7	17	7	6	37
26 A transparant process	1	0	1	0	2
27 Implementation phase	2	2	6	5	15
Total	**243**	**241**	**186**	**209**	**879**

Figure .5: The used axial codes and their frequency per Buyer Group

APPENDIX 5: PRELIMINARY CONCLUSIONS

An overview of the lessons learned out of the cross case analysis are being presented in this appendix. These preliminary conclusions have been used for the validation interviews.

1. For all market parties, the business economical position and the own vision are determinants of their innovation activities. Market parties who focus on a product are most responsive to a demand. The supplier dominated sector can react to demand, if being purposed properly. However, scale intensive firms don't react to demand from their clients.

2. The two biggest barriers for innovation are:
   a) A low or uncertain return of investment for the innovation
   b) A lack, or an improper incorporation of sustainability criteria within tenders

3. For supplier dominated firms, the barriers for innovation are:
   a) An indirect contact with their clients;
   b) A traditional attitude of partners higher is the supply chain, hindering innovation;

4. Buyer Groups can write a market vision in all three types of markets. However, the market vision of supplier dominated firms should not focus on stimulating innovation for a product, or within one supply chain. Instead, it should focus on an ambitious vision for the type of building, with system integrators as market in mind.

5. A substantial part of the end product of the Buyer Groups should focus on better equipping inexperienced procuring parties to incorporate sustainability aspects within their tender.

6. Buyer Groups within supplier dominated markets should also focus on enhancing supply chain collaboration in order to stimulate innovation within this market.

7. Buyer Groups within scale intensive markets can motivate the material suppliers by:
   a) Incorporate these market parties within their network to lower the resistance and increase the commitment to the market vision.
   b) Incorporating market parties from the entire supply chain, to improve the level of sustainability of the material during it entire life cycle, and to also put pressure on the material suppliers by their own supply chain.

8. When market parties participate within a Buyer Group, they should be excluded of determining the ambition. They can add value by indicating practical implications of the strategy, following out of the ambitious vision.

9. Buyer Groups can only effectively be started, if there is already a certain sense of urgency within the market.

10. When a market still has to, or is developing multiple alternatives, a high ambition is needed to stimulate these developments. However, a technology direction should be excluded from the market vision, within this phase of the transition.

11. When many sustainable alternatives are developed within the market, a Buyer Groups should perform LCA's (or make sure the data within the National Milieu database becomes more precis) in order to disclose ineffective alternatives and stimulate the effective alternatives.

12. The most important aspects of a market vision, to stimulate innovation, are:
   a) An integral set of goals for the coming years;
   b) The sector definition of circularity: the linked parameters and their calculations;
   c) Clarity about the future testing method, preferably for a given time period.

13. Buyer Groups have to differentiate their purchasing strategy towards frontrunners and the rest of the market.

14. A market vision can make impact, if:
    a) The level of ambition is high;
    b) The participants actually implement the vision within their own practice;
    c) The vision is unambiguous
        i. No adaptions of the market vision by individual purchasers;
        ii. Conformity with other initiatives, networks and platforms within the same market;
        iii. In harmony with laws and regulations.
    d) The vision will be diffused to (all) purchasing organisation.

15. A market vision must be written for at least 5 years, with a view to 2030 / 2050.

16. In a Buyer Group for a scale intensive market, market parties should be continuously involved in the process, to raise the acceptance of the market vision. In Buyer Groups for specialised suppliers and supplier dominated firms, a market consultation should be held.

17. For the Buyer Groups for products, at least one market consultation must be held to indicate the practical implications of a market vision and a market consultation can be held early in the process about innovation barriers, impact of assessment methods, definition of circularity, development potential etc.

18. When there are many alternatives in the market for the Buyer Groups for products, it is necessary to ask in detail at the beginning about production processes and product characteristics that reveal the impact on sustainability aspects.

19. When market consultations are being held with the entire supply chain (BG product), it is wise to keep the different layers separate in the consultations, in order to encourage market parties to look beyond their own product.

20. To gather all needed information, physical market consultations are always more effective than digital meeting.

21. For a realistic market vision with a high level of ambition, it is necessary that participants in the Buyer Group:
    a) Are ambitious & have a high level of knowledge and experience;
    b) Have an ambitious organization behind them.

22. Within a Buyer Group it is wise to have a mix of knowledge in the following areas:
    a) Preliminary process of tenders;
    b) Technical product knowledge;
    c) Sustainability and innovation knowledge;
    d) Administrative knowledge;

23. To keep participants and their organisations committed to the market vision, it is wise to ensure the following aspects:
    a) Commitment from the top management layer;
    b) Commitment from the other organizational layers (e.g. execution);
    c) Produce tangible results.
    d) Sharing knowledge with other participants;
    e) A doable time burden.

24. In addition to guiding the process, the activities of the coordinator should also focus on:
    a) A continuous expansion of the2nd layer (the group of interested parties);
    b) Coordination with other initiatives in the market.
25. It is particularly important for the materials markets that the coordinator has an influential position in the Dutch administration, in order to be able to initiate changes to any conflicting regulations.

COLOPHON

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