

Value Appropriation in Collaborative Business Models

A sharing arrangement for construction projects executed in supply chain collaboration

A RESEARCH BY

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This master thesis provides the results of my graduation research in the field of supply chain collaboration. The choice for this topic derives from my personal interest in cross-organization collaborations within the construction industry. I noticed that the topic I investigated is 'hot' and triggers a lot of people. Moreover, everybody talked so passionately about the research topic and emphasized on the many challenges to solve. This encouraged me to work even harder and with greater pleasure to ensure a solid research outcome.

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Abstract

Supply chain collaboration is the systematic and strategic coordination of activities between the parties involved in a construction process, with the goal to improve the long-term performance of both the individual parties and the chain as a whole. In this respects, the set of parties - consisting of at least a client and a contractor - work intensively together for the duration of more than one construction project in which the client has an iterative demand. In addition, the application of a collaborative business model (read: 'value appropriation model') in which profits, losses and risks are shared between the strategic parties of the collaboration (read: 'participants') is one of the elements of supply chain collaboration. However, such a value appropriation model is quite rare in practice and not much is known from the literature.

Currently, it is unclear how a value appropriation model should be put into operation in a reliable, practical and manageable manner. Thus, the parties that execute construction projects in supply chain collaboration find it difficult to share profits, losses and risks to complete satisfaction of all participants. The goal of this research is to find out how the value appropriation model should function. The central research question is therefore defined as: "How should the value appropriation model for construction projects executed in supply chain collaboration function?"

In order to construct the model, a literature study and several case studies have been done. The literature study concerns both supply chain collaboration and value appropriation. The theoretical value appropriation model is based on several pillars. The cross-case analysis is executed to compare the views and experiences of field practitioners. Subsequently, the value appropriation model is examined in the light of empirical findings in order to arrive at the preliminary findings. Finally, the preliminary findings are validated by an expert panel.

As a result of the research, the value appropriation model applies a value assessment that identifies the discrepancy between the agreements on common project-specific goals and the project-specific determination on outcomes. Hence 'value' is defined as the extent to which these common goals are met on both financial and non-financial items. The individual projects are central in the determination of the created value. The alignment of individual goals, collaboration goals and project-specific goals is hereby crucial.

This research emphasizes that it is best to only exchange relevant cost information in order to establish a common financial goal that is acceptable to all participants. A common benchmarking method is helpful to establish an ambitious financial goal that is both realistic and complies with current market conditions. The necessity of an independent advisor that assists in this costing process largely depends on the wishes and capabilities of the participants. Continuous improvement can be stimulated by setting the goals higher for each subsequent project.

An important element of the value appropriation model is the determination of which risks are borne collectively and which are borne individually. In the former a shared contingency budget is applied and in the latter several individual contingency budgets are applied. The research states that the incentive to collaborate is more appealing if a substantial part of the risks is borne collectively. The general rule is that a risk is labeled as a 'shared risk' if more than one participant has a significant influence on that risk. In this way the individual contingency budgets are kept minimal. In addition, the individual profit margins of the participants are 'parked' and used as a leverage for the shared contingency budget.

The financial outcome is the total cost of a project. The participants are reimbursed for all reasonable and acceptable direct project costs. The difference between financial goal and the financial outcome is added to the remainder of the leveraged shared contingency budget. This results in the 'surplus', which can be negative in a bad case scenario.

The non-financial outcome is expressed by an average performance score. It is known that parties act more towards the achievement of predefined common goals if their pay-out is somehow linked hereto. The research proposes to make the common performance score decisive in the determination of which part of the 'surplus' is paid out amongst the participants and which part is reinvested in the collaboration. This research suggests to customize several rules of thumb methods to determine the sharing ratio of this 'surplus' pay-out.

'Sharing' also means that the participants stand surety for each other to some extent. A capped liability could therefore be desirable if a party is not able to bear a possible major loss. Yet, the need for caps or thresholds depends on how is dealt with risks and contingencies. In addition, the research concludes that the application of additional incentives is only a good idea if it leads to a desired effect.

The research provides a clear and structured insight in the relevant matters that need to be taken into consideration if a value appropriation model is applied to the execution of construction projects. The value appropriation model ensures that an important feature of supply chain collaboration is fulfilled, namely a shared incentive amongst the participants in terms of profits, losses and risks. Actually, the value appropriation model in this research is the first of its kind that describes how the common interest can be followed, costs are reimbursed correctly, risks are borne properly, and participants are awarded appropriately for their effort in the value creation process in one single model.

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Chapter 1. Assignment

The research assignment is given in this chapter. An introduction to the research topic is given in paragraph 1.1. The research problem is described in detail in paragraph 1.2. The position of the research components are mentioned in the line of reasoning, as can be read in paragraph 1.3. Subsequently, the target group of this research is given in paragraph 1.4. In addition, the main assumption of this research is stated in paragraph 1.5. Furthermore, the research objective is formulated in paragraph 1.6. The central research question and the associated sub questions are listed and elaborated one by one in paragraphs 1.7 and 1.8. By doing so, it is directly clear which aspects have to be taken into consideration for each particular question. Besides, the relevance of this research is given from three different perspectives in paragraph 1.9. Furthermore, the demarcation of the scope is given in paragraph 1.10. Lastly, the audience is mentioned in paragraph 1.11.

Paragraph overview:

- 1.1 Introduction
- 1.2 Research problem
- 1.3 Line of reasoning
- 1.4 Target group
- 1.5 Main assumption
- 1.6 Research objective
- 1.7 Central research question
- 1.8 Sub questions
- 1.9 Relevance
- 1.10 Demarcation of scope
- 1.11 Audience

1.1 Introduction

One of the biggest challenges the (Dutch) construction industry faces is the problem concerned with the high amount of 'failure costs' (Vrijhoef, 2008). 'Failure costs' are defined as all costs made to fix/repair errors before the product arrives at the client (internal failure costs), plus all costs that have to be made to fix (repair) these errors after the client discovered them (external failure costs) (Love & Li, 2000). The lack of good collaboration between the parties involved in a construction project is the main cause of 'failure costs' in the construction industry (Love & Li, 2000).

The high amount 'failure costs' are the result of 'traditional way of working', which is characterized by the clear separation between design and execution, poor standardization, distrust, procurement based on lowest tender price, and suppressing of subcontractors (Noordhuis, 2015). This 'traditional way of working' is further characterized by the existence of perverse incentives, meaning opposing individual interests (Van der Veen, 2012). In order to avoid this, parties can decide to collaborate more closely with each other, which is also known as 'supply chain collaboration' (Blauwhof, Spiering, & Verbaan, 2013).

1.2 Research problem

'Supply chain collaboration'

'Supply chain collaboration' is the systematic and strategic coordination of traditional business functions between organizations of a chain with the main goal to improve the long-term performance of both the individual organizations and the supply chain as a whole (Mentzer, 2001). Or rephrased, a collaboration is called 'supply chain collaboration' if two or more independent and autonomous organizations work together to jointly plan and execute supply chain operations with greater success than when acting individually (O'Brien, Formoso, Vrijhoef, & London, 2009).

The belief of 'supply chain collaboration' is that lower integral costs, faster delivery of productions/services, a (much) higher level of quality, and an improved level of customer satisfaction can be achieved (Noordhuis & Vrijhoef, 2011). Or rephrased, 'supply chain collaboration' is a method to produce a higher quality at lower costs through the reduction of 'transaction costs' (Blauwhof, Spiering, & Verbaan, 2013). In this respect, a 'transaction cost' is a cost incurred in making an economic exchange (between organizations), the cost (or buffer) on top of the price of the product (Williamson, 1991).

Vrijhoef (2009) describes two main advantages of 'supply chain collaboration'. The first benefit is the substantive benefit due to the fact that parties are involved earlier in the process, allowing that the potential for improvements can be exploited. The second benefit is the process oriented benefit by the reduction of transaction costs, through an improved transfer of activities between the subsequent links of the supply chain. These two benefits are related since both mainly occur at the interfaces between the subsequent links of the chain.

Concepts of 'supply chain collaboration'

However, the concept of 'supply chain collaboration' has not been defined uniformly in academic literature, nor its associated pillars. For clarification reasons, the pillars/elements/indicators of supply chain collaboration are described differently by several academics and professionals are given. The most important ones are given.

Noordhuis concludes (2015) that 'supply chain collaboration' in the construction industry will only be successful if the chain fulfils to meet six fundamental pillars. These six fundamental pillars are: a strategic long-term collaboration; information sharing; early involvement of parties; jointly monitoring/measuring; continuous improvement; and sharing risks and rewards. The six pillars are interrelated and must function together to ensure maximum success. If the chain falls short on one particular pillar, it inevitably leads to the malfunctioning of all other pillars and therefore to the malfunctioning of the total supply chain collaboration (Noordhuis, 2015).

Meng (2010) mentions that supply chain collaboration is founded on eighteen different indicators, namely: mutual trust; common objectives; teamwork; risk sharing; continuous improvement; open and effective communication; win-win business attitude; problem solving; competitive tendering/procurement; senior management commitment; sharing of information/learnings; long-term focus; partnering experience; incentives; performance measurement; transparency; and monitoring. Above all, Meng (2010) emphasizes that an incentive system is the way to motivate all parties to enhance project success and to achieve the highest amount of value (Meng, 2010).

Consultancy firm Twynstra Gudde mentions that supply chain collaboration is based on the following eight pillars: corporate strategy; supply chain strategy; process; structure; control; competences; leadership; and culture. Pillar five (control) appoints the management measures, performance indicators and incentive mechanisms that steer the operational functioning of the chain. These incentive mechanisms must be managed and enhanced collectively so that all members get a rewarded for a good performance according to a certain allocation (Scheepers & Schunk, 2011).

Chao-Duivis and Wamelink (2013) describe supply chain collaboration by the following eight components: a clear collaborative business strategy; a quality control system; a well-balanced risk and incentive system; an effective information/communication system; standardized processes; a collective HRM policy; an operational coordination mechanism; and a common system for partner selection. The third component must ensure a balance between risk and rewards with the basic principle that the 'success of the chain' (additional profits and losses, both expected and unexpected) are fairly allocated between the parties. This sharing arrangement must be set in advanced whereby the pay-out must be done in a similar way in the event of a negative result (loss) (Chao-Duivis & Wamelink, 2013).

Vrijhoef (2011) argues that supply chain collaboration enables a client to apply a procurement strategy that relies on the positive effects of long-standing relationships that may include financial incentives and 'pain and gain' sharing based on the common performance. Those incentives tend to reinforce commitment and foster trust for longer periods of time, which apparently cannot be achieved through a one-off approach of single projects (Vrijhoef, 2011).

Value appropriation model as one of the elements of 'supply chain collaboration'

Overall, the five academics/professionals mentioned above indicate that a sharing arrangement is vital to fully meet the principles of supply chain collaboration. However, sharing the risks, benefits, and losses in a collaborative relationship is a challenging activity (Bhaskaran & Krishnan, 2009). Moreover, it is considered very difficult to put a model for revenue, cost and risk sharing into operation to complete satisfaction of all participants (Van der Veen, 2012).

As a matter of fact, there is a need for the development of a model that guides how revenues, costs and risks are shared in a reliable, manageable and practical manner. This model is defined in this research as a 'value appropriation model'. Therefore, it can be stated that is desirable to investigate how such a collaborative value appropriation model functions. So what is meant by a collaboration value appropriation model?

A conventional business model normally outlines how one business enterprise appropriates value considering revenues, costs and profits. A collaborative business model completely differs from these conventional business models and involves a number of additional challenges. The main challenge of developing a unanimously accepted business model that goes across organizational boundaries is that an acceptable appropriation of value is guaranteed for all chain parties. Hereby taking risk, loss and profit sharing into account (Lavie, 2006).

Although a strategic collaboration enables each firm to focus on what it does best, it also introduces new issues related to the alignment of decisions and incentives that have to be managed alongside conventional performances (Lavie, 2007). Lavie (2007) mentions that the value appropriation model must hold some kind of incentive mechanism that improves both the individual performance as well as the collective performance.

From that perspective, academics research the question what happens if the individual interest of all parties are combined into the collective interest. Actually, the question is how the collaboration must enhance the collective interest and what happens if the performance of the chain is better or worse than was targeted in advance. The elaboration of how the appropriation of value is captured in a strategic collaboration to complete satisfaction of all participants is therefore very important.

In short, the problem stems from two existing subjects (or sub problems), namely 'supply chain collaboration' and 'value appropriation in a strategic collaboration'. These two subjects are combined in this research. Quite important, the focus of this research is on the value appropriation model within the context of supply chain collaboration.

Problem statement

The parties involved in a strategic collaboration - active in the (Dutch) construction industry - have difficulties with the development of a clear and solid model in which value appropriation is ensured in a reliable, practical and manageable manner. Thus, the parties that execute construction projects in supply chain collaboration find it difficult to share risks, revenues and costs to complete satisfaction of all of participants.

Figure 1.1: Problem statement

1.3 Line of reasoning

Value creation in a strategic collaboration has been defined as a collective processes to achieve mutual business objectives and to create common benefits to all participants (Lavie, 2007). However, while value creation is absolutely essential to gain revenue from a client, a party must also appropriate a reasonable level of that value (Ritala & Hurmelinna-Laukkanen, 2009). First, the created value must be identified in measurable units before it can be appropriated between the parties of the chain.

Value appropriation is defined as competing for a certain amount of value in a specific moment in time (Brandenburger & Stuart, 1996). As a means to interpret this, the disparity between value creation and value appropriation is similar to the distinction between collective and individual benefits (Khanna & Anand, 2000). Following that idea, value appropriation does not necessarily create new value. As a matter of fact, parties' work together to create value as a collective outcome, while value appropriation leads to the respective sharing of this collective outcome (Lavie, 2007). Moreover, Van der Veen (2012) argues that value appropriation leads by nature to a win-lose situation. Value appropriation needs to go hand-in-hand with value creation in order to get and keep support for such a sharing arrangement (Gülyaz & Van der Veen, 2015).

Nevertheless, parties are always searching for ways to increase their individual profit margins, both in absolute amounts and in relative shares (Laffont & Martimort, 2001). The first way to increase the individual profit of a party is to make the collaboration more successful in terms of overall profit (increasing the pie) and the second way is to increase the individual share of the profit (increasing the piece of the pie) (Jap, 1999). The bargaining power will influence the share of value a party can capture respective to the share of another party (Fisher & Patton, 2011).

Parkhe (1993) mentions that the effort a party wants to put in the creation of value is inevitable linked to the appropriation of value since this latter criterion determines a party's incentive to contribute. Moreover, the overall performance of a strategic collaboration is related to the pattern of pay offs characterizing the collaboration (Parkhe, 1993). Previous research has stressed that the sharing arrangement should be considered 'fair' since the performance reduces if the arrangement is judged as inappropriate (Bresnen & Marshall, 2010). However, 'acceptable for all shareholders' is often considered as more workable since 'fair' is hard to operationalize (Van der Veen, 2012).

Furthermore, it is assumed that more value will be created when a collaboration functions better (Maas, 1997). The value appropriation model should somehow ensure that the traditional 'perverse incentives' and sub-optimizations are reduced through the alignment of individual incentives to the overall objectives (Van der Veen, 2012). The basic principle must be that a party can only be successful by optimizing the collective performance, instead of solely optimizing the individual performance (Noordhuis, 2015). In addition, an assumption is that the value appropriation model ensures that the performance of the chain improves, expressed in an increased creation of value. This can be explained by the fact that if the assumption does not hold, the need for a value appropriation model vanishes.

By applying a value appropriation model, the interaction between the parties is transformed from a distributive negotiation (value claiming) towards an integrative collaboration (joint interest based negotiation or win-win bargaining) related to the 'traditional way of working' (Ellegaard, Geersbro, & Medlin, 2010). In this respect, integrative refers to the potential for the parties to increase the amount of value (Koole, De Dreu, & Wolfgang, 2000). Appropriation is by nature is win-lose. However, a win-win situation can be achieved by ensuring that value appropriation and value creation go hand-in-hand (Gülyaz & Van der Veen, 2015). Gülyaz and Van der Veen (2015) argue that this win-win condition is a crucial condition for supply chain collaboration. In short, the value appropriation model must both stimulate the creation of value and facilitate the appropriation of value.

The value appropriation model is thus positioned within the dynamics of the collaboration whereby value the generated output is (figure 1.2). In other words, the value appropriation model (moderating variable) enhances the value creation process and thus has a positive influence on the relationship between the collaboration (independent variable) and the value (dependent variable).

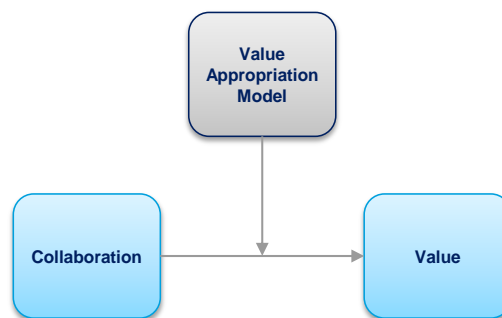


Figure 1.2: The 'value appropriation model' in relation to 'collaboration' and 'value'

1.4 Target group

The set of parties that want to use a value appropriation model in their cross-organizational business is the target group of this research. As a matter of fact, the target group is the set of parties that work intensively together for a long (whether or not undefined) period of time in order to execute several construction projects together. In this respect, a set of parties consists of at least a client and a contractor in which the client has an iterative demand: a program rather than a single project. This specific iterative client demand may concern green-field, renovation or maintenance projects. In other words, the target group is the set of parties that execute construction projects in supply chain collaboration. In short, the target group is the set of associated links of a chain that work intensively together in a (strategic) long-term ‘project unbounded’ collaboration.

1.5 Main assumption

The main assumption of this research is that the value appropriation model consists of two mechanism - a value mechanism and an appropriation mechanism - and functions within a context. This assumption is necessary to structure the research (figure 1.4) and can be substantiated by the fact that several academics distinguish value creation from value appropriation whereby both concepts must go hand-in-hand.

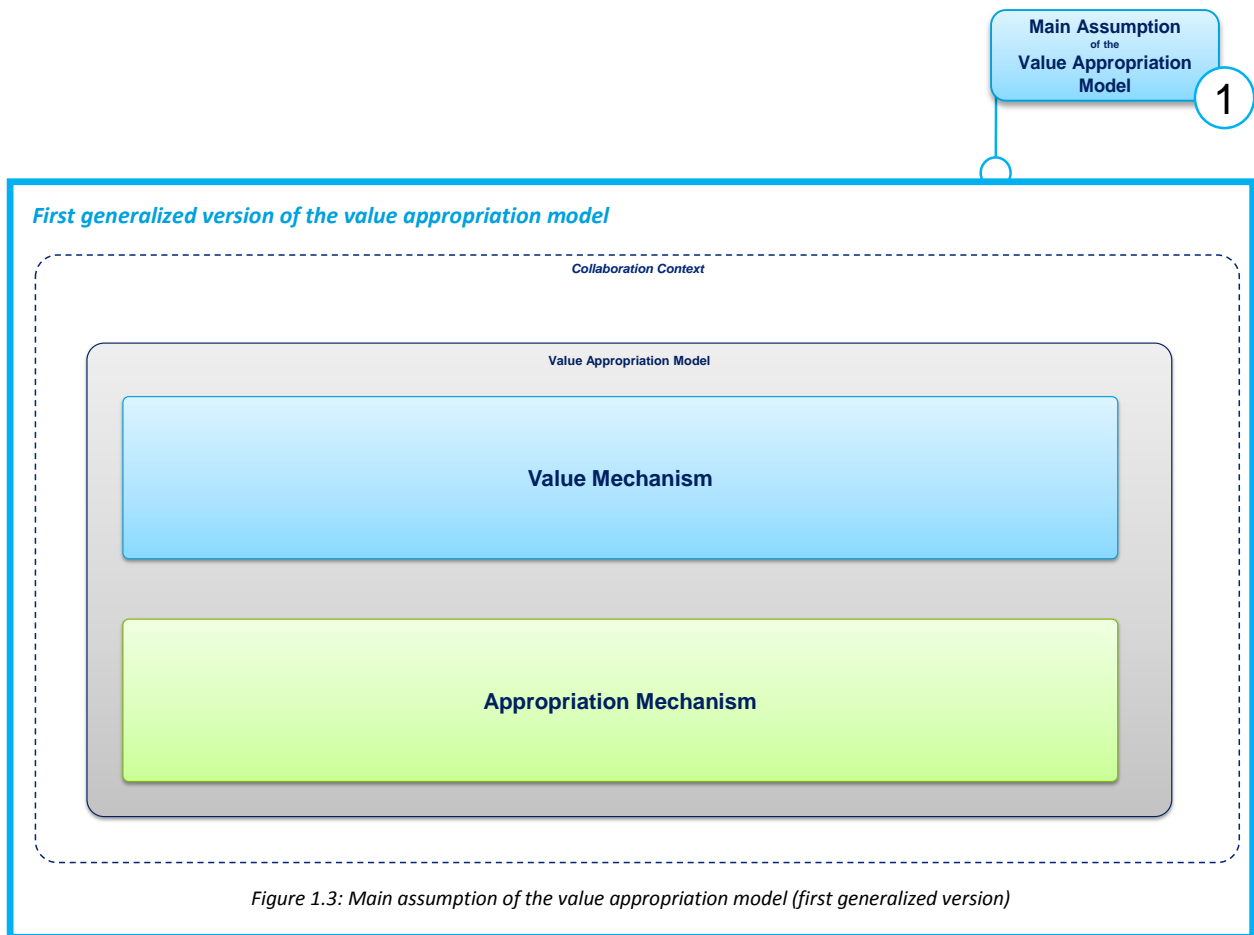


Figure 1.3: Main assumption of the value appropriation model (first generalized version)

1.6 Research objective

The end result of this research is an advice in which the total package of research questions is answered (paragraphs 1.7 and 1.8). Referring to the clearness that must be created about how the target group must deal with the appropriation of value. The conclusions and recommendations of this research are based on legitimate information from both theory and practice, meaning academic literature, truly gained experiences and reasonable perceptions of experts. This research therefore has two main objectives. First, providing new theoretical insights for the current research gap concerned with the appropriation of value. Secondly, to use these theoretical insights to create a solution space for the target group by providing recommendations of how

the value appropriation model must function (figure 1.3). In this matter, the set of parties are advised on how a value appropriation model must be designed, put in operation and ensured in practical inter-organizational processes. It is hereby important that all parties involved can be informed about which issues have to be taken into account. Eventually, this should provide a clear and unilateral response to the market question concerned with the issue of distributing profits, losses and risks within the supply chain.

Research objective:

To find a solution is to find out how the value appropriation model should function for a set of parties that execute construction projects in supply chain collaboration.

Figure 1.4: Research objective

1.7 Central research question

The central research question is about how the value appropriation mode functions for the set of parties that execute construction projects in supply chain collaboration (figure 1.5). The value appropriation model is thus the main element of this research.

Central research question:

How should the value appropriation model for construction projects executed in supply chain collaboration function?

Figure 1.5: Central research question

1.8 Sub questions

The research is more manageable if the problem is split into more defined pieces (Verschuren & Doorewaard, 2010). Three sub questions are therefore formulated to operationalize the central research question (figure 1.6).

- Sub question 1:** In what context functions the value appropriation model?
Sub question 2: How does the value mechanism of the value appropriation model function?
Sub question 3: How does the appropriation mechanism of the value appropriation model function?

Figure 1.6: Sub questions of the research

Sub question 1: In what context functions the value appropriation model?

The context is the surrounding in which the value appropriation model functions. The value appropriation model must fit in the inter-organizational business processes of the predefined target group and must not suffer from the continuous changes in circumstances within this context. Van der Veen (2012) states that the handling and sharing of risks alongside profits and losses must be ensured correctly under 'all circumstances' to keep support among its users. In addition, applying a value appropriation model influences the collaboration (Van der Veen, 2012). It is therefore important to analyze the most important elements of the collaboration in order to be fully able to model the appropriation of value. Data about the most relevant forms of collaborations must be analyzed. Furthermore, the characteristics of - and related topics to - supply chain collaboration must be described. Besides, a lot of factors influence the functioning of the collaboration and the value appropriation model (e.g. risks/uncertainties, financial strengths of the parties). It is important to determine what the main factors are. Associated theories must therefore be analyzed concerned with the behavior, risks and pricing perceptions of parties. In short, the context and the main factors that influence the value appropriation model have to become clear.

Sub question 2: How does the value mechanism of the value appropriation model function?

The value mechanism probably consists of several pillars. These pillars must be found and described into detail to fully understand the dynamics of targeting and measuring performance. The time perspective of these pillars must be taken into consideration as well. So is important to find the best way for considering and measuring value. In addition, more clarity has to be created about how the 'performance of the chain' must be assessed. Meaning the tools and knowledge to determine whether or not the chain has done well. The goal of this sub question is to find a generalized set of pillars for the value mechanism. In addition, the main contributors to the value appropriation model - and the associated options of each contributor - must be found.

Sub question 3: How does the appropriation mechanism of the value appropriation model function?

The appropriation mechanism probably consists of several pillars as well. Subsequently, the interplay between the pillars of both the value mechanism and the appropriation mechanism must be constructed. The appropriation mechanism should function as an incentive system to trigger and enhance value-adding measures by all parties. A party must be rewarded for the partial extra value he created by the measures he took relative to the original predefined plan. On the other hand, a party must be confronted with any short comings and suffer a penalty if a deficiency in value occurs. In short, if the chain has performed well (measured by the value mechanism), the additional generated value must be appropriated between the parties by a certain allocation (indicated by the appropriation mechanism). Subsequently, it is then the question how this appropriation mechanism functions in a structured way. The goal of this sub question is to find a generalized set of pillars for the appropriation mechanism. In addition, the key elements within these pillars - and the associated options of each key element - must be found as well.

1.9 Relevance

The relevance of this research is mentioned from a practical, academic and corporate point of view.

The **practical point of view** is stressed out because the developments in the construction industry have led to a certain demand. The application of a value appropriation model is one of the initiatives launched by the parties that execute construction projects in supply chain collaboration (Van der Veen, Noordhuis, Zuthof, & Reiner, 2013). These parties have an outspoken demand for academically valid recommendations of how to apply a value appropriation model. It is clear that further research is needed from a practical/social point of view since the findings of the research are both interesting and useful for the parties that pursue (and further want to improve) their long-term supply chain collaboration.

The **academic point of view** indicates what the research could mean for the academic knowledge base in general. The combination of two research subjects - supply chain collaboration and value appropriation in inter-firm collaborations - is the innovative element from an academic point of view. In fact, limited literature is available about value appropriation models (Janssen, 2014). The academic relevance of this research is to increase theoretical knowledge in the field of value appropriation models applicable for the construction industry.

The **corporate point of view** is mentioned so that the choice for writing this thesis at Deloitte is substantiated. This choice is in particular based on the fact that the consulting practice of Deloitte has done extensive research - in cooperation with both academic institutions and innovative companies from the field - into supply chains in the (Dutch) construction industry. In addition, Deloitte is directly involved in establishing, managing and monitoring several supply chain collaborations (Deloitte, 2014).

1.10 Demarcation of scope

This research is innovative from both an academic and practical point of view since the research problem is analyzed from an industry-wide and multiple-theory perspective. Industry-wide in the sense that the wider construction industry is analyzed, residential and infrastructure construction. Multiple-theory in the sense that several disciplinarians are combined, namely theory concerned with supply chain collaboration (which is frequently considered as a part of operations and logistics management (Gülyaz & Van der Veen, 2015)) and value appropriation (which is typically studied in the fields of marketing and strategy (Janssen, 2014)). Furthermore, theory concerned with benchmarking and performance measurement fundamentally stem from controlling literature.

However, a very large research area arises by the combination of these two research subjects. As a consequence, research boundaries are necessary to retain a manageable research assignment (Baarde & Goede, 2006). A clear demarcation is therefore made between the issues that are important to the successful completion of this research, and which are not. All associated issues are sorted out in order of relevance and importance to determine whether or not it falls within the scope of this research.

The most important demarcation of scope is that 'additional values' - retrieved from the collaboration - are not taken into consideration in this research. Items like e.g. gained knowledge and expertise, market share, innovation, image, goodwill, marketing, maturity, teaming and learnings are hereby referred to as 'additional values' (Shenhar, Levy, & Dvir, 1997). Nonetheless, organizations are often interested in starting collaboration efforts for exactly these types of value (reputation, continuity and differentiation) in which the short-term benefits are considered less important (Van der Veen, 2012). Van der Veen (2012) argues that - since supply chain collaboration is a strategic initiative - the long-term benefits are more important than short-term gains. Van der Veen (2012) adds - knowing that applying supply chain collaboration includes a major change-management effort - that short-term successes are needed for gaining momentum and to fuel the necessary transition ("success breeds success").

The ambition of supply chain collaboration is to foster commitment so that matters as lawsuits, proceedings and settlements are avoided (Chao-Duivis & Wamelink, 2013). Chao-Duivis (2013) describes the relations between the chain parties, team agreements, alignment of procedures and means to evaluate the progress as very essential for fostering this prolonged commitment. Although, Chao-Duivis (2013) believes that the establishment of a collaboration is possible without a detailed contract. Nonetheless, it is unthinkable that legal structures and well demarcated agreements can be degraded to the old way of doing business (Brealey, Myers, & Allen, 2007). Moreover, Brealey (2007) mentions that contracts will always be part of the business in which construction related laws, regulations, and safety requirements must always be met. In addition, traditional principles like the 'standard administrative terms' (UAV) and 'the new arrangement' (DNR) deviate from the basic principles of supply chain collaboration. Nevertheless, the in-depth analysis of construction agreements is more a corporate law issue. How the sharing arrangement should be formed in a legal framework falls therefore outside the scope of this research. Besides, it is very important to note that there are no legal barriers for applying the principles of supply chain collaboration in the (Dutch) construction industry (AEDES & Nederland, 2011).

The basic requirement of a long-term collaboration is that there exists a common feeling that embodies mutual trust, integrity, transparency, equality, fairness, sharing of all relevant information and providing useful feedback (Chao-Duivis & Wamelink, 2013). Mutual trust - which must be clearly stated and pronounced to each other - is the belief that other parties have the right knowledge and skills to perform their duties properly and that everyone adheres to a desired level of behavior (Vincken & Jongen, 2013). Knowing that a certain level of this common feeling is needed for the successful application of a value appropriation model, the further in-depth elaboration of this common feeling falls outside the scope of this research.

Sharing of risks and rewards is a challenging activity since parties traditionally obtain contradicting business models with conflicting interests (Frisk, Göthe-Lundgren, Jörnsten, & Rönqvist, 2010). Frisk (2010) mentions aspects as strategic (mathematical) decision-making, tactical jousting and rational intelligence for making strategic decisions within a collaboration. Dilemmas that occur when one party is able to make decisions that impacts another party are frequently mentioned by a branch of theories, like 'game theories' (Todeva & Knoke, 2005). Todeva (2005) mentions that individuals – following the game theory - seek to optimize their own performances. This idea applies to this research as well. Nevertheless, the full elaboration on 'game theories' therefore falls outside the scope of this research.

The financial details - like corporate finance, project finance, funding principles, financial flow models, down payments, deposits etc. - are kept simplistic within this research. The in-depth financial field of research will be avoided and falls outside the scope of this research.

Risk management related subjects - like risk assessment (risk identification, risk quantification and risk impact), project change and configuration management (project risk control and treatment) - have some common ground with the appropriation of value, but certainly involves a lot more. The total package of risk management falls therefore outside the scope of this research.

As already stated, the exact definition of value is rather ambiguous. Even if the definition of value was clear, it is still very complicated to estimate or measure the generated value. Research concerned with defining value will be very limited, despite being it an important aspect of this research. In short, the concept of value is to a certain extent demarcated to keep this research manageable.

In short, the in-depth analysis on issues like 'additional values', 'legal compliance', 'common feeling of trust and commitment', 'game theories', 'financial details', 'risk management' and 'value' fall outside the scope of this research.

1.11 Audience

The readers of this research (audience) are all persons interested in topics like 'supply chain collaboration', 'innovative business models', 'value appropriation models', 'sharing arrangements', 'compensation mechanisms', and 'risk and reward sharing'. This research is especially interesting for the persons with some affinity with the construction industry. Roughly, the audience can be divided into four different groups.

The first group consist of all persons employed by parties that execute construction projects in supply chain collaboration. The second group consists of all persons from other parties involved in the construction process (like legislative bodies, governments, municipalities, and utility companies). The third group consists of all persons from schools and universities involved in education and science (like scientists, education staff, and students). The fourth group consists of all persons from industry associations and employer organizations related to the construction sector (like Aedes and Bouwend Nederland).

This research will provide new theoretical insights for the audience mentioned, but also offers a way forward to improve the supply chain collaborations in practice.

Chapter 2. Research design

The research design provides a guidance for undertaking the research and describes how the solution is found for the problem stated. Furthermore, the research design describes how a certain strategy contributes to overall outcome of the research. The way in which data will be collected and analyzed is introduced in paragraph 2.1. In addition, the research strategy is given and visualized by a research framework in paragraph 2.2. The research methodology - necessary to obtain the research objective - is described for each research phase in paragraph 2.3. The limitations of the research are given in paragraph 2.4. Finally, the preliminary study provides the pillars of the value appropriation model, as can be read in paragraph 2.5.

Paragraph overview:

- 2.1 Introduction
- 2.2 Research strategy
- 2.3 Research methodology
- 2.4 Limitations of the research
- 2.5 Pillars of the value appropriation model

2.1 Introduction

The aim of this research is to contribute to both theory and practice by creating clearness about how the value appropriation model functions by the set of parties that execute construction projects in supply chain collaboration. The research design illustrates how to the central research question (“How should the value appropriation model for construction projects executed in supply chain collaboration function?”) will be answered. The deficiency about how the value appropriation model functions is the main research gap. Furthermore, several academics stress the lack of knowledge about value appropriation models in the construction industry (Badenfelt, 2008). Janssen (2015) confirms that only a few amount of knowledge is available about value appropriation models. Also Van der Veen argues that it is hard to find and describe the model due to the fact that academic knowledge and best practices are only limited available. The challenge of this research is to develop a value appropriation model that is suitable to the specified target group.

2.2 Research strategy

The problem concerned with the appropriation of value can be identified on the basis of a discrepancy between theories on the one hand and a current situation (problem) on the other hand. To be specific, this research provides clearness about the relevant theories from literature and the inter-organizational problems from practice. Conducting research in inter-organizational contexts demands for traditional research methods to be adapted and adjusted to fit certain realities (Swanson & Holton, 2005). In order to accomplish this, the research will aim at giving ‘answers with meaning’ that are holistic, explanatory and qualitative by nature.

The research strategy is given and visualized by means of a research framework (figure 2.1). This framework illustrates the most important research steps - especially referring to the gathering and processing of relevant data materials - in order to achieve the research objective. Again, the research strategy has both a theory-oriented and practice-oriented approach.

The research consists of four phases in which a generalized version of the value appropriation model is constructed at the end of each phase. This generalized version ‘grows’ as the research progresses due to the findings gained in each phase.

The first phase consists of chapters 1 and 2. The ‘assignment’ includes e.g. the research problem and objective. How the data will be collected and analyzed is discussed in the research design, e.g. research methodology and criteria to make a valid finding. This first phase ends with the **preliminary study** in which a first idea of how the value appropriation model functioned is described. This preliminary research brings forward the main pillars of the value appropriation model.

The second phase - the **literature study** - consists of chapters 3, 4 and 5. The ‘context’ covers theory concerned with the collaboration between - and behavior of - parties. The ‘value mechanism’ covers theory concerned with value (creation) and the associated ‘contributors’. The ‘appropriation mechanism’ covers theory concerned with value appropriation and the key elements of the value appropriation. The literature study concludes with the theoretical framework (paragraph 5.9) of the value appropriation model in which the identified pillars (paragraph 2.5) are complemented with the associated contributors and key elements. Three different options will be given for all contributors and key elements.

The third phase - the **case studies** - consists of chapter 6. The views and experiences from the individuals that worked with a value appropriation model in practice are analyzed to learn from past experiences. These ‘experiences from practice’ are analyzed on three different cases. Subsequently, theory and practice are confronted in order to examine the found literature in the light of findings from practice. Analyzing the differences and similarities from and between theory and practice works hereby complementary. The combination from both literature and practice - and best of both principle - leads to the preliminary findings of the value appropriation model. These preliminary findings contain all selected options within each pillar.

The fourth phase - the **expert validation** - consists of chapters 7 and 8. The selected options are validated by experts with sufficient knowledge about one of the research subjects. The expert panel is thus decisive in the validation of each selected option. In the end, the final findings of the value appropriation model are incorporated in conclusions. Finally, the research concludes with the reflections and recommendations.

In short, the final findings are derived from theoretical understandings, relevant experiences and grounded validations from experts.

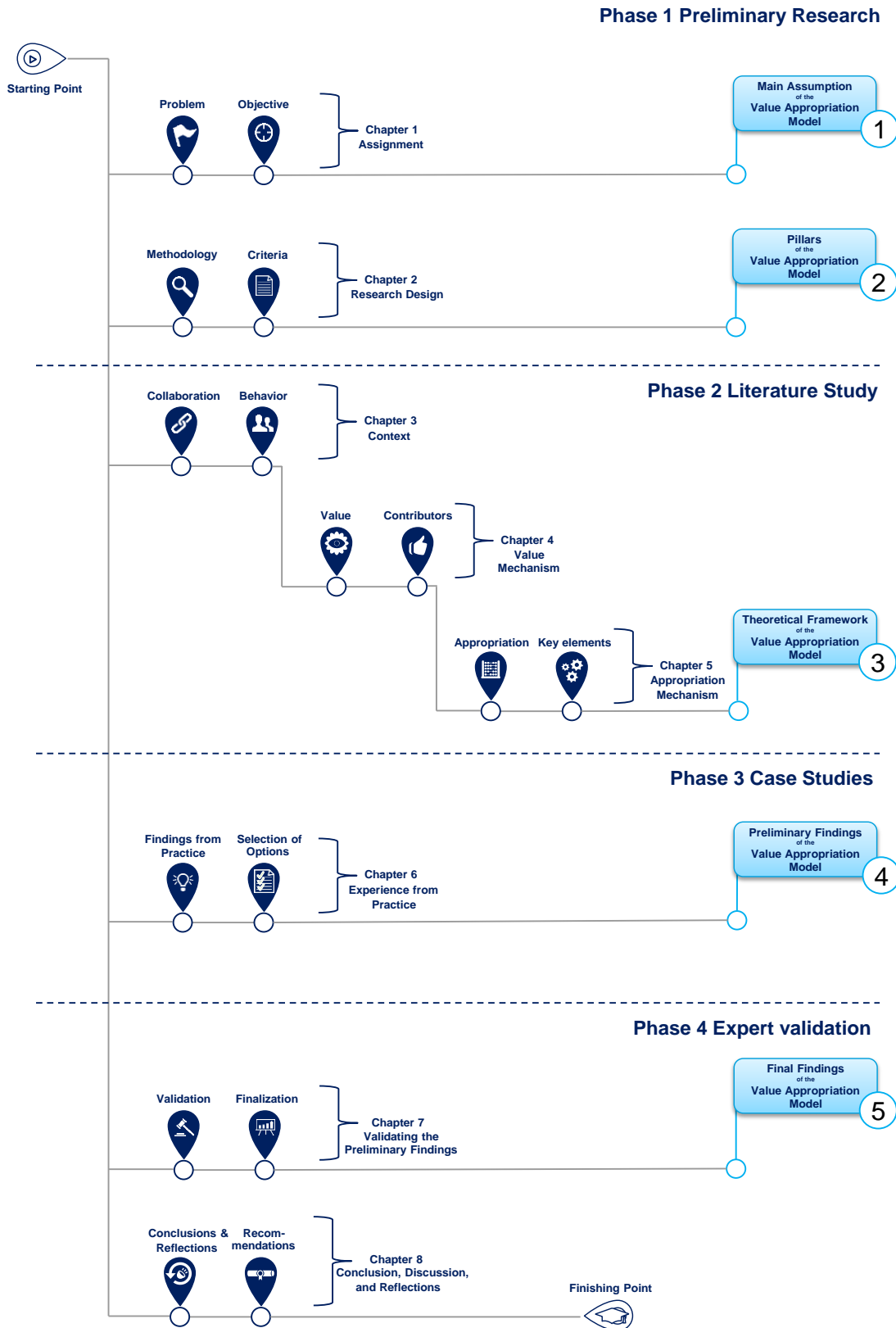


Figure 2.1: Research framework

2.3 Research methodology

Each phase of the research demands for a different execution approach. Nevertheless, the execution approach of both the preliminary research and the literature study are obviously quite similar.

Preliminary study

The preliminary study is a desk research in which relevant data - concerned with the research subjects mentioned - is found by scanning academic literature. A critical assessment of the available literature was needed to filter out the most relevant articles concerned with these subjects.

The following search terms were used to find relevant articles concerned with supply chain collaboration: 'collaboration'; 'supply chain management'; 'supply chain integration'; 'integrated project delivery'; 'integrated form of delivery'; 'organizational behavior in networks'; and 'long-term collaboration'.

In addition, the following search terms were used to find relevant articles concerned with value appropriation in inter-firm collaborations: 'value'; 'value chain'; 'value management'; 'collaborative business model'; 'value appropriation model'; 'incentive system'; 'value allocation mechanism'; 'value management'; 'appraisal system'; 'sharing arrangement'; 'evaluation models'; 'transaction cost economics'; 'value-configuration-based alignments'; and 'actual based costing'.

The words 'model', 'system', and 'mechanism' are interchangeable during the search for literature. Additionally, the word 'construction' is used to obtain more specific literature about the construction industry.

The preliminary study forms the qualitative base for the rest of the research. A first indication of the structure of the value appropriation model is given (first generalized version), which is mainly based on the formulated assumption (paragraph 1.8). Subsequently, the pillars of the value appropriation model (second generalized version) are constructed (paragraph 2.5). The criteria for determining whether or not a pillar belongs to the value appropriation model are set on a common sense approach.

Literature study

The literature study reveals the most relevant theories found in academic literature. The same search terms of the preliminary study are used for the literature study. The pillars of the value appropriation model - as observed in the preliminary study - are supplemented with elements, contributors and key elements. The identifications of contributors or key elements are founded by academic research. Subsequently, **providing three different options** for each contributor and key element is a fundamental part of the literature study. In the end, the literature study concludes with the construction of the theoretical framework of the value appropriation model (third generalized version) (paragraph 5.9).

Case studies

The case studies examined how the set of parties have applied a value appropriation model in practice. The case studies are of a qualitative and interpretative nature in which the experiences of the persons involved are central (Yin, 2008). Yin (2008) mentions that case studies are especially useful for researching phenomena about which little empirical evidence is available, to find the answers to the how and why questionings about these phenomena. The objective of the case studies is to obtain valuable information and gain in-depth exposure from practice as close as possible to the actual business experience.

The cross-case analysis method - an analytical technique to uniform data from individual cases (Gerring, 2007) - is used to compare the different cases. Gerring (2007) emphasizes that naturalistic generalizations can be developed from analyzing data on similarities and differences. Three sets of parties that worked with a value appropriation model in the (Dutch) construction industry have been analyzed.

The first case is 'Succesvol Bouwen' - a bilateral collaboration between a housing association and two general contractors (working separately from each other). The second case is 'Co Green', a multilateral collaboration between a housing association, a contractor and a couple of strategic partners. These two sets mainly realize residential projects together. The third case is 'WALTZ' - a bilateral collaboration between a railway operating agency and a construction consortium - is a project specific collaboration in which an infrastructural railway line is realized.

A proper case selection is essential due to the fact that the experiences from practice form an important source of input for this research. The three cases are selected since they all have entered in a long-term strategic collaboration, are active in the (Dutch) construction industry, use a model to appropriate value, and are good accessible to obtain the relevant necessary data. Face-to-face interviews are chosen as the primary data collection method because it is an effective tool for learning about matters that

cannot be observed readily. Fifteen in-depth interviews are conducted over a five-month period with experienced professionals from client- (fifteen individuals), contracting- (six individuals) and consulting-organizations (four individuals). Only the key persons involved in the collaborations - with the greatest understanding of the value appropriation model - were interviewed to obtain solid observations from all relevant perspectives. Each interview varied in length from 30 minutes to two hours. The interviews are mainly conducted at the offices of the parties involved or at the construction sites. Interview notes were taken to maintain validity and to support the digital recording. The questionnaire used was semi-structured and served as a handhold for the interviews. In advance, desk research was done to obtain relevant case information before the interviews were conducted.

For each case, the context in which the value appropriation model functions is mapped first. Then, the applied options of all pillars (both contributors and key elements) were listed and clarified for each case in 'option tables' (descriptive). The effects of the differences between the cases are especially important to mention. It could be the case that an option worked well in one case, but did not work well in another case. It is important to determine why this is, since lessons can be learned from the problems and challenges observed by these parties faced. Subsequently, the problems observed in each case are reflected to the observations from the other cases. As a nice add-on, the identification of similarities between the concerns from practice and the theories from academic literature are mentioned (if possible).

The cross-case analysis made it possible to bundle all findings from practice and to select the option for each contributor and key element. In other words, the focus of the case studies is to be able to make a proper decision of which options best suit the value appropriation model. The criteria of how to assess which option is best is mainly based on the perceptions of the interviewees (normative). The general perception of the interviewees is thus decisive in the selection of the options.

The main criteria is that the interviewees of at least two of the three cases must indicate a preference for a certain option in order to select that option. If the arguments of these interviewees are indeed more sufficient than the counterarguments (meaning the arguments of the interviewees of the one case that positively applied another option). It could be the case that a certain option only functioned well if a number of conditions are met. Subsequently, these conditions are then mentioned as well. Eventually, it is possible to draft the preliminary findings of the value appropriation model (fourth generalized version) if one option is selected for each contributor and key element (paragraph 6.6).

Expert validation

The expert validation is the process whereby the expert panel verifies the findings. The selected options within each pillar of the value appropriation model are validated by the members of the expert panel. The expert panel consists of three experts with sufficient knowledge about one of the associated research subjects. Two out of three experts have a proven track record in the construction industry. Face-to-face interviews are conducted in order to make optimal use of their knowledge.

The experts are decisive in the validation of whether or not an option is selected correctly. The degree of validation depends on the expertise, professionalism and severity of the experts, which happens often in academic research. This is well ensured due to the fact that the credentials of the experts are quite impressive.

The validations of the three experts are then compared in order to arrive at the conclusions. The main criteria is that at least two out of three experts must validate a selected option, provided that the arguments of those two experts are indeed more sufficient than the arguments of the one expert that rejected that certain option. The validated options will be set in the final findings of the value appropriation model (fifth generalized version) (paragraph 7.3). The rejected options are put aside and further research concerns (to be considered later).

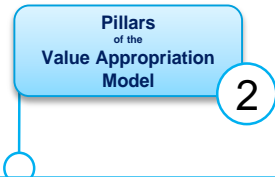
2.4 Limitations of the research

The research contains a couple of limitations that basically result in the constraints of the research (paragraph 8.3). In brief, the research includes the following limitations:

- **'Target group'**: This research is preliminary aimed at the predefined target group (paragraph 1.4);
- **'Main assumption'**: The assumption that the value appropriation model consists of two mechanisms and functions within a context is necessary to provide structure to the research (paragraph 1.5);
- **'Additional values'**: Additional values are not taken into consideration in this research (paragraph 1.10);
- **'Options'**: Only three options are given for each contributor and key element (chapters 4 and 5);
- **'Case studies'**: Only a limited number of cases (two residential and one infra) are analyzed (chapter 6);
- **'Expert validation'**: The expert panel consists of only three members (chapter 7).
- **'Scope'**: This research is solely focused on one pillar of supply chain collaboration; the value appropriation model (model for revenue, cost and risk sharing) (paragraph 1.10).

2.5 Pillars of the value appropriation model

This paragraph provides the results of the preliminary study and brings about a certain idea of how the appropriation of value functions. The main assumption is that value appropriation model consists of two mechanisms - namely a value mechanism and an appropriation mechanism - and functions within a context (paragraph 1.5). In addition, this preliminary study concludes with showing the main pillars of the value appropriation model (second generalized version). The two main mechanisms and the associated pillars of the value appropriation model are thereby described in a concise manner. This generalized version serves as a handhold for the literature study and will be further complemented as the research progresses.



Second generalized version of the value appropriation model

The value mechanism measures the ‘performance of the chain’ and consist of a ‘target value’ and an ‘actual value’. This target value is represented by common goals defined on both the collaboration level and the project specific level. The project specific goals must be clearly formulated before the start of the project. Subsequently, the project specific determination on outcomes measures the extent to which common goals are achieved after a project is realized. However, finding an agreement about the common goals - especially the financial goals - is a challenging activity. Some sort of ‘contributors’ are therefore expected to be necessary to keep the value mechanism manageable.

The appropriation mechanism indicates how the value is appropriated between the parties of the chain. The basic principle is that an incentive exists for obtaining a better common performance outcome. The collaboration agreements on appropriation must be acceptable for all parties involved. Accordingly, project specific agreements on appropriation must be set as well. Subsequently, a project specific assessment of performance must be done, which is based on the discrepancy between the ‘target value’ (set up front) and the ‘actual value’ (measured afterwards). The more common goals have been met, the more the parties should be rewarded. As a matter of fact, the pay-out to the parties is related to the extent to which common goals are achieved.

At this point in research, a choice is made about what the eight pillars of the value appropriation model are. Assuming that this is somehow correct, further research about the context and both the value and appropriation mechanisms is needed. The literature study reveals to which extent these eight identified pillars meet the theoretical aspect from literature. In short, the pillars of the value appropriation model (first generalized version) are illustrated in figure 2.2. Subsequently, this generalized version is complemented by the findings that emerged during the rest of the research.

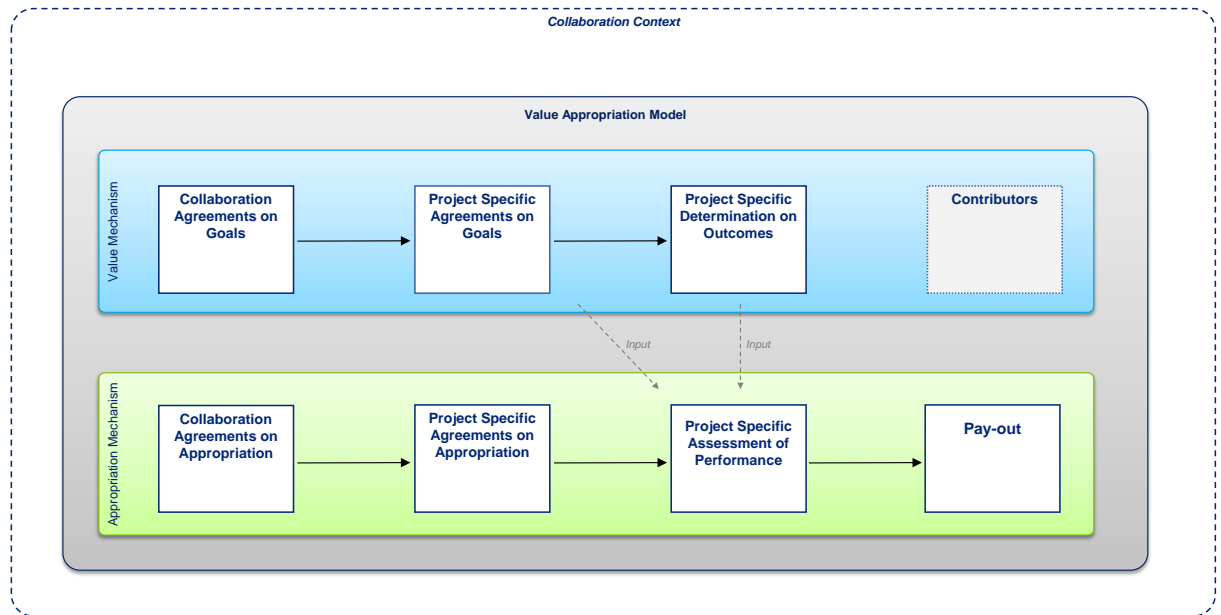


Figure 2.2: Pillars of the value appropriation model (second generalized version)

Chapter 3. Context

The focus of this research is on the value appropriation model within the context of supply chain collaboration. As mentioned in paragraph 1.4, the ‘collaboration’, ‘value’ and ‘value appropriation model’ concepts are interrelated. Moreover, the collaboration is influenced by applying a value appropriation model and vice versa. The developments within the collaboration are thus essential for the successful application of a value appropriation model. A certain understanding of this collaboration is thus considered important. The context of the collaboration is therefore the first subject of the literature study (figure 3.1), which further covers the value mechanism and appropriation mechanism in chapters 4 and 5 respectively. Several important theories are found in academic literature about the interaction between the parties of a (strategic) collaboration, as can be read in paragraph 3.2. Furthermore, the distinction between the ‘collaboration context’ and ‘project specific context’ is described in paragraph 3.3. Besides, this chapter elaborates on some associate theories in paragraph 3.4. The main findings of the context are given in paragraph 3.5.

Paragraph overview:

- 3.1 Introduction
- 3.2 Collaboration theories
- 3.3 Project specific context
- 3.4 Associated theories
- 3.5 Findings of the context

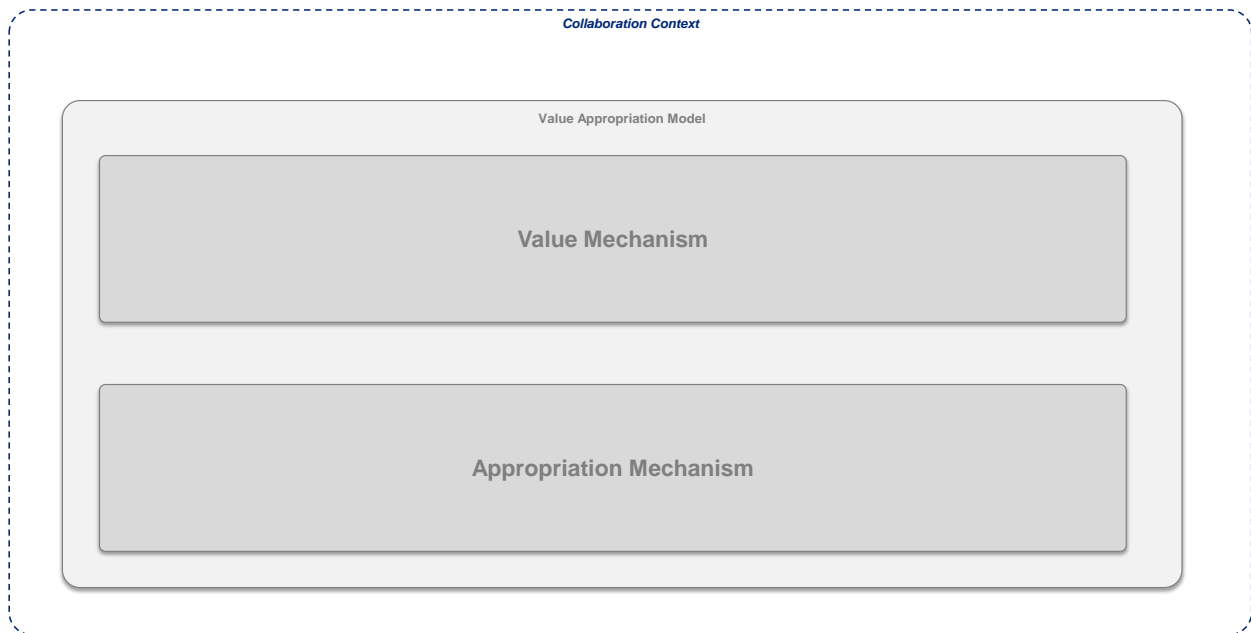


Figure 3.1: The context in which the value appropriation model functions

3.1 Introduction

The aspects that influence the functioning of the value appropriation model are divided in an external context and an internal context. Aspects from the external context include the developments in economic climate (market situation), changing demands in specifications (e.g. sustainability requirements) and the conservative character of the construction industry (industry culture). However, this research only takes the aspects from the internal context into consideration, which are mainly characterized by the behavior of the parties involved in a collaboration. In short, this chapter provides clearness about the main theories found in academic literature concerning the collaboration context. The main factors of influence in this internal context are the individual corporate goals, risks/uncertainties, the ability of the parties to manage those risks/uncertainties, and the respective financial strengths of the parties (Broome & Perry, 2002). However, the exact impact of these factors are hard to measure and are not taken into considerations.

3.2 Collaboration theories

A high number of parties can possibly lead to an unclear situation when uncertainty exists in the different roles, tasks, responsibilities, interests, and lines of communication (Cousins, 2002). Still, the parties with the correct competences and resources must be brought together to ensure the right value creating possibilities (Bennet & Jayes, 1998). Bennet and Jayes (1998) mention that a proper party selection is essential to safeguard this. Still, the relations within a chain are subjected to: (1) the underlying levels of interaction, involvement, trust, commitment and communication; and (2) the underlying degrees of influence, interdependency, equality and bargaining power of the individual parties (Lahdenperä, 2014).

Also, control rights - concerned with decision making - are a fundamental element of a strategic collaboration and a central issue in the negotiation process (Lerner & Merges, 1998). In this perspective, control rights (sometimes referred to as 'decision rights') are about the extent to which a party is able to make a decision. Lerner and Merges (1998) argue that these respective control rights have a critical impact on both the creation and appropriation of value.

Strategic collaborations can roughly be divided in two main categories, namely vertical and horizontal collaborations (Simatupang & Sridharan, 2002). A vertical collaboration includes a collaboration between a client and a supplier. A horizontal collaboration is a collaboration between similar (or equal) parties, both competitors and non-competitors (for example to exploit economies of scale). A combined horizontal and vertical collaboration is also possible, which is called a 'lateral collaboration' (Janssen, 2014). In practice, each collaboration is somehow unique, has its own shape, its own composition and its own form of governance.

De Man (2006) argues that the main goals of a strategic collaboration are: to increase efficiency (scale and scope); to obtain access to new market segments; to meet specific customer needs; to spread risks; to stimulate innovation; and to prevent from becoming submissive to competition (De Man, 2013).

Supply chain collaboration

Again, the value appropriation model functions within the context of 'supply chain collaboration'. Several definitions of the phenomena's 'supply chain' and 'supply chain collaboration' can be found in academic literature. The most relevant definitions are mentioned below.

Definitions of the 'supply chain'

The 'supply chain' is a system consisting of vendors, suppliers, production facilities and distribution channels linked by a feed-forward flow of materials and services, a feed-backward flow of finance and a bi-directional flow of information (Towill, 1992).

The 'supply chain' is a bi-directional flow of products, information and knowledge that entitles all parties from clients and end-users to the supplier of the supplier (Bechtel & Yayaram, 1997).

The 'supply chain' is a collection of organizations which are directly involved in the flow of products, services, finance and/or information between a provider and a recipient (Mentzer, 2001).

The 'supply chain' is in this research defined as a network of organizations involved in the different activities and processes - through upstream and downstream linkages - that produce value by converting resources into end-products towards an end user (Ellram, 1991).

Definitions of 'supply chain collaboration'

'Supply chain collaboration' is a management approach in which the total chain - from suppliers to end-users - is analyzed and managed with the goal to realize the best possible performance outcome for the entire chain (Cooper & Ellram, 1993).

'Supply chain collaboration' is the optimal distribution of roles, activities, responsibilities and competencies between the participants in order to optimize the performance of the chain by fostering the effort of each participant (Harland, 1996).

'Supply chain collaboration' is the systematic and strategic coordination of traditional business functions between the corporations of a chain with the main goal to improve the long-term performance of both the individual organizations and the chain as a whole (Mentzer, 2001).

'Supply chain collaboration' is a partnership in which parties collaborate by sharing information, capacity and risks and make joint decisions to collectively realize a better performance (Bowersox & Closs, 2003).

'Supply chain collaboration' is a network approach with the goal to optimize the performance of the entire chain (Lamming, Zhang, & Caldwell, 2005).

'Supply chain collaboration' is a better alignment of the principal process of the chain with the goal to increase value for the clients and customers (Lambert, 2008).

'Supply chain collaboration' occurs if two or more independent and autonomous companies work together to jointly plan and execute supply chain operations with greater success than when acting alone (O'Brien, Formoso, Vrijhoef, & London, 2009).

'Supply chain collaboration' is a long-term partnership in which parties work closely together to obtain common goals and to realize common benefits that are bigger than could ever be obtained by the individual parties acting alone (Ceo, Vonderembse, Zhang, & Ragu-Nathan, 2010).

'Supply chain collaboration' is the management of coordinating the various links within the supply chain with the aim to optimize and manage it as one entity (a communal organizational chain) instead of the situation in which each link (or each party) is focused on meeting its own individual targets and optimizing its own individual processes (Blauwhof, Spiering, & Verbaan, 2013).

'Supply chain collaboration' is a 'project-unbounded' collaboration between partners involved in the construction process with the goal to improve the performance of the entire chain (Chao-Duivis & Wamelink, 2013).

'Supply chain collaboration' is in this research defined as the systematic and strategic coordination of traditional business functions between the organizations of a chain with the goal to improve the long-term performance of both the individual organizations and the chain as a whole (Noordhuis, 2015).

Characteristics of 'supply chain collaboration'

Three levels of supply chain collaboration can be distinguished, namely the collaboration between employees/department/teams within a business unit (internal), between business units within an organization (internal), or between several independent organizations (external) (Van der Veen, 2003). The third level is most relevant in this research since the value appropriation model must function within a collaboration of different parties of the chain. With the sole exception if one party actually functions as two parties (multiple silos within a company), causing other forces into play that affect the entire supply chain.

Noordhuis (2015) classifies supply chain collaboration by mentioning the following six pillars: long-term collaboration; sharing of information; 'early involvement' of parties; jointly monitoring/measuring; continuous improvement; and sharing of risks and rewards (figure 3.3). The collaboration will only be successful if these pillars are also imbedded in the corporate strategy of the individual parties. Moreover, Noordhuis (2012) argues that senior management commitment from each party is hereby essential. Conveying the beliefs of supply chain is necessary keep the support and commitment of each party (Noordhuis, 2012). The main six pillars are described in order to obtain a full and complete picture of what is meant by supply chain collaboration.

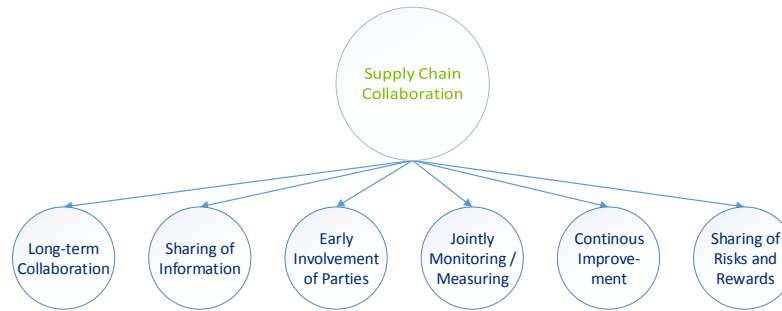


Figure 3.3: The six main pillars of supply chain collaboration of Noordhuis (2015)

Pillar 1: Long-term collaboration

Entering in a strategic partnership agreement is an essential element for the successful application of supply chain collaboration (Van der Veen, 2003). Moreover, parties must have entered into an agreement to execute several projects by a same set of parties. As a matter of fact, Van der Veen (2003) mentions that the realization of construction projects must not longer be seen as a contemporary phenomenon (a one-off collaboration), but instead as a part of something larger (a 'project unbounded' collaboration).

Noordhuis (2012) mentions that the main intention of this long-term collaboration is to obtain common goals on time, budget, and quality items. As a matter of fact, the parties should define common goals that are in line with the corporate goals of all underlying parties. Van der Veen (2012) emphasizes that the alignment of goals must be reflected in the long-term strategy of the collaboration in which solidarity and respect for each other's business is ensured.

A distinction can be made between the common goals on earnings (profit margins), the goals on performance (end product) and the goals in respect to learnings (Noordhuis, 2015). Noordhuis (2015) mentions that all these goals have to be made specific and measurable in order to assess the actual performance in relation to the predefined goals. Besides, Van der Veen (2012) mentions that it is of major importance that project specific goals (short term) are not obtained at the expenses of strategic goals (long-term). Above all, it should be noted that supply chain collaboration must not be seen as a goal on itself, but as a way to improve the inter-organizational structure and the service provided (Haverkamp, 2014).

Furthermore, the processes executed by chain parties could be mutually coordinated or steered by one formal leader (Vrijhoef, 2011). The importance of a central control is also raised in the 'industrial network approach' (INA). Bygballe (2010) provides an interesting view in which he describes three different aspects of supply chain collaboration, namely: the duration of the collaboration ('project bounded' versus 'project unbounded'), the parties involved in the collaboration (bilateral or a network of companies), and the way how the collaboration is developed. The 'industrial network approach' provides a structured approach to deal with these aspects (Bygballe, 2010).

The composition of the chain, meaning the selection of parties, is essential and must contain all necessary competences (Bennet & Jayes, 1998). Bennet and Jayes (1998) therefore argue that all parties must be selected and evaluated on their competences. At the same time, the system for party selection must withhold a procedure for the assessment and evaluation of individual performances, in which a party can be excluded in the case of a shortcoming and/or failure in performance. The differences that exists within the chain concerned with the underlying corporate cultures of the different companies must be overcome (Tomer, 1999). Tomer (1999) emphasizes that the further alignment of corporate cultures is considered important but must be done appropriately.

Pillar 2: Sharing of information

The exchange of information is an essential element for making collaboration to a success (Brandon & Betts, 1995). As mentioned in paragraph 1.1, 'failure costs' mostly arise in the activities that take place between the different parties of the supply chain. In addition, these 'failure costs' mainly occur due to poor communication between the parties (Brandon & Betts, 1995). Brandon and Betts (1995) mention that relevant, reliable and up-to-date information must be transparent and fully accessible for all parties. The exchange of information must happen on time so that all parties are able to make the right decisions. To avoid problems and errors, a modern systems must be put in operation to support the process of information sharing (Schlueter & Thesseling, 2009). Moreover, Schlueter and Thesseling (2009) emphasize that information about inter-organizational processes have to be insightful as well, since that may open opportunities for improvement.

Pillar 3: Early involvement of parties

Following the theory of supply chain collaboration, early involvement of parties is of major importance due to fact that the expertise of more parties can be utilized (Song, Mohamed, & Aboorizk, 2009). Song (2009) mentions that only the parties with a significance impact on the performance in time, budget and quality must be involved early in the process. The possibilities for launching new ideas must be the same for all parties in which all improvement initiatives must be considered similar. Walker (2007) mentions that equality is considered necessary to obtain (and increase) the commitment and involvement of all parties. Commitment can be increases if the parties obtain the belief that they are part of a greater thing.

The main advantage must be that parties are challenged to bring innovative ideas and improvement initiatives to the table that positively affect the value creation process in an early stage (Graham, 2007). The client is thereby better able to take the correct decisions due the fact that all considerations are weighted by using the expertise of all parties. Possible negative (or sub optimal) elements can be better tackled due to this common assessment. Still, the level of expertise of the parties is essential in maximizing the utility of the early involvement of parties (Walker, 2007).

If optimizations are not implemented early in the process, the costs for making adjustments are way higher later on. The main belief is that changes, in the design for example, have to be made early on in the process due to the fact that the costs for making adjustments are than relatively low and the potentials for improvement are than significantly high. Proposals and initiatives can be launched in the initiative and design phases that positively influence the performance in the exploitation phase (figure 3.4). To ensure these effects, the clear separation between design and construction must be released (CURT, 2004).

Pillar 4: Jointly monitoring / measuring

The use of a joint monitoring system is important pillar of supply chain collaboration (Simatupang & Sridharan, 2005). Noordhuis (2015) mentions that monitoring is necessary to map the progress of the collaboration. As a matter of fact, the monitoring systems will contribute to the search for appropriate improvement initiatives, since these monitoring systems provide insight in the strong and weak elements. This could potentially lead to an improvement of both the processes and associated outputs. Two main types of monitoring systems can be distinguished, namely a system for monitoring output and a system for monitoring the process (Aggenbach, 1996).

Aggenbach (1996) mentions that output monitoring measures the extent to which the strategic goals of the collaboration are achieved. In other words, the output monitoring system is necessary to control and evaluate the performance outcomes in relation to the common goals. Aggenbach (1996) mentions that the same approach applies to process monitoring in which the efficiency of the flow of products and services of the entire building process is measured. The extent to which the chain succeeds to work more efficient as the collaboration progresses becomes clear in this manner.

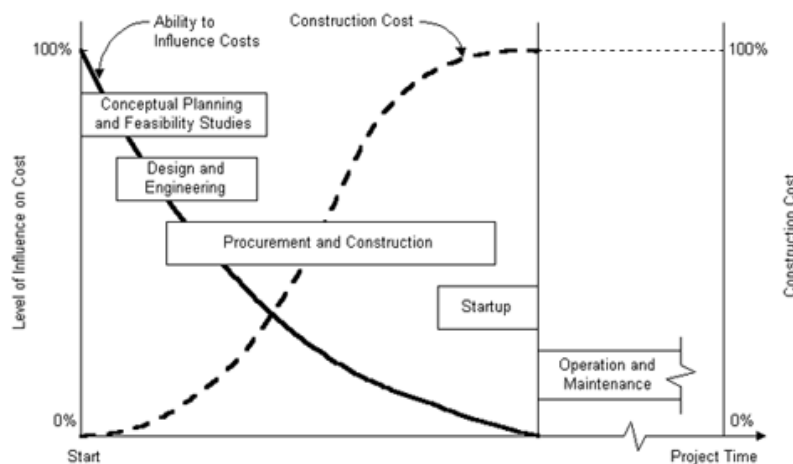


Figure 3.4: Ability to influence construction costs over time by CURT (2004)

Pillar 5: Continuous improvement

Supply chain collaboration is characterized by the belief that the collaborating parties must continuously search for possibilities to improve the overall performance of the chain (Smyth, 2010). In this respect, the concept of continuous improvement is describes by making better processes leading to better products (Womack, 1997). A situation must be created in which a 'learning chain' enables that the parties search for joint improvement opportunities in operational, planning, product development, design and logistics processes (Love & Li, 2000). In order to accomplish this, proven and structured improvement methodologies must be used.

The Deming circle is often mentioned as a tool for the continuous improvement of processes by using the 'Plan', 'Do', 'Check', and 'Act' principles. The determination of improvement initiatives and the necessary actions to achieve these improvements are put in the 'Plan'. The 'Do' stands for the implementation of the proposed initiatives as defined in the 'Plan'. The 'Check' ensures the study to measure the actual results in relation to the predefined 'Plan'. The result of the 'Check' must be the determination whether or not the implemented improvement initiative indeed leads to a measurable better performance outcome. So the results of the implemented improvement must be measured and compared with the initial situation. The situation after the implementation becomes the new standard if the 'Check' indicates that the improvement is implemented successfully. The PDCA-cycles can then be restarted whereby the objectives are set higher over time. If an objective is not achieved, the chain should search for an alternative improvement initiative (Sokovic, Pavletic, & Pipan, 2010).

Lastly, it is considered important to measure the performance of the chain in relation to the subsequent improvement (Chan & Chan, 1999). Chan and Chan (1999) describe that identifiable measurable performance improvements contribute well to the belief of the parties to continue the collaboration.

Pillar 6: Sharing of risks and rewards

A well-balanced risks and reward system - in which each party is rewarded correctly for his respective effort - positively contributes to a desired situation of commitment, mutual trust, equality and fairness (Van der Veen, 2012). The main principle hereby is that risks and rewards are jointly taken. In addition, in order to encourage continuous improvements, a situation must be created in which a party receives an award for his respective contribution to the overall performance (Chan & Chan, 1999).

Vrijhoef (2011) mentions that the link between individual rewards and the realization of common objectives must be clearly present. In order to accomplish this, the interest of all parties must be linked to the overall outcomes of the entire chain. By doing so, a party is rewarded for obtaining common goals, instead of rewarding a party for achieving individual goals (Vrijhoef, 2011).

An incentive system - as part of the risk and reward sharing arrangement - must ensure that the individual parties are rewarded for the achievement of common goals (Van der Veen, 2012). Van der Veen (2012) mentions that sharing of risks and rewards stimulates the parties to help each other in the realization of common objectives and to improve the performance of the chain. So the incentive system must lead to a particular desired behavior that is considered good for both the individual organizations (called sub-optimization) and the chain (system optimization). Furthermore, Van der Veen (2002) argues that the application of an incentive mechanism enhances the drive for continuous improvement.

Also, Beijder (2008) advices to make agreements about how will be dealt with additional profits and savings. So fairness and equality doesn't necessary mean that all additional yields are appropriated in a similar way, but also elements like performance and effort must be taken into account as well (Beijder, Wandahl, & Ebbesen, 2008).

Eisenhardt (1989) emphasizes that a sharing arrangement encourages the parties to work together to act more in the common interest - and thereby to increase efficiency and minimize actual costs and time - especially in case of outcome uncertainty and information asymmetry.

At the same time, a party's motivation to reduce costs decreases if only a low proportion of sharing is used (Perry & Barnes, 2000). Perry and Barnes (2000) stress that the factors that play a significant role in a successful sharing arrangement are: (1) precise and clear determination of the actual costs and fees; (2) realistic tenders (backed up by comprehensive and realistic estimates); and (3) a reliable and fair method for the adjustments of goals.

Related topics to supply chain collaboration

Eccles (1981) described the importance of promoting and enhancing the linkages between the firms involved in a construction project before literature was written about supply chain collaboration. Egan (1981) was one of the firsts to propose a radical cultural change within the construction industry in which no place exists for the outdated believe of procurement based on lowest tender price. Egan (1981) believed that the integral use of knowledge from all over the supply chain is essential to improve the performance. The phrasings of Eccles (1981) are sometimes associated with the ‘quasi-firm’ theory (Albino & Garavelli, 1998).

The ‘quasi-firm’ theory describes the notion of firms behaving as ‘one firm’, a main contractor and a couple of sub-contractors in this respect. Albino and Garavelli (1998) argue that the ‘quasi-firm’ theory predominantly covered economical aspects in which the supply chain was regarded as a single firm. However, production and organization aspects remained hereby underexposed (Albino & Garavelli, 1998).

Different forms of collaboration are used by several sets of companies in the (Dutch) construction industry, from simple ‘cooperation agreements’ to ‘intensive prolonged strategic collaborations’. The main purpose of these prolonged strategic collaborations (hereby referring to ‘supply chain collaboration’) is to improve the overarching supply chain by building better, faster, cheaper (and more sustainable) (Rutten, 2010). Supply chain collaboration is often associated with more other topics, the most relevant ones are described in this paragraph.

‘(Product) standardization’ - hereby referring to the use of standardized building components - is recognized as one of the first initiatives for improving the supply chain. A superlative of product standardization is the development towards ‘legolisation’ of the construction industry (De Ridder, 2012). De Ridder (2012) describes a customized industrial production process that meets all client specifications (sometimes referred to as ‘modular construction’) as the necessary revolutionary change for the conservative construction industry. In this respect, industrialization can be regarded as the structural means for eliminating on-site construction activities (Warszawski, 1997). Warszawski (1997) believes that quality can be improved and productivity increased if activities are moved off site. De Ridder (2012) argues that the scheduling of work on site is simplified and the overall building time is reduced if ‘modular construction’ is applied.

‘Lean construction’ is based on the idea that the supply chain is more stable with standardized (or ‘mass-customized’) products (Womack, 1997). ‘Lean construction’ initially emphasized on a collaborative planning with subcontractors and suppliers to increase the efficiency of the operations of the contractor (Ballard & Howell, 2010). Several lean management tools and techniques (derived from the Toyota’s production system) have been applied in the construction industry to e.g. shorter delivery times and to lower inventories on building sites (Pheng & Chuan, 2001).

‘Co-creation’ (sometimes referred to as ‘co-makership’) is characterized by the interactive and equal based collaboration between two or more parties that make optimal use of knowledge (Prahalad, 2004). ‘Co-creation’ is a way of working together in which all parties accept interdependency, that there is a need for each other (to come to an efficient solving capacity by the exchange of knowledge, skills, interests), and that the differences between parties will be mutually respected in order to increase the joint value (Wierdsma, 1999).

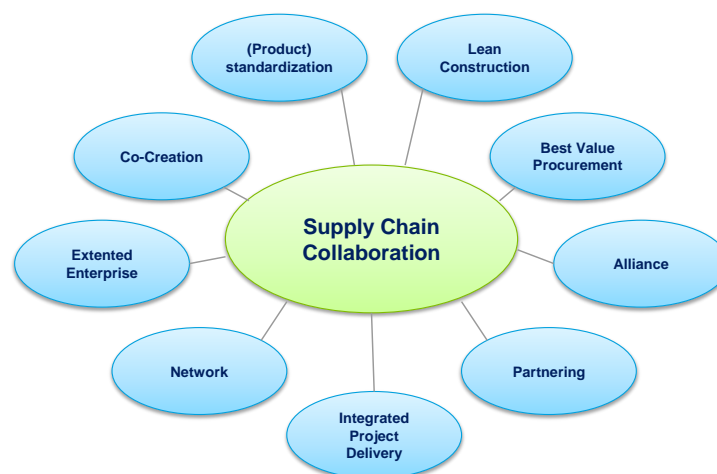


Figure 3.5: Corresponding concepts to supply chain collaboration

The **'extended enterprise'** is a concept to combine the core competences of relatively many specialized parties to create a more effective divisions of operations (Barney, 1991). Higher levels of inter-firm relationships are necessary - together with constructing trust and mutual benefits - to ensure a more efficient allocation of specialized tasks that still contain all necessary competences (Bennet & Jayes, 1998). Bennett and Jayes (1998) mention that the 'extended enterprise' consists of the following seven fundamentals: strategy, membership, equity, integration, benchmarking, project processes and feedback. Zooming in on one of these fundamentals, equity is the drive for a balance between (additional) risks that an individual party takes - in order to achieve commons goals - and the associated reward for taking those risks.

A **'network'** is a group of firms with specific (often contractual) objectives with the aim to obtain mutual financial gains. The parties of a network have agreed to explicitly cooperate in some way and to depend on each other to some extent (Powell, 1996). Rosenbloom and Christensen (1995) mention that the main reason for a party to work together in a network is to stay competitive - apart from just gaining mutual financial gains - since resources are often needed from other parties to execute all business operations completely and effectively. The agreements between the parties of a network about the exchange of resources and capabilities - which cannot be produced internally - are essential in order to satisfy the increasing demands of clients (Rosenbloom & Christensen, 1995).

'Partnering' is defined as a long-term commitment by two or more organizations for the purpose of achieving specific common business objectives by maximizing the effectiveness of the resources of each participant (Chan & Chan, 1999). 'Partnering' is a project management approach to enhance project performance in which processes become more efficient (and thereby cost-effective), an increased opportunity level for innovation arises, and continuous improvements are encouraged that must result in products and services with a higher quality (Bresnen & Marshall, 2010). Kadefors (2004) distinguishes three basics of 'partnering', namely: shared culture and goals, joint methods for problem solving, and continuously working on quality improvements. Kadefors (2004) believes that a 'partnering' collaboration has to meet a certain set of pre-conditions to comply with these basics, the most important are mutual trust, commitment, open communication, formalized team building, systems for conflict management, mechanism for quality improvement and an understanding of each other's individual expectations and corporate values (Kadefors, 2004).

An **'alliance'** is a collaboration in which an owner (mostly public) and one or more service providers (mostly private actors like designers, constructors, suppliers, etc.) work as an integrated team to deliver a specific product. Besides, a contractual framework is applied in which commercial interests are aligned and tied to actual project outcomes (Ross, 1999). An 'alliance' is a project delivery method based on a joint contract (legally formed) in which the parties assume joint responsibility for the design and construction of a project that will be executed by an integrated/joint organization (possible a legal entity) (Lahdenpera, 2012). Lahdenpera (2012) mentions that an 'alliance' is founded on the basis of a 'best for project' attitude and aims to create a win-win situation through optimized teamwork in which both positive and negative outcomes are shared.

'Integrated project delivery' is an inter-firm agreement that seeks to improve project outcomes by an early involvement of parties, an alignment of incentives/goals and by sharing of risks and rewards (Kent & Becerik-Gerber, 2010). 'Integrated project delivery' is a project delivery approach that integrates people, systems, business structures, and practices of different parties to optimize project results, increase value to the owner, reduce waste, and maximize efficiency through all phases of design, fabrication and construction (Matthews & Howell, 2005).

'Best Value Procurement' (BVP) is a procurement process in which a contractor is selected that best matches with the project requirements in order to obtain the highest possible performance (Kashiwagi, 1999).

In addition, other concepts that have strong similarities with supply chain collaboration are 'integrated contracts', 'serial contracting', 'multiple project delivery', 'strategic procurement', and 'supply chain clusters/constellations' (Vrijhoef, 2011). Lastly, 'supply chain collaboration' becomes 'supply chain integration' if organizations work so close together that business processes have become inextricably linked, making organizational boundaries nearly invisible (Blauwhof, Spiering, & Verbaan, 2013).

3.3 Project specific context

The collaboration context is described in the previous paragraph. Overall, supply chain collaboration is characterized by a 'multi-project' approach that ensures that the relations between parties are maintained for the duration of more than one project (Vrijhoef, 2011). Moreover, this 'multi-project' ('project unbounded') delivery approach is established by a repetitive tendering arrangement between a client and a contractor (Gholipour, 2006). In this perspective, the contractor is observed as a partner that really adds value for a client's business, instead of regarding a contractor as the party that is assumed to solely accomplish the client's terms and conditions (Bresnan & Marshall, 2000).

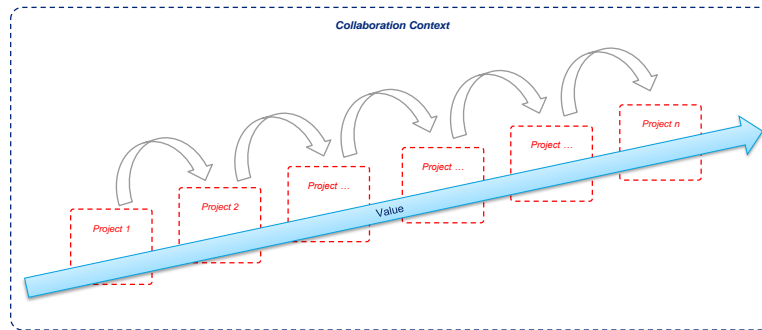


Figure 3.6: Increased value over the consecutive projects due to the 'learning curve effect'

The traditional 'project-driven' approach assumes that each project is somehow unique and influenced by unique circumstances (project specific risks and uncertainties) (De Ridder, 2012). De Ridder (2012) argues that irrespective of how strong the commitment of a chain is, the common performance is always reviewed on the performance on the projects in question. Moreover, the set of parties that deliberately work together for more than one project must understand that the construction industry will never completely waive this project specific character (Vrijhoef, 2011).

Vrijhoef (2011) argues that systematic feedback (by the transfer of knowledge and expertise) from and between project teams must become part of the general way of working. Vrijhoef (2011) expresses the belief that a 'learning curve effect' emerges over the sequential projects by entering in a long-term collaboration.

The choice for entering in a strategic long-term collaborating is sufficient if this 'learning curve effect' is used maximally (Simatupang & Sridharan, 2005). Simatupang (2005) argues that learning from past experiences (mistakes made) will enhance the value creation process in the long-term. In other words, the overall value is increased over the consecutive projects due to this 'learning curve' effect (figure 3.5).

In short, the construction industry has always been focused on the creation of value on each particular project (Broome & Perry, 2002). For this reason, it seems convenient to apply a similar breakdown for the context. This research therefore applies a collaboration context and a project-specific context. Although, supply chain collaboration prescribes a 'project-independent' approach during which project-specific circumstances are assumed (Van der Veen, 2012).

3.4 Associated theories

The degree of information asymmetry and outcome uncertainty influences a party's behavior (Chan & Ives, 2007). A lot more things influence a collaboration, meaning all dynamics between the parties. Searching for academic literature about value appropriation models have led to a large amount of articles that underpin the behavior of parties in strategic collaborations. These associated theories are divided in a behavioral theory and a risk theory.

Behavioral theory

The behavior of parties depends on more than elements as trust, commitment and transparency. The value appropriation model influences the behavior of parties due to the fact that the interests of all participants are linked to the overall project outcomes (Hosseini, 2013). Love (2011) mentions that rewarding parties on their performance appeared to be most decisive - next to perceived fairness and equality - in promoting positive behavior within a project team. In addition, parties will show more commitment throughout the total life-cycle of a project if their commercial interests are linked to the overall common performance outcome (Love, Davis, Chevis, & Edwards, 2011).

A collaborative culture and a good level of trust contribute well to the success of a collaboration (Linton & Walsh, 2004). The nature of the individuals involved in a collaboration is decisive in this success since trust is propagated by these individuals (McKnight, Cummings, & Chervany, 1998). Personal contact and the respectful approach towards persons from other companies observed as one the most important conditions (Van der Veen, 2012). Van der Veen (2012) mentions that social aspects of a collaboration are considered essential to ensure prolonged success, which is sometimes referred to as EBITO (Dutch acronym for honesty, trustworthiness, integrity, transparency and openness). Often other types will be added to this, like altruism, social preferences, fairness and reciprocity.

In a client-contractor collaboration, the contractor's effort cannot be fully monitored by the client causing asymmetry between both parties (Hosseinian & Carmichael, 2014). Due to this asymmetry - complemented with a certain degree of uncertainty - the contractor may act in its own interest instead of the client's interest. In that case, the contractor don't give the effort the client desires due to the fact that effort is at cost of the contractor (Eisenhardt, 1989).

Self-interest acting is in particularly highlighted by the search of a party to increase his profit share. In general, a party can try to increase his profit share in two ways. The first way is making the collaboration more successful in terms of overall profit (increasing the pie) and the second way is to increase the share of the profit (increasing the piece of the pie) (Hosseinian & Carmichael, 2014).

A party shows non-cooperative behavior if that party pursues a high level of self-interest (Lavie, 2006). In addition, Hosseinnian (2014) appoints cooperative and non-cooperative behavior as the two main classification for behavioral types. The two most relevant theoretical concepts that negatively affects a collaboration is if parties showing 'opportunistic behavior' (Bejder, Wandahl, & Ebbesen, 2008).

'Opportunistic behavior' refers to the pursuit of self-interest by economic actors (Nagin, Rebitzer, Sanders, & Taylor, 2002). As a consequence of unavoidable information distortion, parties pursuing own (short-term) objectives irrespective of the consequences for the other supply chain parties (Lavie, 2006). Moreover, 'opportunistic behavior' thereby leads to a sub-optimal result for the supply chain.

Lavie (2006) mentions that an extreme variant of 'opportunistic behavior' if parties mislead, distort and disguise information, e.g. start hiding profits or are exaggerating costs. In addition, three main types can hereby be distinguished, namely 'shirking', 'free-riding', 'hold-up' and 'exploitation' (Jap, 1999). 'Shirking' means avoiding work or shifting costs to another party (Nagin, Rebitzer, Sanders, & Taylor, 2002). 'Free-riding' means delaying processes (waiting) in order benefit from actions of other parties (Williamson, 1991). A 'hold-up' means exploiting a party's dependency within the collaboration. A party then tries to keep things open in order to make it an advantage in a later stage (Klein, 1980). 'Exploitation' means that power and control abilities are misused.

'Opportunistic behavior' is also described in 'transaction cost economics'. 'Transaction cost economics' is seen as the guiding theory for economic behavior in which the value of the own silo is considered more important than the value of other one's silo. Williamson (1991) assumes that - from a 'transaction cost economics' point of view - all parties act rational and pursue profit maximization. In this matter, the parties in a network serve their own interests, while the overall performance of the network gets less attention. To put this in perspective, many actions described here can also be called 'appropriating value at the expense of the other parties of the chain'.

'Agency theory' - often mentioned in combination with 'transaction cost economics' - addresses concerns in scenarios in which one party (principal) depends on another party (agent) to do something on the principal's behalf (Eisenhardt, 1989). 'Agency theory' addresses work relationships - and issues related to project outcomes, uncertainty and risk - in which the agent is assumed to be a rational self-interested and risk averse actor (Spake, 1999). In this respect, Spake (1999) mentions that the 'adverse selection problem' and 'moral hazard problem' are the two broad problems a principal faces.

The 'adverse selection problem' occurs before the principal enters in business with the agent and concerns the question whether or not the agent possesses the capabilities and resources the principal is seeking. The 'moral hazard problem' occurs after the principal has entered into a contractual relationship with the agent and occurs when the agent's actions are not in line with the principal's interests. Both the 'adverse selection problem' and the 'moral hazard problem' are observable in construction projects, the latter one is however more important for the sake of this research.

'Decision theory' (both normative and prescriptive) is concerned with identifying the best decision to take by knowing that a party's best option provides not necessarily the optimum benefit (Hansson, 2005).

The 'theory of constraints' adopts the belief that the chain is not stronger than its weakest link, meaning that the maximum performance is related to the weakest link. Besides, it is focused on the process of identifying, restructuring and reducing the number of constraints in order to increase the limits of achievement (Rahman, 1980).

'Organizational theory' describes the coordination within an inter-firm relationship in relation to the degree of interdependencies and uncertainties. The inter-firm coordination is directly related to the value creation possibilities. Activities crossing (or having influence across) organizational boundaries therefore need to be coordinated across those boundaries (Dekker, 2003).

'Resource dependency theory' describes the role of dependencies and (bargaining) power within inter-organizational relationships. Constraints in the supply of critical resources creates a dependence on resource providers who thus acquires power over the dependent organization. Resource dependence has two dimensions, namely power imbalance and mutual dependence. These two dimensions influence both the likelihood of using power by the dominant organization and the likelihood of restructuring/reducing dependencies by the weaker organization (Pfeffer, 2003).

'Bargaining power' is the capacity of one party dominating the other due to its strength, size, status, or persuasions (Lavie, 2007). Bargaining power is the ability of a party to exert influence over another party in a negotiation in order to achieve a deal which is favorable to them self (Cachon & Lariviere, 2005).

Lavie (2007) mentions that bargaining power is directly linked to the capability of a party to appropriate value. In general, the amount of value a firm can capture is greater if a firm's bargaining power is greater. Also, bargaining power is associated with the relative degree of interdependences between firms and the number of alternate suppliers (Lavie, 2007).

Risk theory

The outcome is not solely dependent on a party's effort but is also affected by uncertain events outside his sphere of influence (Barnes, 1983). This uncertainty introduces risks that must be borne somewhere (Eisenhardt, 1989). Project management is characterized by the arrangements made between parties about how to deal with the risks (Chan, Chan, & Lam, 2012). 'Risk' means exposure to the chance of occurrence of events that adversely affect the outcome as a consequence of uncertainty (Hosseinian & Carmichael, 2014). In addition, Eisenhardt (1989) argues that it becomes increasingly expensive to shift risks to another party if uncertainty increases.

Dealing with risks and uncertainties leads to strategic behavior (Aloini, Dulmin, Mininno, & Ponticelli, 2012). Aloini (2012) mentions that 'cooperative' or 'non-cooperative' behavior results in respectively a 'risk neutral' or 'risk averse' attitude. The term 'risk neutral' refers to a party that is not afraid of risk and can disregard risk with different associated alternatives in decision making (Kraus, 1996).

The term 'risks averse' refers to a party that avoids risk, is afraid of risk, or is sensitive to risk (Clemen & Reilly, 2001). Van der Veen (2012) argues that the need for a forecastable gain increases and a party willingness to 'gamble' on the outcome reduces if a party becomes more risk averse. The risks attitude of a party depends on both social dimensions (e.g. interaction, trust, shared vision, dedication to common goals) and individual dimensions (e.g. control ability, self-efficacy, expectations and corporate values) (Zhang & Li, 2014). Next, parties often obtain a contingency budget to deal with risk (paragraph 5.4). Van der Veen (2012) mentions that frequently entities do not want to be too transparent on risks because they do get the rewards even when the risk does not materialize.

3.5 Findings of the context

The context is the surrounding in which the value appropriation model functions. In general, supply chain collaboration is the context in which the value appropriation model functions. This context is characterized by a long-term strategic vision represented by a 'project unbounded' collaboration agreement. Still, a distinction is made between a collaboration context and a project specific context.

Notable, previous research showed that a sharing arrangement plays a significant role in motivating a party to act more in the common interest. Although, a sharing arrangement could also negative impact the inter-organizational relationship if it is interpreted as unfair. In other words, the chance that a party starts showing 'opportunistic behavior' increases if one organization believes that he makes asymmetric contributions in relation to another party.

The value appropriation model must therefore stimulate the transformation of a party's behavior from both: (1) 'non-cooperative' towards 'cooperative' behavior; and (2) 'risk averse' towards 'risk neutral' behavior. Lastly, there are many other aspects that affect the functioning of the value appropriation model, which are not covered within this research.

Chapter 4. Value Mechanism

Chapter 4 is the second part of the literature study and covers the first mechanism of the value appropriation model: the value mechanism (figure 4.1). The second mechanism is described in chapter 5 (appropriation mechanism). Continuous improvement and jointly monitoring are two important pillars of supply chain collaboration, as can be read in the previous chapter. This first pillar - continuous improvement - means that the set of parties that execute construction projects in supply chain collaboration should enlarge the generated amount of value over the consecutive projects. In order to map this enlargement, value must be made measurable (and jointly monitored) on both the collaboration level and the project specific level. Some general views and definitions of value - including various types and related topics - are given in paragraph 4.2. The structure of the appropriation mechanism is similar to the structure of this chapter. This chapter underpins the belief that the construction industry has translated value into the achievement of common goals. How the performance of the chain can be mapped - meaning the relation between setting and achieving goals - is described in this chapter. The collaboration agreements on goals are therefore elaborated in paragraph 4.3. The project specific agreements on goals are given in paragraph 4.4 in which both the financial and the non-financial goals are discussed. Subsequently, the project specific determination on outcomes is mentioned in paragraph 4.5. In addition, three contributors to the value mechanism are discussed comprehensively in paragraph 4.6. As described in the research design, three different options will be given for each contributor. Finally, the findings of the value mechanism are listed in paragraph 4.7.

Paragraph overview:

- 4.1 Introduction
- 4.2 General
- 4.3 Collaboration agreements on goals
- 4.4 Project specific agreements on goals
- 4.5 Project specific determination on outcomes
- 4.6 Contributors
- 4.7 Findings of the value mechanism

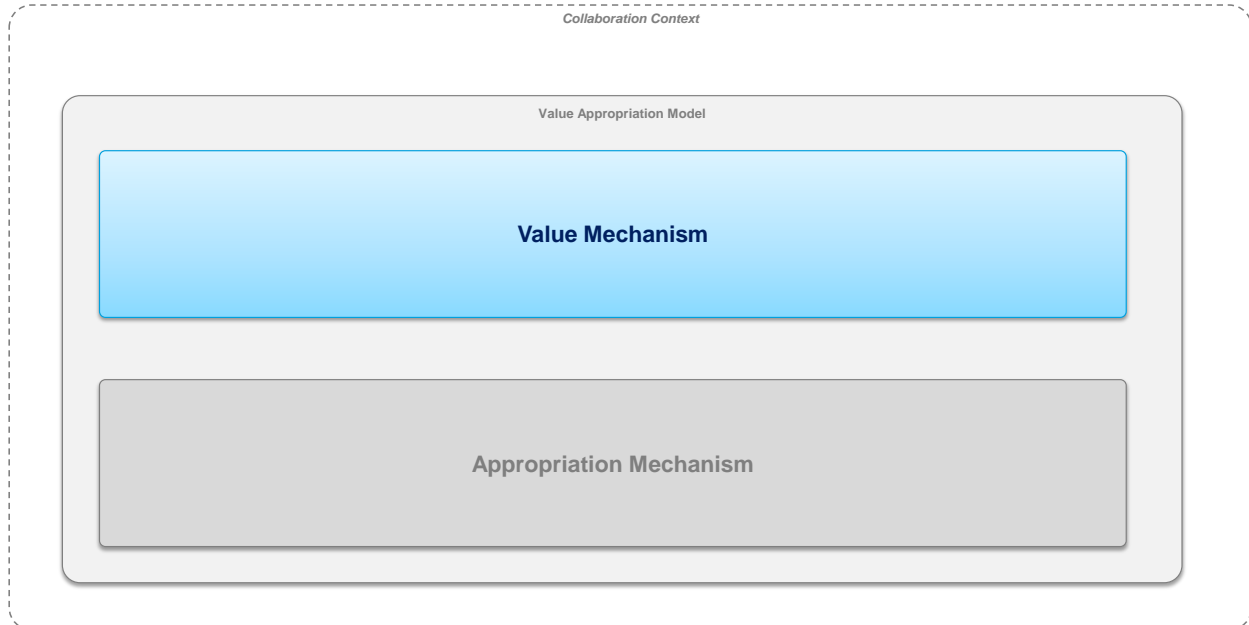


Figure 4.1: The value mechanism of the value appropriation model

4.1 Introduction

The value mechanism provides insight in the amount of value that is created by the chain, when value is measured, and how the common performance of the chain is determined. What the parties consider as value must be defined before it can be measured. The most logical way to measure created amount of value in the construction industry is to measure the extent to which value is created on each particular project (Broome & Perry, 2002). It is hereby necessary to get a good feeling of the time perspective, meaning the target value upfront, the value creation process during progress, and the created amount of value measured afterwards. Macdivitt and Wilkinson (2011) argue the total created amount of value must be directly legible from the value mechanism whereby any discussions are avoided.

4.2 General

Before a value mechanism can be applied, the question rises what can be understood under the definition of 'value'. Nevertheless, the exact definition of 'value' in the construction industry is rather vague. This research stated earlier that 'value' is considered ambiguous, meaning that no single uniform definition exists. Even if the definition of 'value' was clearly stated, it still is very complicated to measure the generated amount of value. Various academics apply different definitions in academic literature, the most relevant definitions of 'value' are described in this paragraph. In addition, some concepts related to value are given as well.

Definitions of 'value'

'Value' is the difference between the benefits received and the sacrifices made (Zeithaml, 1988). Zeithaml (1988) mentions that 'value' refers to the worth of a product (whether a good or service) whereby worth is always an inherent relative matter. 'Value' is in this definition set by the respective assessment of alternatives.

The general definition of 'value' used in economics is the amount (of money) that is considered to be a fair and suitable equivalent for something else; a fair price or return (Hausman, 1996).

'Value is the extent to which the needs of a client are met, hereby referring to the needs on items like planning, budget, and operational and technical specifications (Shenhar, Levy, & Dvir, 1997). The remaining question is than how these needs can be mapped in a manageable manner. The most logical and suitable answer to that question is to translate these needs into operational goals (Lindahl & Ryd, 2007).

'Value' can be defined in terms of a specific product that meets specific needs of a client for a specific price at a specific moment in time (Womack, 1997). The producer is in Womack (1997) eyes the one who is responsible for creating the 'value' and therefore must define 'value' accurately through a dialogue with the client. Womack (1997) argues that a structured mapping methodology must be used ('value stream mapping') to map all material and information flows required to deliver the product to the client. All non-value adding steps (wastes) of the 'value chain' can then be better identified and eliminated.

'Value' is a measure (given by a relationship between function, time, cost and quality) expressed in a comparative scale (currency, effort or exchange) which reflects the desire to obtain or retain an item or service (Kelly & Male, 2004).

'Value' indicates to what extent the need of a client is fulfilled with respect to the resources used in which something has no 'value' if there is no need (Johnson, Haubl, & Keinan, 2007).

'Value' is the perceived worth of a product in monetary units of the set of economic, technical and social benefits received by a client firm in exchange for the price paid whereby the available products and prices of alternative supplier are taken into consideration (Anderson, Jain, & Chintagunta, 2008).

Kashiwagi (2011) refers to 'value' with the question whether the client/customer receives the closest thing (desired value) to what he wants (best possible option or alternative) for the lowest possible price (Kashiwagi, 2011).

'Value' is about what the (end) product (and service delivered) is worth for the client during the total life-cycle of that (end) product (Macdivitt & Wilkinson, 2011). Macdivitt and Wilkinson (2011) describe most optimal value as the extent to exactly understand what the client wants and give it to him the exact moment he actually wants it.

'Value' applied is in this research defined as the extent to which the common goals are achieved.

Topics related to ‘value’

A distinction is often made between ‘tangible value’ and ‘intangible value’. ‘Tangible value’ are all products and services that generate (or are expected to generate) value, meaning the exchange/flow of goods and services including all transactions. In addition, ‘intangible value’ are all other types of values, meaning among others knowledge exchange (including strategic information, planning knowledge, process knowledge, technical know-how, collaborative design and policy development) (Allee, 2008).

Life-cycle thinking appears to be a crucial element by defining ‘value’ by construction projects (Van der Veen, 2012).

The ‘value for money’ concern is the problem whether or not the client receives the thing (the maximum benefit from the goods and services acquired) he actually wants within the resources available to him (maximum value for the price paid) (Bauld & McGuinness, 2006).

The ‘value chain’ is a collection of activities performed in a specific industry in order to transform inputs into products or services (Porter, 1991). Porter (1991) mentions that such a ‘value chain’ is extending vertically from suppliers in upstream industries to buyers of products and services downstream.

The total benefit of the ‘value chain’ consists of the benefit for the client (difference between value and price) and the profit for the supplier (difference between price and costs) (De Ridder, 2009). The ‘value-price-cost’ model of De Ridder (2009) illustrates the relevant parameters between the demander (client) and a supplier (contractor) that execute a construction project together (figure 4.3).

‘Value creation’ in a strategic collaboration has been defined as a collective processes to create common benefits to all parties of the collaboration (Lavie, 2007). Lavie (2007) argues that ‘value creation’ is a commercial process of resource transformation that adds worth to the need of a client or end user. ‘Value creation’ is the configuration of resources and activities (that contain units of money, time and effort) of a set of organizations in order to achieve (mutual) business objectives (Prahalad, 2004).

The ‘value creation’ process in the construction industry are reviewed on the executed projects. In fact, the second and third pillar of the value mechanism (which are both project specific) form the dashboard of the ‘value creation’ process. The assessment of the project performance is done by identifying the discrepancy of the project specific agreements on goals and the project specific determination on outcomes (read paragraph 5.5). Most important, the ‘created value’ is directly legible from the value mechanism (figure 4.2).

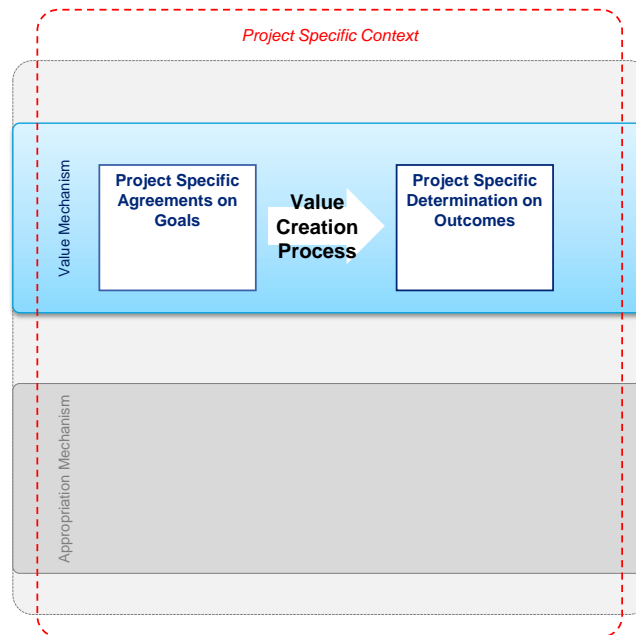


Figure 4.2: The value creation process is mainly situated between the second (project specific agreements on goals) and third pillar (project specific determination on outcomes) of the value mechanism

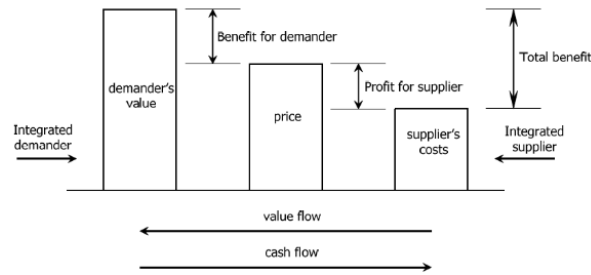


Figure 4.3: Value-price-cost model of De Ridder (2009)

'Value creation' is accomplishing the pie (Jap, 1999). Jap (1999) gives a general formula to express 'value creation' as the function of the buyer's 'willingness-to-pay' for a product minus the seller's 'opportunity of cost' of that product. Both concepts are within the transaction between different parties of the value chain.

The 'willingness-to-pay' for a product is seen from the viewpoint of the buyer and is the extent to which a buyer is interested in a certain quantity of a product from the firm (focal company). The buyer's 'willingness to pay' is the price for which the buyer is interested in a certain quantity of the product in question. However, the 'willingness to pay' for a product may be different from one buyer to another since each party will value the product differently. Actually, the value of a product is subjective since a certain buyer may derive more utility from a product (or has more to spend) than another (Brandenburger & Stuart, 1996).

The 'opportunity cost' of a product is seen from the viewpoint of the supplier and is the loss of potential gain from buying an alternative (Pearce & Markandya, 1987). Pearce and Markandya (1987) argue that the 'opportunity cost' is the cost incurred by not enjoying the benefit of taking the second best choice available. The 'opportunity cost' of a product is the value of the best alternative forgone in a situation in which a choice needs to be made between several mutually exclusive alternatives given limited resources (Shaw & Feather, 1999). The 'opportunity cost' of a product plays a crucial role in ensuring that scarce resources are used efficiently.

The resources of the parties involved are thus decisive in the value creating possibilities of the chain (Wade & Ulland, 2004). Wade and Ulland (2004) mention that physical, financial, technological, managerial, and organizational resources are the most common types of resources mentioned in academic literature. Wade and Ulland (2004) argue that the configuration of resources between organizations determines the value creating potential of a network. The lack of resources is the main reason for organizations to look outside the scope of their own organizational boundaries to take the advantage of using the resources of other organizations.

'Value management' addresses the underlying logic of how a firm or chain delivers value to its clients and distributes costs (Langford & Male, 2008). 'Value management' is a process in which the functional benefits of a project are made explicit by the client through a value system (Kelly & Male, 2015). Kelly and Male (2015) mention that 'value management' in construction projects is often monitored by process related values such as lead time, cost levels, quality control, and customer satisfaction. Value engineering and value management are often used in a similar context.

'Value engineering' is a collective process for increasing the generated amount of value by either increasing the quality or by staying more within the client's budgetary requirements (Eriksson, 2010). Eriksson (2010) argues that a combination of techniques can be used to identify better alternatives and to implement modifications in the design phase of project. In practice, 'Value engineering' rather means optimizing the client's specification by using the knowledge available from the entire supply chain (Shank & Govindarajan, 2005). Shank and Govindarajan (2005) argue that a competitive advantage can be achieved by using value engineering due to either reducing costs while keeping quality constant or by increasing quality while keeping costs constant. Moreover, Eriksson (2010) emphasizes that a decision is often made of what performance is considered more important: a higher quality or a lower price.

Finally, 'ethical values', 'ideological values' and 'social values' serve to distinguish between good and bad, right and wrong, and moral and immoral. Social values are pros and cons of a project for the society which is often translated into monetary units (Arrow, Sen, & Suzumura, 2011).

4.3 Collaboration agreements on goals

Pillar 1 of the Value Appropriation model

A workable manner for measuring value must be used in order to keep the value mechanism manageable. The general definition of value used in the value mechanism therefore is the extent to which the goals of the collaboration are met. This can be substantiated by the fact that pursuing of common goals is important according to the principles and beliefs of supply chain collaboration (Noordhuis, 2015). This can be further substantiated by the fact that common goals are decisive in ensuring continuity and prolonged success of a collaboration (Hauck & Walker, 2004). Previous research showed that the sharing arrangement should be responsive to the goals of the collaboration (Jap, 2000).

In addition, the most important purpose of supply chain collaboration is that the common goals are to be followed at all times (Chao-Duivis & Wamelink, 2013). Chao-Duivis and Wamelink (2013) emphasize that the main aim is to enhance the performance of the chain over time. In order to do so, the set of parties must make collaboration agreements on how to pursue this continuous improvement and how to establish an alignment of goals.

(*) Continuous improvement

The aim of the strategic long-term collaboration is that the parties seek for continuous improvement opportunities (Noordhuis, 2015). Moreover, Noordhuis (2015) mentions that the belief of supply chain collaboration is that the value of the products can be increased by a better functioning chain by the so called 'learning curve effect'. These improvements are expressed by a lower cost price (reduction of friction costs), faster processes and a better quality of products and services (faster, cheaper, better).

The desired performance level should therefore continuously be defined as being better than has been achieved in previous projects. However, while common goals should be set at a very high performance standards, they should still be achievable (Li, Cheng, & Love, 2004). The establishing a common goals is one thing, setting up mechanisms to increase the likelihood of achieving those goals is another (Hauck & Walker, 2004).

The value mechanism ensures that the common goals and outcomes are made measurable and comparable to prove that the strategic long term collaboration indeed leads to better end products. Hauck and Walker (2004) argue that the parties must monitor if the chain indeed creates better measurable outcomes.

() Goal alignment**

A consistent theme of supply chain collaboration is to avoid that the goals of the collaboration are in conflict with the individual goals of the underlying parties (Noordhuis, 2015). Moreover, the common goals must be in line with the individual goals of the underlying parties in order to eliminate any opposing interests (Hauck & Walker, 2004).

Besides, the goals of the collaboration are translated to project specific goals in order to measure the generated value on each particular project. Hence, the project specific goals must be in line with both the collaboration goals and the goals of the individual parties. In fact, supply chain collaboration only 'works' if the project specific goals are aligned with both the individual goals of underlying parties and the common goals of the collaboration (Noordhuis, 2015).

The essential of supply chain collaboration is to align these individual goals in such manner that contradictions and opposing commercial interests are avoided. The alignment of individual incentives with the common goals of the chain is essential for the improvement of the overall chain performance (figure 4.5).

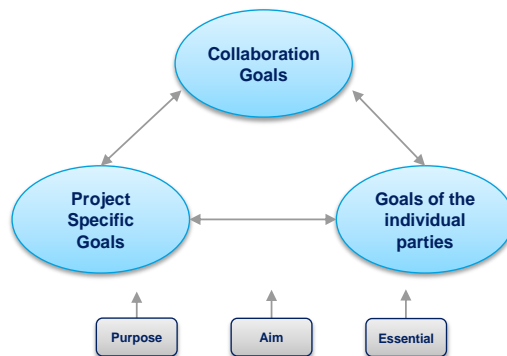


Figure 4.5: The alignment of goals is backed up by the purpose, aim and essential of supply chain collaboration

4.4 Project specific agreements on goals

Pillar 2 of the Value Appropriation model

The value mechanism must be seen as a structured methodology to determine whether the chain has done well or not (Todeva & Knoke, 2005). The time perspective is thereby important whereby the desired level of value is set up front and the created amount of value is measured after realization. The actual created value is measured by the extent to which both financial and non-financial goals are met (paragraph 4.5). Both the upfront (target value) and afterward (created value) determinations must be directly legible from the value mechanism. In general, the agreements on common goals are translated to project specific agreements on both (I) financial and (II) non-financial goals.

(I) Financial goals

The financial goal is the budget agreement for which the chain will realize the concerned construction project(s) (Hosseinnian & Carmichael, 2013). This financial goal is always an estimate and consists of several cost components (e.g. direct project costs, indirect project costs, project specific overheads, corporate overheads, contingencies, profit margins) which include several cost items. In addition, life-cycle cost aspects can be seen as financial goals as well. Finding an agreement about the financial goals is considered as one the most difficult elements of a supply chain collaboration (Contractor & Ra, 2000).

(II) Non-financial goals

Non-financial goals can be set on single or multiple aspects relevant to the collaboration (Holt, Love, & Li, 2000). By a single aspect, only one particular aspect is assessed. By multiple aspects, several items are assessed. The most often mentioned non-financial items are planning (lead time duration), quality aspects, sustainability items, level of end customer satisfaction, number of deficits (deliverable items) and environmental impact (inconvenience for the end-users or the environment) (Chan, Lam, & Yeung, 2010). These non-financial goals are sometimes referred to as key performance indicators (KPI's) or key result areas (KRA's).

4.5 Project specific determination on outcomes

Pillar 3 of the Value Appropriation model

The performance of the chain is measured at the end of a project by (I) the project specific assessment of the financial performance outcome and (II) the project specific assessment of the non-financial performance outcome.

(I) Financial performance

The financial outcome is simply based on what the project (or projects) has (have) cost in the end (Williams & Ryall, 2013). Meaning all actual capital expenditures needed to deliver the project (or projects). The financial outcome could either result in a cost overrun, a neutral cost outcome or a cost underrun (Hosseinnian & Carmichael, 2014).

(II) Non-financial performance

Parties often decide to use a joint monitoring system to measure the project-specific non-financial performance outcomes. A single non-financial performance item could be measured by a performance scale between -100 (poor) and +100 (outstanding) with zero designated as the neutral (Ross, 2003) (figure 4.6).

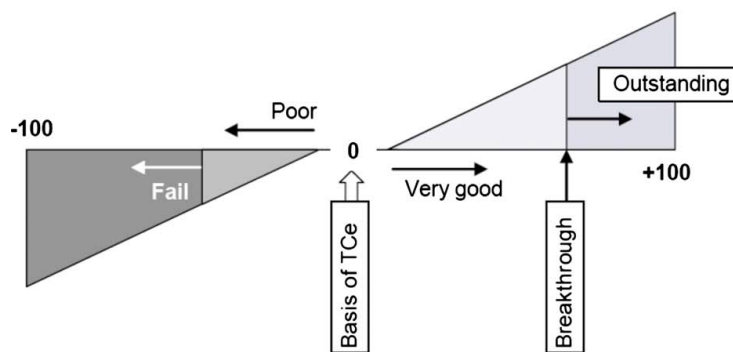


Figure 4.6: Performance scale of Ross (2003) for a non-financial performance item

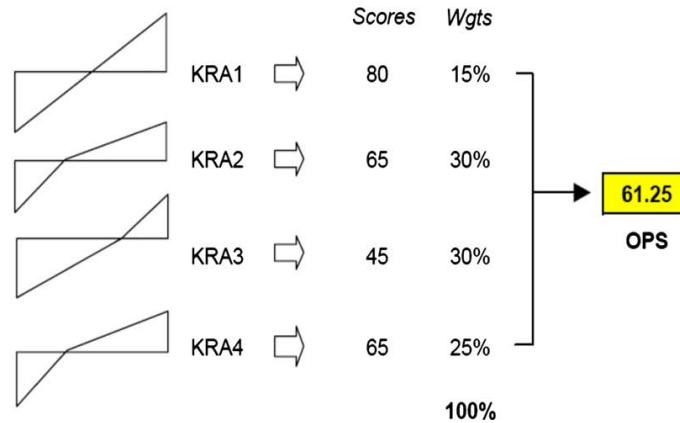


Figure 4.7: Overall performance score (OPS) of Ross (2003) based on the weighted average of several non-financial performance item (A non-cost target is named a key result area (KRA) within this figure)

Hutcherson (2003) frames the overall performance score (OPS) as a measurement systematic to calculate the summed weighted average of multiple non-financial performance items. The weight of each individual non-financial performance item respective to another can be adjusted to customize the value assessment (paragraph 5.5). This overall non-cost performance outcome, also named the overall performance score (OPS), is given by a percentage (figure 4.7). The overall performance score of Ross (2003) is just one of many ways in which multiple criteria can be evaluated into a single criterion. The measurement systematic can further indicate whether the parties create a better measurable outcome over time (Hutchinson & Gallagher, 2003).

4.6 Contributors

Pillar 4 of the Value Appropriation model

In general, three main contributors can be distinguished to help the parties in arriving at a situation in which a joint agreement is found for setting the common financial goal, namely: (A) the accounting approach; (B) benchmarking; and (C) the use of an independent advisor. These three contributors are positioned within the fourth pillar of the value appropriation model. Three different options are given for all three contributors.

(A) Accounting approach

The accounting approach serve as a sufficient handhold in - next to measuring the financial performance of the chain - the process of establishing the financial goal. The accounting approach represents the method for recording all cost items - both estimated and incurred - involved in a collaboration (Hosseinian & Carmichael, 2014). Hosseinian and Carmichael (2014) argue that a solid accounting approach ensures that all cost items are insightful, transparent and verifiable. In addition, costs can be better managed cooperatively by using cost data from across the supply chain (Dekker, 2003). Dekker (2003) argues that the possibilities of the accounting approach are largely dependent on the party’s willingness to share information with other firms within the value chain. The three main options in applying an accounting approach are ‘closed-book’, ‘partially open-book’, and ‘full open-book’.

The **first option** is to apply a closed-book accounting approach which basically represents the ‘traditional way of working’. A closed book accounting approach is sometimes referred to as ‘black box’ accounting since budget estimate are kept secret and cost information is not exchanged.

The **second option** is to apply a partial open-book accounting approach in which only relevant cost information is exchanged without harming the established level of trust. Yeung (2007) emphasizes that cost information is often confidential. When buyers and suppliers open their books and exchange cost and performance information, concerns may arise about their bargaining position and about information spillovers to competitors. Therefore, they will not exchange private information before they are confident that this information will not be misused (Yeung, Chan, & Chan, 2007). Moreover, the firms are often only willing to exchange information if it actually contributes to the improvement of both individual performance next to the improvement of the performance of the chain. To overcome this problem, the parties can agree to only share information that is non-confidential and/or non-subjective to abuse. Besides, Dekker (2003) argues that improvement opportunities become more insightful if the parties only share relevant cost information.

The **third option** is to apply a full open-book accounting approach in which all cost information is exchanged. All parties provide each other with a full and complete view of each other's costs in which a total feeling of mutual trust is needed. In general, an open-book accounting approach is seen as the way to create openness, transparency and understanding all costs and profits involved in a project (Badenfelt, 2008). Badenfelt (2008) describes open-book accounting as a concept involving the structured management and sharing of price information between a client, contractor and (sometimes) associated suppliers.

(B) Benchmarking

The use of some kind of financial benchmark system could serve as a useful tool in setting the financial goal. A financial benchmark system must be seen as a comparison method to obtain cost information on broad categories of building elements (Luu, Kim, & Huynh, 2008). Traditional cost indicators, market cost indicators and a base cost estimate are the three options for applying a financial benchmarking system.

The **first option** is apply traditional cost indicators from similar already (traditional) realized construction projects.

The **second option** is to apply market cost indicators in which the cost indicators are modified and adjusted to the developments in the current market place. (Luu, Kim, & Huynh, 2008). Luu, Kim and Huynh (2008) argue that it is hereby important to keep the benchmark up to date conforming the current economic climate.

The **third option** is apply a base cost estimate which is used as a reference point to arrive at a more ambitious financial goal (Zimina, Ballard, & Pasquire, 2012). This base cost estimate derives from the belief of higher performance possibilities by working in supply chain collaboration (Stewart, 2010). Again, the aim of supply chain collaboration is to perform better than could have been done in ever changing co-operations. The desired performance level should therefore be defined as being better than has been consistently achieved by individual parties working in a traditional manner (Love, Davis, Chevis, & Edwards, 2011). Moreover, the main aim must be to improve the overall performance of the chain (Chao-Duivis & Wamelink, 2013). The parties could therefore agree to set the financial goal higher – thus the price lower - than traditional and market cost indicators point out. In addition, Zimina (2012) argues that the use of a base cost estimate is especially worthwhile in combination with value engineering (read paragraph X).

(C) Independent advice

The use of an independent advisor is considered desirable to not disrupt the accrued level of trust (Stewart, 2010). In accounting literature, the independent advisor is called a third party advisor in a client-contractor relationship. The parties could decide to make use of an independent cost advisor, an independent cost mediator, or an independent accountant to arrive at a price estimate as close as possible to reality (Tomkins, 2001).

The **first option** is to hire an independent cost advisor that provides an additional cost estimate which must be seen as a 'second opinion'. The client is then better able to confront the budget estimate of a party with any shortcomings or inaccuracies.

The **second option** is to hire an independent party that acts as a mediator to guide the negotiation process of establishing the financial goal. Tomkins (2001) mentions that an independent cost mediator is best able to decide what price is considered 'fair'.

The **third option** is to hire an independent party that takes the role of (project) accountant to monitor all actual costs. Besides, the project accountant is often seen as the most suitable party to map the overall financial outcome and to judge the performance. Basically, the accountant executes work which was done simultaneously by the collaborating parties in a traditional working relationship.

4.7 Findings of the value mechanism

This chapter provides an answer to the second sub question from a theoretical point of view (How does the value mechanism of the value appropriation model function?). The value mechanism measures to which extent the common goals of the collaboration are met (figure 4.8). The parties must find consensus on the goals of collaboration and project-specific goals. Subjects like continuous improvement and goal alignment are essential in making collaboration agreements on goals. The value mechanism is shaped by setting both financial goals and non-financial goals, next to the application of contributors (table 4.1). As described in the research design (chapter 2), three different options are now given for each contributor.

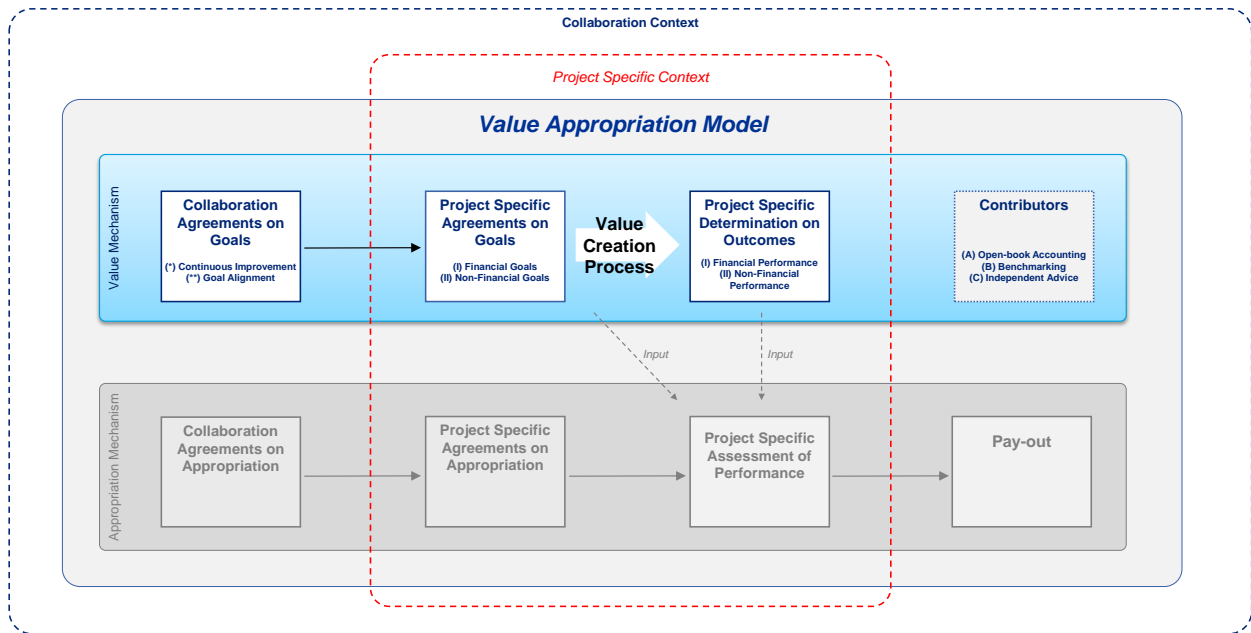


Figure 4.8: The value mechanism of the value appropriation model

Contributors	Option 1	Option 2	Option 3
(A) Accounting approach	Closed-book	Partial open-book	Full open-book
(B) Benchmarking	Traditional cost indicators	Market cost indicators	Base cost estimate
(C) Independent advice	Cost advisor	Mediator	Accountant

Table 4.1: Contributors to the value appropriation model

Chapter 5. Appropriation Mechanism

Chapter 5 covers the appropriation mechanism and thereby concludes the literature study (figure 5.1). The appropriation mechanism is the guiding instrument in the reimbursement of all costs made and the subsequent efforts in the value creation process. The paragraph structure of this chapter is similar to the structure of the appropriation mechanism. Firstly, some general descriptions and definitions of value appropriation and some related subjects are given in paragraph 5.2. Subsequently, the parties must make certain agreements on the collaboration level about how to deal with the appropriation of value, as elaborated in paragraph 5.3. The project specific agreements on the appropriation of value can be read in paragraph 5.4. The project specific assessment of performance is described in paragraph 5.5. Furthermore, several pay-out related items are mentioned in paragraph 5.6. As described in the research design (chapter 2), three different options will be given for each key elements within all four pillars of the value mechanism. In the end, the most important findings about the appropriation mechanism are listed in paragraph 5.7. In addition, an example of a value appropriation model found in academic literature is given in paragraph 5.8. Lastly, the most important findings from literature - including the findings of the context and the value mechanism - are mentioned in paragraph 5.9. This concluding paragraph will bring forward the theoretical framework of the value appropriation model (second generalized version).

Paragraph overview:

- 5.1 Introduction
- 5.2 General
- 5.3 Collaboration agreements on appropriation
- 5.4 Project specific agreements on appropriation
- 5.5 Project specific assessment of performance
- 5.6 Pay-out
- 5.7 Findings of the appropriation mechanism
- 5.8 An example from literature
- 5.9 Theoretical framework

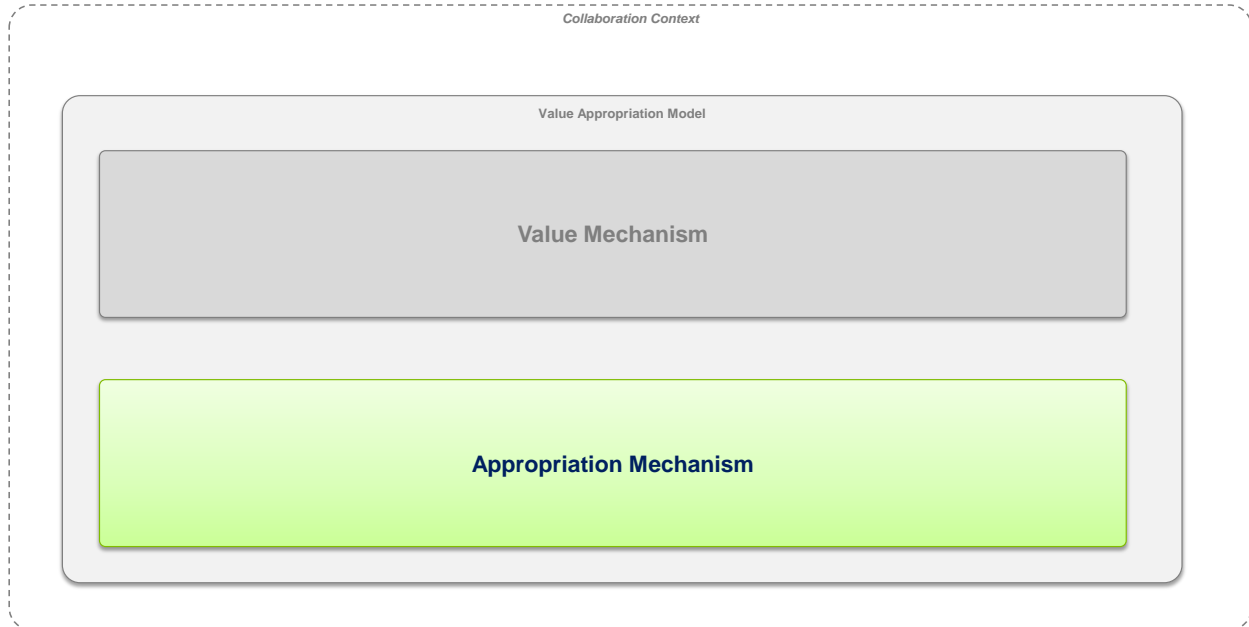


Figure 5.1: The appropriation mechanism of the value appropriation model

5.1 Introduction

The parties must be rewarded for the success of the chain and reimbursed for the cost made and their effort in obtaining the common goals of the collaboration. Van der Veen (2012) argues that herein exists a distinction between the reimbursement of project-related costs and project-independent-related costs. The appropriation mechanism is the guiding instrument of the reimbursement, meaning that the amount payable to the parties must be higher if more value has been created (if more common goals are achieved). So if the chain has performed well, the extra generated value is appropriated between the parties (award for achievement). On the other hand, the parties should be confronted if a deficiency in value occurs (penalty for any shortcomings). The appropriation mechanism should function as an incentive to trigger and enhance value-adding measures by all parties. The assurance of fairness in the appropriation agreement is particularly critical because there may be a great deal of uncertainty in the nature of the pie, its potential size, and the probability of successful pie expansion (Jap, 2000). Jap (2000) emphasizes that there must always be an attempt to insure an outcome that is acceptable to all parties, regardless of what happens.

5.2 General

The performance of a strategic collaboration will be significantly related to the pattern of payoffs characterizing the collaboration (Parkhe, 1993). Parkhe (1993) mentions that value creation in an inter-firm collaboration is not independent from value appropriation since this latter criterion determines an alliance partner's effort and incentive to contribute. Consequently, Parkhe (1993) mentions that it is important to clarify the interactions between the drivers of value creation and the drivers of value appropriation. Broome and Perry (2002) argue that the clarification of these interactions is difficult to do in the absence of an explicit theory of value appropriation.

The term 'appropriation' is defined differently by several academics, the most relevant ones are listed below. Other related subjects concerned with appropriation are defined as well, like 'revenue sharing', 'division of value' and 'incentive'. These topics are often discussed in articles on value appropriation. In addition, the relation between 'value creation' and 'value appropriation' is discussed as well.

'Appropriation'

Value appropriation is a process in which each party tries to appropriate a certain amount of value (Brandenburger & Stuart, 1996). Value appropriation is defined as the share of value a party can capture (Gulati & Singh, 1998). Gulati and Singh (1998) mention that the appropriation of value is always relative to the appropriation of another party. It is a negotiation process in which a 'fixed pie' is divided between parties involved (Jap, 1999). Jap (1999) mentions that the parties try to claim the largest possible part of the pie. Value appropriation is defined as a party's share of the total value in a specific moment in time. This definition for value appropriation means that a particular share of the value goes to a particular organization within the collaboration. Also this definition displays the inherent element of 'value', namely that value is always relative. Hereby, Jap (1999) notes that an appropriation mechanism is continuous, but that the actual appropriation will be done at a particular moment in time. Meaning, appropriation is a procedure for making a split in the generated value between the parties of the chain.

'Appropriation' is in this research defined as the individual value share a party can capture (Ritala & Hurmelinna-Laukkanen, 2009). Ritala and Hurmelinna-Laukkanen (2009) argue that rational profit-seeking firms want to appropriate a profit from a collaboration. Thus, in addition to finding ways of creating value, firms are searching for ways to secure their share of value. In negotiation literature, value appropriation is referred to as a process of value claiming (Fisher & Patton, 2011). Fisher and Patton (2011) describe value appropriation as an interactive task where parties arrive at a certain appropriation agreement. This agreement is thus established by means of negotiating. The bargaining power of a party will influence the size of the share a party can capture.

'Revenue sharing'

The intention of using a contract with a sharing arrangement is to bring the client and contractor into close cooperation (Hosseinian & Carmichael, 2014). Hosseinian and Carmichael (2014) describe revenue sharing as an agreement to distribute the profits and between the stakeholders of that agreement. Profit sharing refers to the distribution of gains and losses and is often used to increase the feeling of equality between the parties involved in the collaboration (Perry & Barnes, 2000). Outcome uncertainty and information asymmetry emphasize on the significant role an outcome sharing arrangement plays in motivating the contractor to act in the client's interests (Eisenhardt, 1989). Eisenhardt (1989) mentions that sharing of financial risks encourages the client and the contractor to work together to minimize actual costs and time, next to increasing efficiency. Perry and Barnes (2000) argue that the contractor's motivation to reduce actual cost decreases if only a low proportion of outcome sharing is used. Perry and Barnes (2000) suggest that the proportion of outcome sharing should be at least 50% in a client-

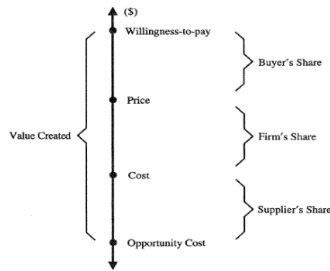


Figure 5.2: Division of value by Brandenburger and Stuart (1996)

contractor's relationship. This suggestion is substantiated with the fact that equal sharing keeps all parties interested and committed to achieve high results on project outcomes. Perry and Barnes (2000) stress the factors that play a significant role in a successful revenue sharing arrangement, knowing: precise and clear definitions of the actual costs and fees, realistic tenders (backed up by comprehensive and realistic estimates) and a reliable and fair method for the adjustments of targets. Concerns about selecting the proper revenue sharing arrangement is often mentioned in contract negotiations. Revenue sharing is sometimes called 'pie-sharing', by which the total profit/revenue amount is defined as the 'pie', and the part that is appropriated by a particular party is then defined as the 'piece' (Cheung & Myers, 2011). Nevertheless, there are many more contract mechanisms (besides revenue sharing) that have the same effect.

'Division of value'

The 'division of value' within a buyer-firm-supplier relation derives from a double-related bargaining process in which (1) the buyer and the firm determine the amount the firm receives for providing the product to the buyer and (2) the supplier and the firm determine the amount the supplier receives for providing resources to the firm (Brandenburger & Stuart, 1996). This vertical collaboration described by Brandenburger and Stuart (1996) is illustrated in figure 4.4. The top section of the vertical line represents the amount of value captured by the buyer (buyer's share) which is the difference between the buyer's 'willingness to pay' and the price paid for receiving the product from the firm. The middle section of the line represents the amount of value captured by the firm (firm's share) which is the difference between the price received from the buyer minus the cost for acquiring the resources from the supplier. The bottom section represents the amount of value captured by the supplier (supplier's share) which is the difference between the cost for the firm minus the supplier's 'opportunity cost'. A detailed description for the division of value is given in chapter 5.

'Incentive'

In traditional contract agreements, the financial success of an individual party is not necessarily tied to the success of the project (Brandenburger & Stuart, 1996). Brandenburger and Stuart (1996) mention that an incentive mechanism can be incorporated in the contract to make a party's pay-off dependent on the success of a project. Moreover, Bresnan (2000) mentions that a value appropriation model must provide meaningful financial incentives for all parties in order to eliminate egocentric and inefficient individual behavior (Bresnan & Marshall, 2000).

An incentive basically serves to induce or motivate a party by providing a stimulus (bonus) for high productivity (Brandenburger & Stuart, 1996). Brandenburger and Stuart (1996) define an incentive as something that induces action or motivates effort such as the fear of punishment or the expectation of a reward. Subsequently, Hosseinnian and Carmichael (2013) define an incentive as something that incites (or tends to incite) to more action or to greater effort since a reward is offered for increased productivity.

The use of multiple incentives can be used to motivate the contractor in achieving several objectives. Hosseinnian and Carmichael (2013) mention that when multiple incentive schemes are used, care should be taken not to overemphasize one particular incentive since that might cause an imbalance in the contractor's priorities and therefore harm the client's interests.

Relation between 'value creation' and 'value appropriation'

It is very important to understand the difference between value creation and value appropriation. Value creation occurs if parties collaborate and produce a product that meets customer demands, while value appropriation is about competing for obtaining the most of what has been achieved (Ulaga & Eggert, 2002). In business relationships, parties collaborate with each other to create value and compete with each other to appropriate value (Lavie, 2007). Ulaga and Eggert (2002) mention that parties often act in their self-interest and try to obtain a great share of the value. On this idea, Lavie (2007) makes the point that value appropriation does not necessarily create new value. Rather, parties can work together to create value as a collective outcome,

while value appropriation leads to the relative sharing of this collective outcome. In other words, the disparity between value creation and appropriation is similar to the distinction between collective and private benefits (Khanna & Anand, 2000).

From a party's perspective, value appropriation is slightly more important than value creation (Ritala & Hurmelinna-Laukkanen, 2009). Ritala and Hurmelinna-Laukkanen (2009) argue that while value creation is absolutely essential to gain revenue from a client, a party must also appropriate a reasonable level of that value. Without a reasonable level of value appropriation a party will eventually fold, and that is not necessarily in the interest of the other parties of the network.

A distinction between appropriation and creation is also made in negotiation related literature (Ellegaard, Geersbro, & Medlin, 2010). Ellegaard, Geersbro and Medlin (2010) mention that when a supplier and a buyer meet to negotiate about a new contract. Such a negotiation - which basically is a division of value - can be distributive (value claiming) or integrative (value creating).

Value is on the table in the form of a given solution, product or service from the supplier in a distributive negotiation (also referred to as a 'fixed pie' negotiation) (Giacomantonio, De Dreu, & Shalvi, 2010). Hence, Giacomantonio (2010) argues that the normative behavior of a party is to try to claim the largest part of the pie. The more benefits and the less sacrifices (such as price) for the buyer the more value is appropriated, and vice versa.

A negotiation strategy in which parties collaborate to find a 'win-win' solution to their dispute is called an integrative negotiation (also referred to as an interest-based bargaining or win-win bargaining) (Giacomantonio, De Dreu, & Shalvi, 2010). Giacomantonio (2010) mentions that this integrative negotiation (which also used in the so-called 'Harvard method') focuses on developing a mutual beneficial agreement based on the interests of the parties involved. In other words, integrative refers to the potential for the parties to be in ways to enlarge the pie and increase joint value (Koole, De Dreu, & Wolfgang, 2000). Koole, De Dreu and Wolfgang (2000) mention that the potential for an integrative negotiation only exists if there are multiple issues involved in the negotiation. Since the parties must be able to make trade-offs across issues in order for both sides to be satisfied with the outcome.

The exact position of the value creation process within the value appropriation model is elaborated on in paragraph 4.2. The direct link between the value mechanism (value creation) and the appropriation mechanism (value appropriation) is described in paragraph 5.5.

5.3 Collaboration agreements on appropriation

Pillar 5 of the Value Appropriation model

The collaborating parties must make certain agreements on the collaboration level about the how to deal with the appropriation of value on the following items: (1) number of parties; (2) moment of 'surplus' appropriation; and (3) type of pooling. These three key elements are positioned within the fifth pillar of the value appropriation model. Three different options are given for all three key elements.

(1) Number of parties

The number of parties involved in the collaboration may be different from the number of parties that hold a share in the sharing arrangement. Having a share means that a party takes responsibility, and even puts its effort at risk, with the purpose to obtain gain from a better performance outcome (Hosseinian & Carmichael, 2014). Also Van der Veen (2012) argues that putting effort at risk is a crucial element of the sharing arrangement: "No risk-sharing means no dynamic value appropriation model". A distinction is regularly made between a bilateral (often a client-contractor relation), a multilateral (strategic) and multilateral (large group) shareholders structures in academic literature concerned with the sharing of risks and rewards (Hazeu, 2007).

The **first option**, a bilateral shareholder structure, is the most discussed variant and involves the two main parties involved in a construction project, namely the client and contractor.

The **second option**, a multilateral shareholder structure that only involves the strategic parties of the collaboration. Hosseinian and Carmichael (2014) argue that the number of parties with a share in the sharing arrangement must be limited to a select group of parties, meaning the parties that significantly contribute to the value creation process. Besides, Hazeu (2007) mentions that a 'social control' is more likely to withhold if only a small number of parties is involved in the sharing arrangement.

The **third option**, a multilateral shareholder structure that engages a lot of parties of the supply chain in order to be able to align more chain wide activities. It is believed that more chain wide consensus can be obtained if a great group of parties is engaged in the shareholder structure (Hazeu, 2007). Hazeu (2007) argues that more individual goals can be aligned, more conflicting interests can be avoided and more perverse incentives can be eliminated if more parties are involved in the shareholder structure.

(2) Moment of ‘surplus’ appropriation

The aim of supply chain collaboration is to realize multiple projects in close collaboration with substantially the same set of parties. Nonetheless, agreements have to be made about the moment of ‘surplus’ appropriation. The timing and frequency of the value assessments and the pay-outs are thus for decision concerns (Li Destri & Dagnino, 2006). In general, three different agreements can be made about the moment for appropriating the ‘surplus’ value, namely after a series of projects, after each project or combined.

The **first option** is to appropriate value after a series of projects, a multi-project value assessment is than needed. The belief of supply chain collaboration is that the creation of value increases if the collaboration progresses and therefore becomes more apparent after more consecutive projects. Besides, Li Destri and Dagnino (2006) argue that the long-term retention of the created value - and thus the postponement of the ‘surplus’ appropriation - provides more stability and commitment. Besides, it will accommodate more mitigation opportunities for the collaborating parties (figure 5.2).

The **second option** is to appropriate value after each project, a project specific value assessment is than needed. More appropriation moments seem more desirable if the composition of the set of parties’ changes too often and/or too substantial (Li Destri & Dagnino, 2006) (figure 5.3).

The **third option** is to appropriate part of the value after each project whereby part of the gain is reinvested in the collaboration or in the next project (figure 5.4).

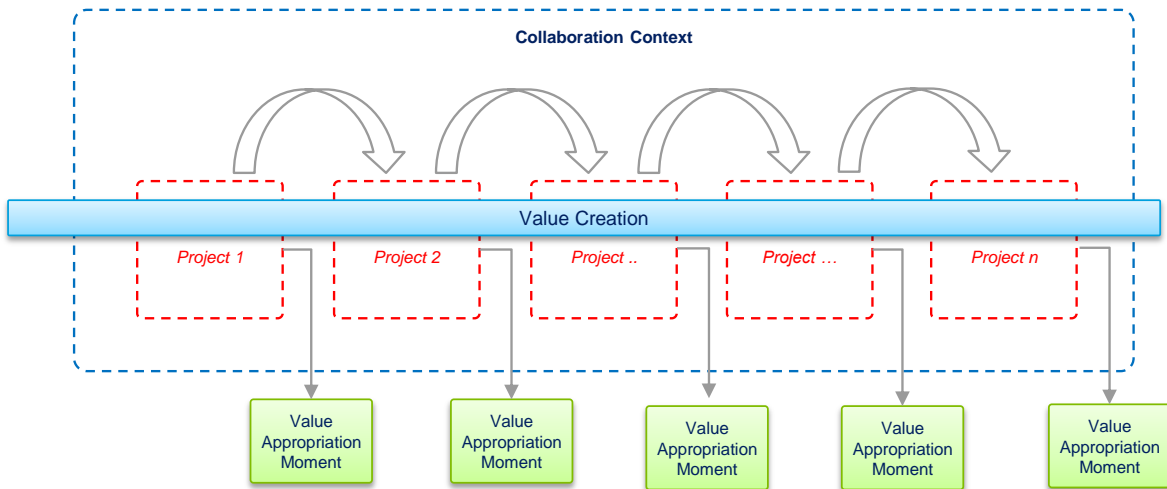


Figure 5.3: Appropriation of ‘surplus’ after a series of projects

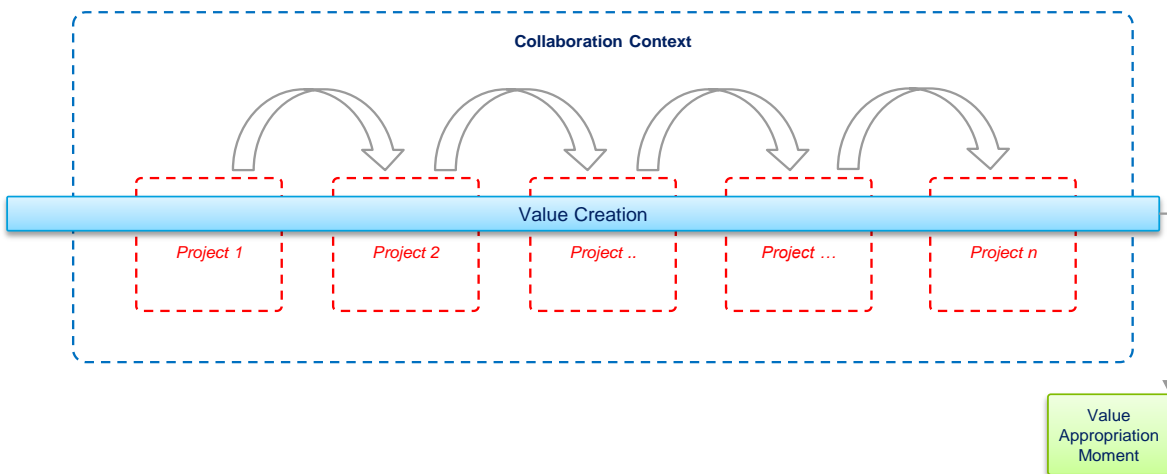


Figure 5.4: Appropriation of ‘surplus’ after each project

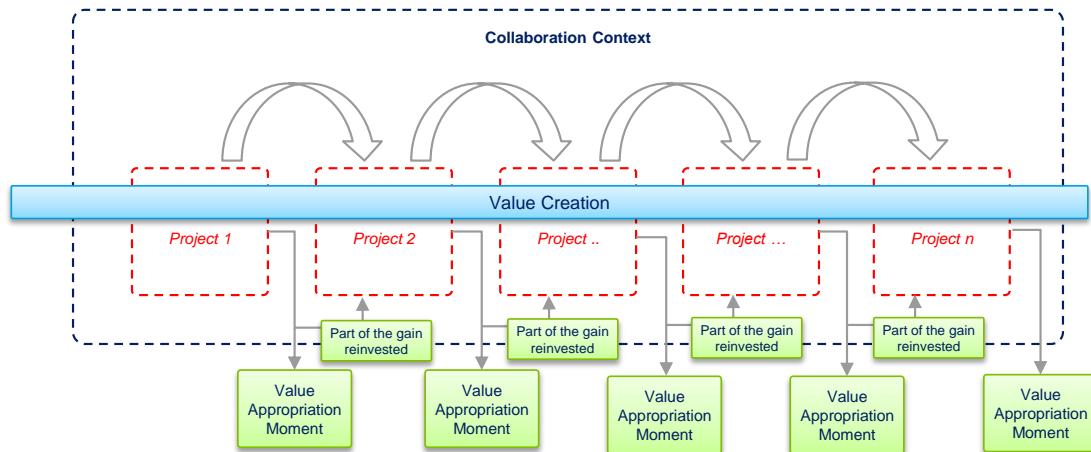


Figure 5.5: Appropriation of 'surplus' after each projects in which part of gain is reinvested in the collaboration

(3) Type of pooling

Pooling is a resource management term that refers to the grouping together of financial resources for the purpose of advantage maximization and risk minimization to the applicants (De Man, 2013). De Man (2013) argues that pooling is a fundamental element of a sharing arrangement and distinguishes three main types, namely cost pooling, revenue pooling and profit pooling.

The **first option** is cost pooling in which the parties share the costs but retain individual revenues.

The **second option** is revenue pooling in which the parties share the revenues but retain individual costs.

The **third option** is profit pooling in which the parties both share all costs and revenues.

5.4 Project specific agreements on appropriation

Pillar 6 of the Value Appropriation model

The collaborating parties must make certain agreements on the project specific level about the how to deal with the appropriation of value on the following items: (4) profit margins; (5) sharing principle; and (6) risks and contingencies. These three key elements are positioned within the sixth pillar of the value appropriation model. Three different options are given for all three key elements.

(4) Profit margins

In essence, the value appropriation model must facilitate the individually benefit of all parties from the collective benefit, meaning that all parties should retrieve a reasonable amount of profit from the collaboration. In general, three different options for dealing with profit margins can be distinguished in a sharing arrangement, namely: separate (parties include an individual profit margin); shared (individual profit margins are 'parked' and put 'at risk'); or joint (individual profit margins are not obtained).

The **first option** is that the parties directly incorporate an individual profit margin in their contract price, which is normally the case in traditional business relations.

The **second option** is that the parties exclude their individual profit margin from their contract price and 'park' them in a shared account. Those individual profit margins can then be used as a leverage to cover risks and unforeseen circumstances. It is believed that the commitment of each party is strengthened by this 'parking' system due to fact that it intuitively becomes more attractive to perform better because the individual 'parked' profit amount grows as the individual turnover increases (Naoum, 2003). By doing so, the chain becomes financial stronger since the pay-off hold on the prospect grows. Naoum (2003) mentions that 'parking' of individual profits is sometimes called the 'fee at risk' principle, where the parties tie a certain proportion of their profit fee to the overall success of the chain. Naoum (2003) argues that in such case the additional fees are financed by some of the overall savings if the chain is successful, but that the parties earn less than their normal fee if the chain is not successful.

The **third option** is a joint profit approach in which individual profit margins are not obtained since the parties rely on benefitting from a common positive outcome. In traditional relations, parties incorporate buffers and overly profit margins in their contract price to guarantee a 'healthy' business situation (Brandenburger & Stuart, 1996). In order to avoid this, Stuart (1996) argues that the parties must take out all buffers and profit margins and fully share the total created profit amount by a certain ration.

(5) Sharing ratio

Badenfelt (2008) states that no existing literature has looked at the optimal sharing ratio in construction contracts. Moreover, the current practice of choosing an appropriation arrangement is arbitrary and not based on scientifically sound evidence or mathematical calculations (Badenfelt, 2008). By looking at the existing literature concerned with sharing arrangements, there are generally three ways to determine the share of a party, namely to base it on: a rule of thumb; a combination of several rules of thumb; and cooperative game theory principles.

The **first option** is to use a rule of thumb method, which are mainly appointed by the principles of equity and equality sharing. The *equity sharing principle* derives from equity theory, which states that parties judge an outcome as acceptable when the ratio of their own resources and outputs equals the ratio of resources and outputs of comparison others (Adams, 1976). In other words, the *equity sharing principle* specifies that each party's relative share is a function of its resources to the collaboration. Which means that the greater one's contribution to the collaboration is, the greater one's share is. In practice, this means that the share of a party is calculated by a party's relative turnover of the total capital expenditures (Ross, 1999). Ross (1999) mentions that hereby a distinction can be made between direct and indirect costs. Although, this method is also in doubt due to the fact that the share of some parties (e.g. design consultant) are believed to be higher than their relative turnover foresees. The exact determination of the share of a party is thereby thus still subjective to discussion. Hence, the party that contributes more resources than the other will be motivated to ensure that an equity rule is applied in order to assure itself a larger portion of the pie (Jap, 2000). Moreover, Jap (2000) argues that, by using the equity rule, a party can manage the potential vulnerability resulting from asymmetric resources because this rule provides an assurance that the one who has made the greater contribution will receive the dominant share of the pie.

The *equality sharing principle*, which is sometimes referred to as the equal share/split method, specifies that all parties receive an equal share (Allison & McQueen, 1992). The *equality sharing principle* derives from the belief that all parties are considered equally important and thereby must be treated as equal (Broome & Perry, 2002). Broome and Perry (2002) mention that this means a 50/50 split in a client-contractor relationship. Research showed that the *equality sharing principle* facilitate more cooperation among the parties, although it may not foster the highest levels of productivity (Allison & McQueen, 1992). Moreover, the *equality sharing principle* is typically used in a collaboration where the main priority is to maintain social relationships and harmony next to the reduction of dissension (Kabanoff, 1991). Allison and McQueen (1992) argue that equality sharing is particularly useful when differences between various resources are vague and hard to measure. Besides, Kabanoff (1991) argues that the *equality sharing principle* is typically advocated by those parties with few resources.

The **second option** is to combine the mentioned rules of thumb methods which is more customized and often more desirable in complex collaborations (Jap, 1999). Jap (1999) mentions that the parties can start with the *equity sharing principle* until each party has received its respective return for its investment and over time (if all processes, roles, and investments become increasingly interdependent) switch to the *equality sharing principle*. Or, Jap (1999) also mentions the possibility to apply the *equity sharing principle* on a sub part of the building assignment and the *equality sharing principle* on another sub part. Meaning that several methods can be combined to ensure an arrangement that better fits the needs of the parties. However, such customized arrangement is governed by a negotiation process that could become heavily subjected to the characteristics of the collaboration and the parties involved (e.g. bargaining power, network, financial situation, interdependencies, specific resources) (Ellegaard, Geersbro, & Medlin, 2010).

The **third option** is to apply a method from a branch of mathematics called cooperative game theory, like the Shapley value, the nucleolus value, the compromise value, and the Nash-bargaining solution (Kohli, Park, & Tijs, 2008). Since the rules of thumb seem intuitively appealing, they almost never capture the true contribution of a party in the value creation process (Kallenberg & Spieksma, 2013). Also Kallenberg and Spieksma (2013) argue that a more sophisticated method is needed to truly determine a parties' share, as can be found in cooperative game theories. It should be kept in mind that the construction industry is known for rejecting radical new methods, meaning that unusual working methods count on little support (Van der Veen, 2012). Van der Veen (2012) emphasize on the point that the method for determining the sharing ratio should be acceptable, explainable to the 'outside world' (for instance the board of directors) and provide an incentive to collaborate. It would therefore be preferable to have a 'simple' sharing ratio rule rather than one that fulfills all academic requirements. Van der Veen (2012) mentions that the parties active in the construction industry do appreciate recognized methods that are practical and manageable, using a method from cooperative game theory seems therefore undesirable.

(6) Risks and contingencies

The trade-off between incentive and risk is central to the design of a sharing arrangement (Zhang & Li, 2014). Zhang and Li (2014) argue that a good balance of risks and rewards will enforce the feeling of equality and will foster the underlying level of trust. Besides, dealing well with risks and uncertainties is considered very valuable for the performance of the chain (Chan, Chan, & Lam, 2012). The way how is dealt with risks and uncertainties is called risk management (Perry & Hayes, 1985). Perry (1985) mentions that proper risk management is considered important in order to arrive at the best mitigation strategy for each risk. Of course, proper risk management is heavily dependent on the ability of the parties to actually manage those risks (Broome & Perry, 2002).

Chan (2012) mentions that a contingency budget is often established in order to compensate for the unfavorable deviations from the estimated cost. A 'contingency' is a possible event – that past experiences show likely to happen - that must be prepared for (Gunhan & Arditì, 2007). Gunhan and Arditì (2007) mention that the contingency budget is the amount reserved to overcome the potential expenses of these possible events. The contingency budget is the amount of money (or time) needed above the estimate to reduce the risk of a project overrun to a level acceptable to the organization (Baccarini, 2007). Baccarini (2007) describes the contingency budget as a specified amount added to the base estimated that covers unexpected expenses to achieve a specific confidence level. A contingency budget is established in order to compensate for the unfavorable deviations from the estimated cost in order to achieve a specific confidence level (Khamooshi, 2009). There are different ways to determine the contingency budget but is often subject of negotiation. Khamooshi (2009) mentions that the contingency budget is in practice often based on a fixed percentage of the total direct costs of a project, while it is actually better to directly link the amount to the risks involved in a project.

In general, three different models for dealing with risks and contingencies can be distinguished in a client-contractor relationship, namely: a *traditional risk model*; a *'three-type' risk model*; and a *joint risk model* (figure 5.5).

The **first option** is to apply the *traditional risk model* in which parties try to obtain a better commercial position by benefiting from keeping risk related information to themselves (Baccarini, 2007). Notable, Baccarini (2007) mentions that risks are not clearly appointed, discussed or budgeted collectively from a traditional point of view. Moreover, the *traditional risk model* is known for its fighting culture in which all parties try to hide and shift risks to the other party (Hillson & Simon, 2007). Besides, parties obtain individual contingency budgets to deal with the individual risks involved in the collaboration. Hillson and Simon (2007) argue that these individual contingency budgets will increase if the impact of the risks, and therefore the size of the financial consequences, is unclear. Moreover, parties will incorporate additional buffers in their contract price due to uncertainty and asymmetry. These buffers are sometimes referred to as the risk premium and are often calculated by taking a fixed percentage of the total direct costs (Baccarini, 2007). Baccarini (2007) argues that the client pays the full amount whether or not these risks actually occur.

The **second option** is to apply the *'three-type' risk model* in which parties work together to ensure that risks are more equally divided. Chan (2012) mentions that a systematic approach for risk management is given shape by collectively listing all risks, assessing the possible chance of occurrence, and determining the possible financial consequence of all risks. In this manner, all risks are collectively mapped and translated into monetary terms. Subsequently, in a client-contractor relationship, all identified risks are classified into three different categories. First, the risks that belong to the client. Second, the risks that belong to the contractor. Third, the risks that belong to both the client and the contractor. Baccarini (2007) argues that this last category is essential and emphasizes that these shared risks have to be managed by both the client and the contractor. Gunhan and Arditì (2007) mention that a shared contingency budget can be applied to cover these shared risks. The amount reserved for the shared contingency budget can be determined on the basis of the weighted sum of the financial implications of all shared risk multiplied with the chances of occurrence (Chan, Chan, & Lam, 2012). If less budget was needed than the amount reserved for the shared contingency budget, the parties could either agree to return the remainder to the client or to reward the parties for dealing properly with the risks (Gunhan & Arditì, 2007). In short, a shared contingency budget is considered necessary in the *'three-type' risk model*. Besides, the parties still obtain an individual contingency budget to deal with the individual assigned risks (Baccarini, 2007). The main goal of the *'three-type' risk model* is to secure a better common understanding of the shared risks involved in the collaboration. However, the overview of responsibilities, accountabilities, and control of risk classes become often too fragmented. Gunham and Arditì (2007) argue that the *'three-type' risk model* does in practice not prevent parties from shifting risks away.

The **third option** is to apply a *joint risk model* in which all risks are the responsibility of all parties (Gunhan & Arditì, 2007). Zhang and Li (2014) mention that shifting risks to another party must be avoided since that directly obstructs the achievement of common goals. Subsequently, the principle is used that the party who is best able to deal with a risk should take the lead in collectively handling that risk (Baccarini, 2007). Zhang and Li (2014) emphasize that the associated costs of these joint risks must be borne in the right way. This means that the lead party should get an appropriate award for dealing properly with a risk.

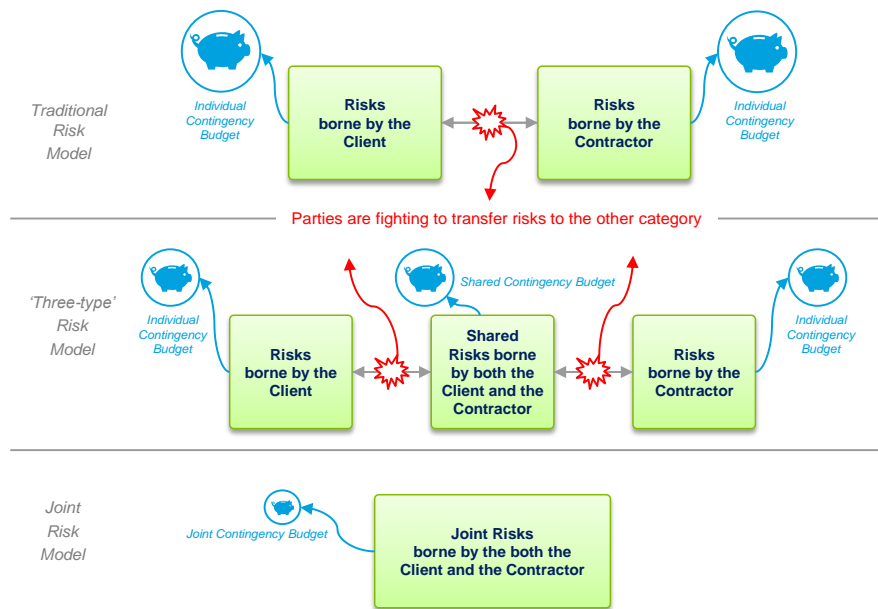


Figure 5.6: Three different models for dealing with risks and contingencies in a client-contractor relationship

Nevertheless, the main purpose of the joint risk management approach is not just to arrive at the best mitigation strategy for each risk (which is always the purpose of a common risk management approach) but also to ensure that the frictions involved in the collaboration are minimized (Zhang & Li, 2014). Moreover, it is believed that a joint risk management approach leads to better interface management that enables risk intelligence, control and assurance activities. Besides, more awareness of risks is created by mastering the capabilities of all parties. By doing so, the activities between the subsequent links of the supply chain can be further optimized. This enables that traditional incorporated buffers are excluded due to a better understanding of interdependencies, correlations, and systemic risks (Hauck & Walker, 2004). Hereto, the end-to-end joint risk management approach adds value to the successful delivery of the project. Hauck (2004) mentions that joint risk, rather than just shared risk, can distinguish a value appropriation model from other forms of contracting arrangements. Nevertheless, a *joint risk model* still leads the adoption of a joint contingency budget, which is expected to be of a smaller size than the sum of traditional contingency budgets of the individual parties (Gunhan & Arditi, 2007). Similar to the *three-type risk model*, the amount left (remainder) can be paid back to the client or shared between the parties.

5.5 Project specific assessment of performance

Pillar 7 of the Value Appropriation model

The collaborating parties must make certain agreements on the project specific assessment of performance which must be done by a (7) value assessment. This key element is positioned within the seventh pillar of the value appropriation model. Three different options are given for this key element.

(7) Value assessment

Todeva and Knoke (2005) argue that some kind of structured methodology must be used to determine the performance of the chain. However, studies in the field of organizational performance are considered as complex, particularly in terms of the criteria used to judge effectiveness (Walker, 2007). The determination of performance can be done by a value assessment, which basically shows the extent to which the common goals are met. In other words, a value assessment is based on the discrepancy between the target value set up front and the actual value measured afterwards (figure 5.6). As mentioned earlier, the value assessment takes place take at the moment of appropriation (read paragraph 5.3). In general, three different options for executing a value assessment can be distinguished, namely: singular (only financial or only non-financial) and plural (both financial and non-financial).

The **first option** is to only take the financial performance into consideration. The financial goal (target cost) and the financial outcome (actual cost) are compared with each other in order to determine the financial performance outcome, which could either result in a cost overrun (deficit), a neutral cost outcome or a cost underrun (surplus).

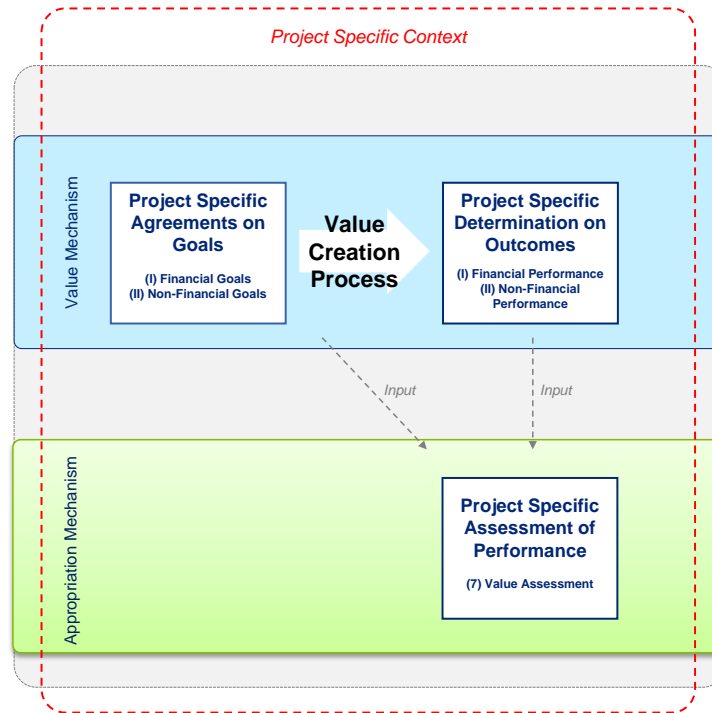


Figure 5.7: Project specific assessment of performance bases on a 'value assessment'

The **second option** is to only take the non-financial performance into consideration. The non-financial goals and outcomes are compared with each other in order to determine the non-financial performance outcome. This could include multiple non-financial performance items due to the fact that the chain (and in particular the client) may be concerned about more than one performance item (e.g. timely completion, quality of the work performed, safety, environmental impact, sustainability, productivity, innovation, and life-cycle cost aspects) (Hosseinian & Carmichael, 2014). Only taking non-financial performance items into consideration seems unworkable since any collaboration is financial driven (Van der Veen, 2012). Van der Veen (2012) mentions that - for instance - if the cost are a bit higher but the quality (as perceived by the client or end user) is much higher, the result is often that all parties do not benefit from the better quality but suffer from the higher cost.

The **third option** is plural and takes both financial and non-financial performance items into consideration. It is believed that this third option ensures that the common performance of the collaboration is truly assessed (Hosseinian & Carmichael, 2014).

5.6 Pay-out

Pillar 8 of the Value Appropriation model

The collaborating parties must make certain agreements on the pay-out of the collaboration and how to deal with the following items: (8) reimbursement type; (9) pay-out mechanism, (10) commitments; and (11) additional incentives. These four key elements are positioned within the eighth pillar of the value appropriation model. Three different options are given for all three key elements.

(8) Reimbursement type

So a cost underrun or overrun (in relation to the predetermined common financial goal) can be borne by the parties in pre-agreed proportions, hereby alluding to the sharing ratio. Due to this sharing arrangement, the parties are motivated to work together to minimize actual costs (Broome & Perry, 2002). In fact, while cost reduction was normally of only importance to the client, the minimization of costs becomes important for all parties since it will increase the total common profit amount. Still, the parties have to find an agreement about the method for reimbursing these made costs. Of course, the relational procurement and contracting structure of a collaboration is herein decisive. In contracting literature, several types of contracts can be used to govern the reimbursement of costs. The most common ones are a fixed price contract, a prime cost contract and a target cost contract.

The **first option** is to apply a fixed price contract. Turner and Simister (2001) mention that by using a fixed price contract, a party receives a fixed amount for the services rendered and/or the product delivered. A lump sum contract is a fixed price contract under which a client agrees to pay a party a specified amount for completing an assignment (traditionally without requiring a cost break down). Costs associated with the deviations from the original agreed plan will only be reimbursed if the party can prove that the content has changed from the original assignment. A schedule of rates contract is a fixed price contract under which a party lists unit prices that cover all likely activities that might form part of the assignment (Turner & Simister, 2001).

The **second option** is to apply a prime cost contract. Broome and Perry (2002) mention that by using a prime cost contract, sometimes referred to as a cost reimbursable contract, a client reimburses all acceptable and reasonable direct and indirect costs of a party (see figure 8). In addition, two main prime cost contracts can be distinguished, namely a cost plus contract and cost plus fee contract. By a cost plus contract, the plus on top of the costs includes anything not covered in the definition of direct and indirect costs and is needed for corporate overheads. By a cost plus fee contract, the fee on top of the plus functions as a risk-reward amount to cover risks and uncertainties (figure 5.7). This fee is either fixed (fee remains constant) or set at a percentage of the actual direct costs (e.g. fee grows linear to the actual costs). In this latter case, a party has an interest in increasing the direct costs since the fee is coupled thereto. This is an uncomfortable situation for the client who will probably urge the party to keep the costs under control (Broome & Perry, 2002).

The **third option** is to apply a target cost contract. Zimina, Ballard and Pasquire (2012) mention that by using a target cost contract a 'target cost estimate' of the total capital expenditure is jointly established. Rather, a target cost contract is a contractual procedure to collectively reach an agreement about what the building assignment will cost (Zimina, Ballard, & Pasquire, 2012). The joint determination of a 'target cost estimate' is considered very valuable in a strategic collaboration to create more awareness in each other's business and to obtain a better feeling of fairness (Hosseinnian & Carmichael, 2013).

In a client-contractor relationship, the parties can agree that both a budget overrun and a budget underrun will be shared among the parties (Broome & Perry, 2002). For example, a target price contract with a 50-50 split in which the savings of a budget underrun and the costs of a budget overrun are shared among both parties (figure 5.8).

(9) Pay-out mechanism

The pay-out mechanism must ensure that the 'financial performance outcome' (surplus or deficit) is shared in an acceptable manner and that the parties get disbursed correctly on the basis of their effort in the collaboration and their share in the value appropriation model. In general, three different pay-out mechanisms can be applied, namely the pay-out is not linked, partially linked or fully linked to non-financial performance targets.

The **first option** is that the pay-out is not linked to non-financial performance outcomes. The remainder is directly awarded to the chain as a whole, with each party sharing a predetermined proportion of the gain/loss (Hutchinson & Gallagher, 2003). Meaning that a surplus will be directly granted to the parties and that the parties directly stand surety for a deficit (negative pay-out).

The **second option** is that the amount payable is partially linked to actual obtained non-financial performance outcomes. Hauck (2004) emphasizes that part of the gain is then shared by obtaining common objectives and part of the pain is shared if expectations falling short. Parties are then compelled to focus on these common performance items due the collective nature in which a party can only fully succeed if all parties succeed (Hauck & Walker, 2004). Hutchinson and Gallagher (2003) argue that when the actions of just one of the participant result in a negative financial outcome, all parties would suffer the consequence. In other words, the failure of one party to the total financial outcome directly threatens the profitability of all other parties. In addition, the non-financial performance outcomes play no means in case of a budget overrun.

The **third option** is that the amount payable is fully linked to actual obtained non-financial performance outcomes. Arditi (1997) mentions that a client wants to have the highest possible level of quality for the amount he deems appropriate. If the pay-out is fully linked to non-financial performance outcomes, the distribution could be linked linear, exponential or s-curved to the overall performance score (Contractor & Ra, 2000). In addition, the non-financial performance outcomes play no means in case of a budget overrun.

(10) Commitments

The parties can agree to exclude some parties from taking a chance of making an excessive loss or an unreasonable profit (Broome & Perry, 2002). Moreover, Broome and Perry (2002) argue that the application of a specified maximum limit for profits or losses could be desirable. In general, three different options concerned with the commitments of parties can be distinguished, namely a capped profit, capped liability or capped commitment range.

The **first option** is a capped profit in which a maximum gain for a particular party can be agreed. This option may be desirable if the potential reward of a party could get unreasonably high.

The **second option** is a capped liability in which a maximum loss for a particular party can be agreed. This option may be desirable if a party does not want to have a too big stake in a possible major loss. The parties that agreed to use a target cost contract can agree to obtain a capped client commitment for a maximum loss (capped liability). This means that the additional costs of a budget overrun are for the full cost of the contractor while the amount left from a budget underrun will be shared among both parties (figure 5.9).

The **third option** is a capped commitment range in which boundaries are established for both a maximum gain and loss, a particular party than both holds a capped profit and a capped liability.

(11) Additional incentives

The parties could decide to disburse the chain or an individual party with additional incentive payments (Bresnan & Marshall, 2000). Bresnan and Marshall (2000) mention that an additional incentive payment serves to induce or motivate the chain (or a particular party) by promoting particular standalone performance items. The heights of the additional incentive payments must be determined up front and may be fixed or variable. A capped commitment can be applied for an additional incentive payment of which the height is variable so that the amount varies between certain limits (Hosseinnian & Carmichael, 2013). In general, the parties could agree to apply positive incentives (bonus), negative incentives (penalty), or no incentives at all.

The **first option** is to obtain a positive incentive payment - a stimulus or bonus - for obtaining a particular standalone performance item (a specific objective).

The **second option** is to obtain a negative incentive payment - a penalty - for not obtaining a particular standalone performance item. The most common one is the penalty for a too late delivery (Brandenburger & Stuart, 1996).

The **third option** is to not obtain any additional incentives at all. Hosseinnian and Carmichael (2013) mention that when (multiple) incentive payments are used, care should be taken not to overemphasize one particular incentive item since that might cause an imbalance in the parties' priorities and therefore harm the common interests.

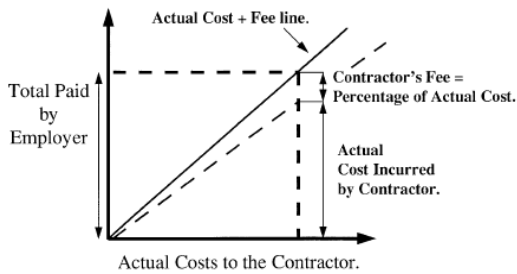


Figure 5.8: Cost-reimbursable contract with a percentage fee between a client (employer) and a contractor by Broome and Perry (2002)

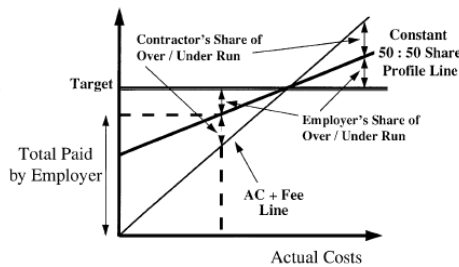


Figure 5.9: Target cost contract with a 50:50 share profile between a client (employer) and a contractor by Broome and Perry (2002)

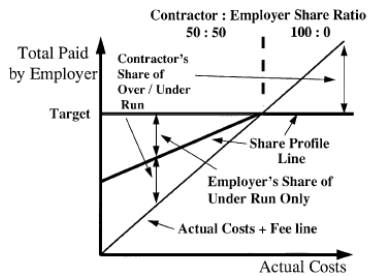


Figure 5.10: Target cost contract with a capped client (employer) commitment by Broome and Perry (2002)

5.7 Findings of the appropriation mechanism

The appropriation mechanism facilitates the pay-out to the collaborating parties (figure 5.10). The parties must find consensus on the eleven items of the appropriation mechanism. The appropriation mechanism is shaped the eleven identified key elements, in which three options are given for all eleven key elements (table 5.1).

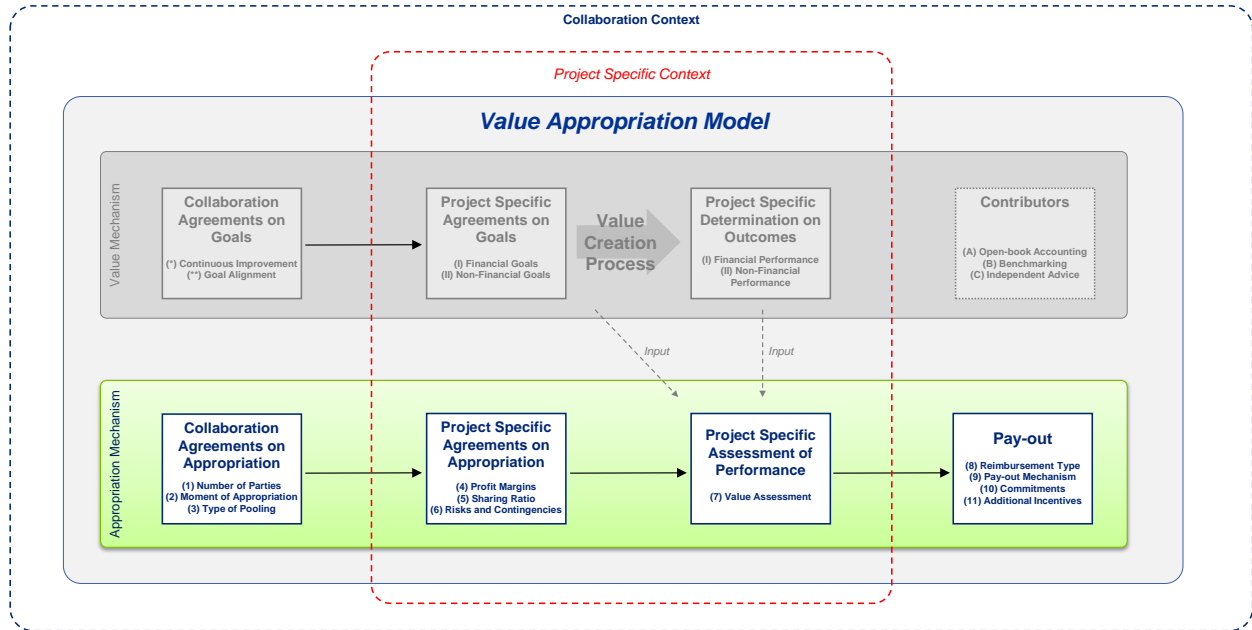


Figure 5.11: The appropriation mechanism, including the eleven key elements

Key elements	Option 1	Option 2	Option 3
(1) Number of parties	Bilateral	Multilateral (strategic)	Multilateral (large group)
(2) Moment of 'surplus' appropriation	After a series of projects	After each single project	Combined (part of the gain reinvested)
(3) Type of pooling	Cost pooling	Revenue pooling	Profit pooling
(4) Profit margins	Incorporated (individual profit margins)	Shared (profits parked 'at risk')	Joint (no individual profit margins)
(5) Sharing ratio	Rule of thumb (equity or equality sharing)	Customized (combination rules of thumb)	Cooperative game theories
(6) Risks and contingencies	Separate (individual, traditional)	Shared (assigned, 'three-type' risk)	Joint (responsibility for all risks)
(7) Value assessment	Singular (only financial)	Singular (only non-financial)	Plural (both financial & non-financial)
(8) Reimbursement type	Fixed price	Prime cost	Target cost
(9) Pay-out mechanism	Pay-out not linked to non-financial performance targets	Pay-out partially linked to non-financial performance targets	Pay-out fully linked to non-financial performance targets
(10) Commitments	Capped profit (maximum gain)	Capped liability (maximum loss)	Capped commitment range (boundaries, maximum profit and liability)
(11) Additional incentives	Positive	Negative	No

Table 5.1: The eleven key elements of the value appropriation model, with three options for all eleven key elements

5.8 An example from literature

The most relevant value appropriation model found in academic literature is the ‘three-limbed project compensation model for non-owner participants’ discussed by Love, Davis, Chevis and Edward (2011). The Australian Government also refers to this ‘three-limbed compensation model’ in the ‘National Alliance Contracting Guidelines’ (Australian Government, 2011). In Love’s (2001) view, a compensation model typically includes the following elements: achievability of performance targets; project cost risk/reward; non-cost risk/reward; risk-reward shared percentages among non-owner participants; and a risk cap.

Three-limbed project compensation model for non-owner participants

Love (2011) describes the dynamics between multiple project participants (**multilateral number of parties**) concerned with value appropriation within infrastructure alliance projects. Love (2011) mentions two main types of project participants, namely owner participants (the client) and non-owner participants (NOP’s). Non-owner participants are e.g. construction contractors, design consultants, and suppliers. Similar like Bresnan (2000), the model of Love (2011) applies a systematic in which meaningful financial incentives for all participants are ensured through non-cost performance items. Love (2011) describes the model as that what aligns project participants’ behavior towards the achievement of project performance objectives through the use of incentives. The model aims to share risk and reward among the project participants **after each single project** to achieve specific deliverables and to drive project performance. Or rephrased, the underlying purpose of the compensation model is to provide a fair and equitable performance-related payment mechanism to project participants who strive to achieve predetermined performance targets. This should lead to incentivize non-owner participants to work together as a coherent team that improves the project outcomes. The model described by Love (2011) exists of three main components which are often referred to as ‘Limbs’, namely the reimbursement of non-owner participants, the non-owner participants overhead and profit fees and a risk-reward performance incentive payment. The three-limbed value appropriation model for non-owner participants is characterized by **profit pooling** and illustrated in figure 5.11 (Love, Davis, Chevis, & Edwards, 2011).

Limb 1 Reimbursement of non-owner participants

The Limb 1 consists of all costs and expenses made (directly for the project) by the non-owner participants, including any project-specific management costs and preliminaries. The reimbursement of this Limb 1 relates to the direct project costs (e.g. labor, plant and equipment, materials, engaged sub-contractors, specific risk contingencies, and de-mobilization expenses) and project-specific overhead expenses of the non-owner participants. All non-owner participants are reimbursed 100% for these direct project costs and project-specific overhead expenses regardless of their performance (Love, Davis, Chevis, & Edwards, 2011).

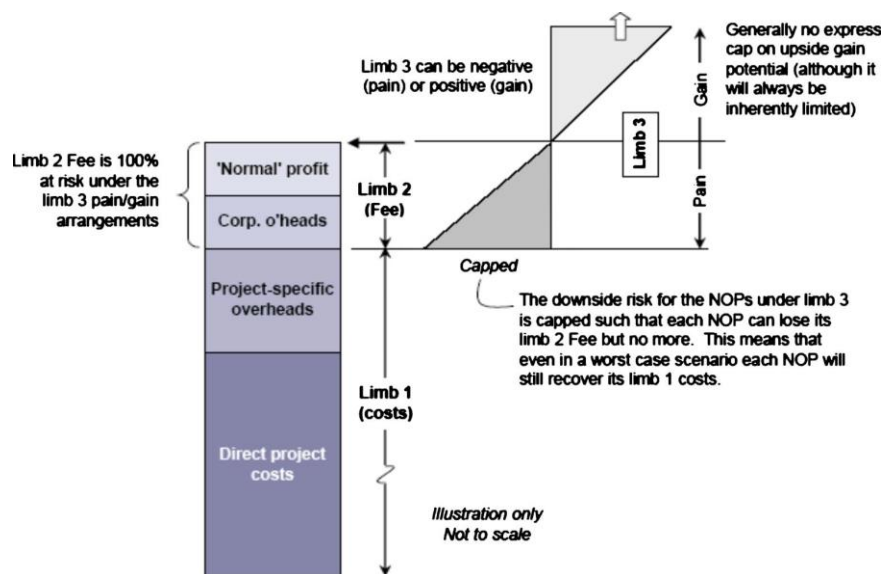


Figure 5.12: ‘Three-limbed compensation model for non-owner participants’ by Love, Davis, Chevis and Edwards (2011)

Limb 2: Non-owner participants overhead and profit fees

The client (owner) pays a contribution fee to meet non-project specific corporate overhead expenses of the non-owner participant. Besides, the non-owner participants also receive a 'normal' profit fee. So basically, the Limb 2 includes the corporate overheads expenses and the normal profit fees necessary for the non-owner participants to obtain a healthy business situation (Love, Davis, Chevis, & Edwards, 2011). Love (2011) mention that the corporate overhead expenses and the normal profit fees are often set as a percentage of the direct project costs which can either be set at the beginning of the project (as a fair estimate upfront), or based on the actual project costs (exactly set afterwards). The non-owner participants receive these Limb 2 payments on the basis of the common performance. Love (2011) argues that the Limb 2 payments are 100% 'at risk' under the Limb 3 arrangements. Love (2011) thereby applies a **shared profit margin** in which profits are parked 'at risk'.

Limb 3: Risk-reward performance incentive payment

The Limb 3 is the risk-reward performance incentive payment in which each non-owner participant is rewarded or punished for the delivered work (Love, Davis, Chevis, & Edwards, 2011). Love (2011) mentions that the delivered work is monitored on the basis of non-cost performance items, also known as 'key result areas' (KRA's). In other words, a **plural value assessment** is applied in which non-financial items are taken into consideration next to financial items. These non-cost performance items include critical success aspects of the project such as timely completion, quality, environment and safety. The Limb 3 performance incentive payment is sometimes called pain and gain sharing since the pay-out may be positive or negative (Hosseinian, 2013).

If the performance of a non-owner participant is positive, based on the review of the non-cost performance targets, he receives a reward (gain) on top of the Limb 1 and Limb 2 payments. In a best case scenario, the non-owner participant get its Limb 3 fee paid out fully. The pay-out of is thus **partially linked to non-financial performance targets**, namely only Limb 2 and Limb 3.

If the performance of a non-owner participant is negative, based on the review of the non-cost performance targets, he receives a penalty (pain) which will be withhold from the Limb 2 payment. In a worst case scenario, the non-owner participant can lose its Limb 2 fee in total. So the Limb 3 risk is capped for each non-owner participant at the maximum loss of the entire Limb 2 payment. This can be seen as a **capped commitment range** in which a maximum profit and liability are established.

Each non-owner participant is entitled to full reimbursement of its direct costs regardless of its performance outcomes, so the Limb 1 payments will always be paid out. If the performance is neutral, meaning a performance score of 0 based on the review of the non-cost performance targets, the non-owner participant only receives his Limb 1 and Limb 2 payments. So a monetary amount is subtracted from the non-owner participants Limb 2 payment (corporate overhead and neutral profit fee) if the overall non-cost performance outcome is worse than the targeted neutral performance benchmark. In short, the non-owner participants incur a risk/penalty (shortening in payments) for poor non-cost performance outcomes (Love, Davis, Chevis, & Edwards, 2011).

Shortcomings of the three-limbed project compensation model for non-owner participants

The three-limbed compensation model for non-owner participants is described in broad outline. However, this model does not deal with all dynamics and difficulties involved in executing construction projects. It is therefore important to uncover these difficulties in order to obtain a better view. As Love (2011) describes, the direct project costs and the project-specific overheads are reimbursed to the non-owner participant as a Limb 1 payment. The Limb 2 is called the pain share since it is directly 'at risk'. The third limb is called the gain share since it is a bonus if the project meets its predefined performance targets. However, Love (2011) does not describe the process of how an agreement is concluded in respect to the amount reserved for these Limbs. It is very difficult to determine a 'fair price' for all these cost items (Chan, Lam, & Yeung, 2010).

Normally, the 'project specific overheads' are a percentage of the 'direct project costs' (both two items are included in the Limb 1). Subsequently, the 'corporate overheads' and the 'normal profit fee' (which form the Limb 2) are mostly set as a percentage of the 'direct project costs'. Setting the Limb 3 happens in a similar way and is in fact of similar size as the Limb 2. Simply said, Love (2011) mentions that the size of the Limb 2 and the Limb 3 are based on the size of the Limb 1. So the Limb 2 and Limb 3 commensurate with the Limb 1 and grow and shrink in a similar manner. Meaning that the non-owner participants are thus not rewarded for reducing the Limb 1 costs. There is simply no incentive for a non-owner participant to reduce the Limb 1 costs. By freezing the Limb 2 and Limb 3 the moment the value engineering procedure starts, the non-owner participants can reduce cost without reducing their corporate overhead payments and profit fees. However, the big question still remains how the Limb 1 of each non-owner participant must be determined.

Also, Love (2011) mentions that a certain individual (**separate**) **risk contingency budget** is built in the Limb 1, so that a buffer is incorporated to cover unforeseen circumstances. Unfortunately, Love (2011) does not describe how these risks are identified and

how the associated budgets are determined. Whereas a systematic approach to deal with risks and uncertainties is essential for project success (Gunhan & Arditi, 2007).

Furthermore, Loves (2011) mentions that the Limb 2 and Limb 3 payments are dependent on the performance of non-cost performance targets. So the reward for the non-owner participants is dependent on the extent to which the non-cost performance targets are met. Thus, Love (2011) assumes that the client has a certain amount of money reserved to reward the non-owner participants for obtaining a certain level of performance. Although, Hosseinian (2014) mentions that the financial performance outcome (budget overrun or underrun) must be decisive in rewarding the non-owner participants, meaning that the non-owner participants only receive an additional award on top of their direct project costs and project specific overheads in case of a budget underrun. The Limb 3 payment should thus only be paid out if a budget underrun occurs (Hosseinian & Carmichael, 2014). Moreover, Hosseinian (2014) argue that the non-owner participants must even be punished for a budget overrun by withholding the Limb 2 payment.

Applied contributors and key elements

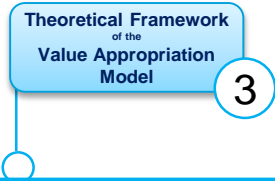
The value appropriation model of Love (2011) mentions several key elements. The options of Love (2011) are marked blue (table 5.2). Love (2011) mentions nothing about additional incentives.

Key elements	Option 1	Option 2	Option 3
(1) Number of parties	Bilateral	Multilateral (strategic)	Multilateral (large group)
(2) Moment of 'surplus' appropriation	After a series of projects	After each single project	Combined (part of the gain reinvested)
(3) Type of pooling	Cost pooling	Revenue pooling	Profit pooling
(4) Profit margins	Incorporated (individual profit margins)	Shared (profits parked 'at risk')	Joint (no individual profit margins)
(5) Sharing ratio	Rule of thumb (equity or equality sharing)	Customized (combination rules of thumb)	Cooperative game theories
(6) Risks and contingencies	Separate (individual, traditional)	Shared (assigned, 'three-type' risk)	Joint (responsibility for all risks)
(7) Value assessment	Singular (only financial)	Singular (only non-financial)	Plural (both financial & non-financial)
(8) Reimbursement type	Fixed price	Prime cost	Target cost
(9) Pay-out mechanism	Pay-out not linked to non-financial performance targets	Pay-out partially linked to non-financial performance targets	Pay-out fully linked to non-financial performance targets
(10) Commitments	Capped profit (maximum gain)	Capped liability (maximum loss)	Capped commitment range (boundaries, maximum profit and liability)
(11) Additional incentives	Positive	Negative	No

Table 5.2: The value appropriation model of Love (2011), an overview of the chosen options for each key elements

5.9 Theoretical framework

This paragraph finalizes the theory-building process of this research by shaping the theoretical framework. The theoretical framework of the value appropriation model is the main result of the literature study.



Third generalized version of the value appropriation model

First of all, a distinction can be made between a collaboration context and a project-specific context. Furthermore a couple of aspects from the context are mentioned that influence the functioning of the value appropriation model. However, the degree of influence (associated impact) of these aspects remains unexposed.

The value mechanism makes it possible to measure the extent to which the chain has been able to achieve the desired amount of value. Value is considered as the extent to which the common goals of the collaboration are achieved. The created amount of value is mainly mapped and measured on the projects. The parties must find consensus on the following items of the value mechanism:

- **Pillar 1:** the collaboration agreements on goals: (*) continuous improvement and (**) goal alignment;
- **Pillar 2:** the project specific agreements on goals: (I) financial goals and (II) non-financial goals;
- **Pillar 3:** the project specific determination of outcomes: (I) financial goals and (II) non-financial goals.

In general, three main contributors can be distinguished to help the parties in arriving at the common financial goals, namely:

- **Pillar 4:** (A) ‘Accounting approach’; (B) ‘Benchmarking’; and the use of (C) ‘Independent advice’.

The appropriation mechanism facilitates the pay-out to the collaborating parties. The end result of the appropriation mechanism is that all parties are paid out correctly for their respective effort in the value creation process. The parties must find consensus on the following items of the appropriation mechanism:

- **Pillar 5:** the collaboration agreements on goals: (1) ‘Number of parties’; (2) ‘Moment of ‘surplus’ appropriation’; (3) ‘Type of pooling’;
- **Pillar 6:** the project specific agreements on appropriation: (4) ‘Profit margins’; (5) ‘Sharing principle’; (6) ‘Risks and contingencies’;
- **Pillar 7:** the project specific assessment of performance: (7) ‘Value assessment’;
- **Pillar 8:** the pay-out: (8) ‘Reimbursement type’; (9) ‘Pay-out mechanism’, (10) ‘Commitments’; and (11) ‘Additional incentives’.

The above mentions items form the second generalized version of the value appropriation model and represents the theoretical framework of this research (figure 5.12).

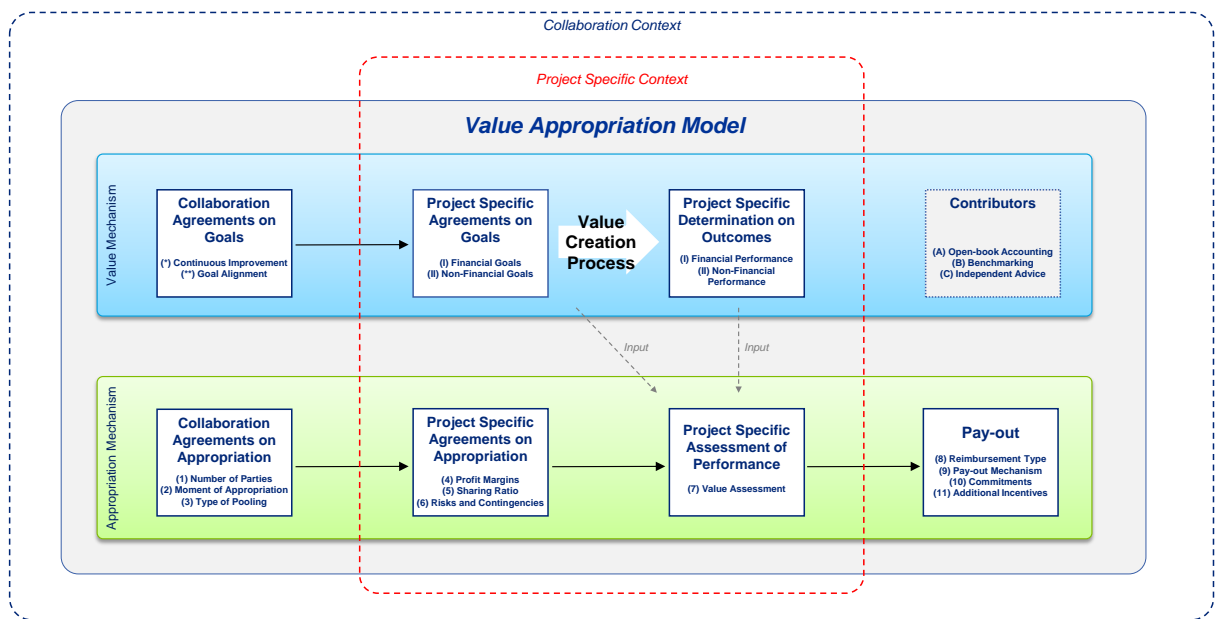


Figure 5.13: Theoretical framework of the value appropriation model (third generalized version)

Chapter 6. Experiences from Practice

The third phase of the research is the case studies in which the experiences from practice are analyzed. The case studies provide insight in three different value appropriation models that are (have been) used in the (Dutch) construction industry. The first one is the 'Succesvol Bouwen' case - a collaboration between a housing association and two head contractors - covered in paragraph 6.2. The second one is the 'Co Green' case - a collaboration that consists of a housing association, a contractor and a couple of strategic partners - as can be read in paragraph 6.3. The collaborations within these two cases realize residential property projects. The third one is the 'WALTZ' case - a collaboration between a railway operating agency and a construction consortium (consisting of two contractors) - as described in paragraph 6.4. This latter collaboration realizes an infrastructural railway line. The case studies have led to new insights in which a couple of practical problems and concerns came to the surface. The theoretical framework of the value appropriation model (second generalized version) as derived from the literature study (paragraph 5.9) forms the blueprint for the case studies. Meaning that the three cases are analyzed on the basis of the identified pillars, contributors and key elements. The case overview is given in paragraph 6.5. The chapter concludes with the preliminary findings of the value appropriation model (third generalized version). These preliminary findings underpin the selection of one option for each contributor and each key element.

Paragraph overview:

- 6.1 Introduction
- 6.2 Case 1 'Succesvol bouwen'
- 6.3 Case 2 'Co Green'
- 6.4 Case 3 'WALTZ'
- 6.5 Overview cases
- 6.6 Preliminary findings

6.1 Introduction

The case studies provide an overview of three value appropriation models used in practice, the associated agreements made by the collaborating parties and the experiences of the persons involved. The case studies have led to new insights in which mainly practical problems and concerns came to the surface. A cross case analysis is used to find the similarities and difference between the cases. The effects of the differences between the cases on the performance of the chain or on the behavior of the parties are hereby interesting as well. The same pillars, contributors and key elements (plus associated options) mentioned in the theoretical framework of the value appropriation model (paragraph 5.9) are used for the case studies setup. Eventually, the findings from practice provide the options that best fit the value appropriation model. The criteria for assessing all options are described in the research methodology (paragraph 2.3). Especially the perceptions of the interviewees about which options works best is decisive in the selection process. If possible, the choice for a certain option is substantiated with academic literature if the viewpoint of an academician is in line with the finding from practice.

6.2 Case 1 ‘Succesvol bouwen’

‘Succesvol bouwen is a collaboration between a housing association (Havensteder) and two main contractors (Dura Vermeer and Ballast Nedam). The ‘Succesvol bouwen’ model has been adjusted and modified over time, making it quite complicated to exactly identify it. This case study only elaborates on the earliest versions.



Value mechanism

The ‘collaboration agreements on goals’ are laid down in the ‘Framework Agreement’ (R.O.K.) and ‘Collaboration Agreement’ (S.O.K.). The parties agreed to continuously pursue more efficient and effective processes concerned with the development, execution, and exploitation phases of their projects. The ‘R.O.K. agreement’ is a contract - representing respect, transparency, and trust - in which the parties have established a formal ‘project unbounded’ collaboration for the duration of five years. Subsequently, the ‘R.O.K. agreement’ stipulates that goals are established for the collaboration itself and for each specific project which will periodically be evaluated and adjusted. The ‘S.O.K. agreement’ states which projects will be executed and how the inter-organizational processes are shaped (of course in accordance to the principles of supply chain collaboration). Also, a general descriptions about financial constraints, conduct rules, communication, partner selection and risk management are laid down in the ‘S.O.K. agreement’. Furthermore, the ‘S.O.K. agreement’ stipulated the alignment of goals on the following items: customer satisfaction; product quality; sustainability; project costs; time; maintenance costs; and project team satisfaction.

The ‘project specific agreements on goals’ – both financial and non-financial - are set by the project team and laid down in the ‘P.O.K. agreement’. The contractor makes a budget estimate of the financial goal (in Dutch: Anneemsom) that includes direct projects costs (e.g. working hours, materials, sub-contractors, project specific overhead costs) and indirect project cost (e.g. corporate overheads costs (x% of direct project costs), and a normal profit (x% of direct building costs)). The mentioned non-financial goals from the ‘S.O.K. agreement’ were made project specific and laid down in the ‘P.O.K. agreement’.

Concern 1: Finding an agreement about the project specific financial goal

The contractor argued that project specific circumstances must be taken into consideration by the establishment of the project specific financial goal. Interviewees from the contractor mentioned that the budget estimated was still contested by the client even so all costs were made insightful.

The client argued that the contractor obtained a non-competitive budget estimate (not conform current market situation) that contained too much buffers.

The project accountant (independent advisor) emphasized that the establishment of the project specific financial goal was a great point of discussion. He experienced a some asymmetry between the client and the contractor about this topic.

The concern about finding an agreement about the project specific financial goal is described by Luu, Kim and Huynh (2008) in academic literature as: “The accuracy of price indicators and correctness of the cost estimate of a product is normally an inevitable point of discussion in a client-contractor relation”.

The ‘project specific determination on outcomes’ was done after a project was completely realized. Remarkably, only financial outcomes were taken into consideration. The financial outcome was simply based on what the project had cost in the end, meaning all actual capital expenditures needed to deliver the project. Common savings in relation to the ‘Anneemsom’ (like design and attunement savings) were deposited in the ‘Fonds’. Individual savings (like operating savings) came for the full benefit of the contractor. A change in scope (‘more/less work’ principle) and other changes (like taxes, safety measures and maybe price fluctuations) that influenced the project costs were for the full expenditure of the client. The project specific non-financial performance was barely determined.

Concern 2: Cost savings

The contractor argued that it is desirable to reward a party for bringing in improvements, especially when an improvement is negatively influencing the revenue stream of that particular party. In his opinion, the party should get a share of the cost saving that is bigger than the profit margin that particular had obtained without the improvement.

The client argued that any improvement is for the full benefit of the chain. According to his opinion, cost savings are only interesting if this happens without comprising quality.

The project accountant (independent advisor) argued that the only logical way to promote these kind of cost saving is to lock the profit amount of a party at a certain point in time. His belief is that more improvements will be initiated by the parties if such a principle is applied.

The concern about cost savings is described by Bresnen and Marshall (2000) in academic literature as: “The motivation of actors within partnership alliances to put forward improvement initiatives demands for incentives to stimulate commitments”.

Applied contributors

The S.O.K. agreement stipulated that the contractor provides openness in all relevant cost items. In other words, the parties agreed to apply the ‘partial open-book’ principle.

The contractor used - in order to establish the budget estimate - cost indicators from already (traditionally) executed projects as a benchmarking mechanism.

The parties used two independent advisors, namely a ‘cost advisor’ (Interplan) and a mediating ‘project accountant’ (WD - BKA). The independent ‘cost advisor’ calculated – just like the contractor - a cost estimate of the ‘Anneemsom’ by using price indicators from a general benchmark. The difference between the price of the contractor and the price of the independent cost advisor was the playing field in which the client and the contractor had to found an agreement.

The independent ‘project accountant’ acted as a mediator between the client and the contractor to arrive at the correct financial goals (‘Anneemsom’) that matched with the project specific circumstances. In addition, the independent ‘project accountant’ monitored all actual costs and savings made during the execution phase in order to draft the financial performance outcome.

The concerns of the applied contributors of the value appropriation model of ‘Succesvol Bouwen’ are listed in table 6.1.

Contributors	‘Succesvol Bouwen’	Observations
(A) Accounting approach	Partial open-book	The contractor argued that the partial open-book accounting approach is convenient since only relevant cost information must be exchanged that does not harm each other’s business. The client argued that a full check of the contractors budget estimate is practically impossible without a full open-book accounting approach.
(B) Benchmarking	Traditional cost indicators	The contractor argued that ‘bouwteam cost indicators’ must be used - instead of ‘aanbestedings cost indicators’ - since projects executed in supply chain collaboration have the same ‘start-up’ costs as projects executed in a ‘bouwteam’. The client argued that ‘market cost indicators’ should be used instead of ‘traditional cost indicators’. The clients argued that a lower price estimate was more appropriate due to the impaired market conditions of that time. Besides, the client believes that projects executed in supply chain collaboration can be realized cheaper compared to traditional executed projects.
(C) Independent advice	Cost advisor + Mediator/Accountant	All parties argued that the help of an independent cost advisor is considered necessary to tackle the greatest part of the discussion concerned with the determination of the financial goal. The client believes that the help of a mediator becomes redundant as the collaboration matures. He also argued that the work of an independent project accountant can also be done by the parties themselves.

Table 6.1: Observations concerned with the applied contributors of the value appropriation model of ‘Succesvol Bouwen’

Appropriation mechanism

The ‘collaboration agreements on appropriation’ are drawn in the ‘Framework Agreement’ (R.O.K.) and the ‘Collaboration Agreement’ (S.O.K.). The collaboration was formed by two parties (bilateral), namely the client (housing association Havensteder) and the contractor (Dura Vermeer or Ballast Nedam). The moment of ‘surplus’ appropriation was set after the realization of each project. In addition, the parties applied profit pooling.

The ‘project specific agreements on appropriation’ stated that the parties agreed to include a ‘normal profit’ and a fee to cover ‘corporate overhead costs’ (both amounts are based on a standard percentage of ‘direct project costs’). The profit margin of the contractor was thus incorporated in the project specific financial goal (‘Aanneemson’). The equality sharing principle was used (50-50 split) to determine the sharing ratio.

Besides, the client and the contractor worked together to analyze all risks involved in the project. This collective risks assessment resulted in a matrix in which all risks were identified and expressed in monetary terms. Nevertheless, the parties agreed to apply a traditional risk model in which some risks are borne by the client and some risks are borne by the contractor. The contractor obtained an additional fee on top of his ‘direct project costs’, ‘corporate overhead costs’ and the ‘normal profit fee’ to cover the risks borne by the contractor. This additional fee must be seen as an individual contingency budget necessary to cover these individual assigned risks. The remainder of individual contingency budget was deposited in the ‘Fonds’ at the end of project. The ‘Fonds’ was an additional kept budget to overcome additional costs, like e.g. unforeseen circumstances that were not assigned to a particular party.

The ‘project specific assessment of performance’ was done by a value assessment. This value assessment determines the extent to which the project specific goals are met. The project accountant monitored all costs and savings, provided the balance sheet and determined the financial project outcome. The discrepancy between the project specific financial goals and outcomes were identified in the value assessment. The identification of the discrepancy of the project specific non-financial goals and outcomes have not been executed. In other words, the value assessment was singular and only based on the project specific financial performance outcome.

The ‘pay-out’ to the contractor was based on a fixed price contract (reimbursement type). This pay-out was not linked to non-financial performance targets. If no additional savings are made, the contractor gets the full ‘Aanneemson’ amount paid out. If additional savings are made in relation to the ‘Aanneemson’ (next to changes of scope), these savings are deposited in this ‘Fonds’. In case of a budget overrun in relation to the ‘Aanneemson’ (next to changes of scope), the additional costs are for the full expenditure of the contractor. In other words, the client had a capped commitment in case of a budget overrun. The remaining of the ‘Fonds’ is paid out by an equal split. Besides, an additional negative incentive (penalty) was put in place if the contractor delivered the project too late.

To be complete, in most of the projects no budget of the ‘Fonds’ remained, meaning that the ‘Fonds’ was completely empty at the end of a project. If money from the ‘Fonds’ remained, the remainder was simply divided among both parties by an equal split.

The applied key elements of the value appropriation model of ‘Succesvol Bouwen’ are listed in tables 6.2 and 6.3.

Key elements	‘Succesvol Bouwen’	Observations
(1) Number of parties	Bilateral	The contractor argued that proper dealing with sub-contractors and suppliers is also to the concern of the client. The contractor mentions that the involvement of sub-contractors and suppliers can be increased by involving them in the value appropriation model. The client argued that it could be a good idea to involve more parties in the sharing arrangement.
(2) Moment of ‘surplus’ appropriation	After each single project	All parties mentioned that the appropriation of value must be done after each single project to retain a clear overview of the financial results. Besides, the belief of the advantages of working in supply chain collaboration is strengthen if value is appropriated regularly.
(3) Type of pooling	Profit pooling	All parties argued that profit pooling is the only appropriate way.

Table 6.2: Observations concerned with the applied key elements of the value appropriation model of ‘Succesvol Bouwen’ (1)

Key elements	'Succesvol Bouwen'	Observations
(4) Profit margins	Incorporated (individual profit margins)	All parties argued that obtaining a profit from the collaboration must be ensured for all parties to keep support and commitment.
(5) Sharing ratio	Rule of thumb (equity or equality sharing)	All parties argued that a 50-50 sharing ratio is fair in a client-contractor relationship since it illustrates an equal situation.
(6) Risks and contingencies	Separate (individual, traditional)	<p>The contractor obtained the belief that a party must only be made responsible for a risk when he is actually able to influence/mitigate that risk. The contractor therefore argued that a <i>separate risk model</i> is best suitable, despite the fact of the discussions it engenders.</p> <p>This phenomenon is described by Hillson and Simon (2007) in academic literature as: "a fighting culture in which all parties try to hide and shift risks to the other party".</p> <p>The client argued that he would have preferred a more joint risk approach instead of the 'fights' of transferring risks to the other party.</p> <p>This phenomenon is described by Baccharini (2007) in academic literature as: "the party who is best able to deal with a risk should take the lead in collectively handling that risk".</p>
(7) Value assessment	Singular (only financial)	<p>The contractor argued that he doesn't want to be responsible for any goals outside his sphere of influence. The contractor mentioned that it is good that common goals are established, but argued that a value assessment must only be done to judge the individual performance of a party. A good individual performance score must be granted with a new assignment in his opinion.</p> <p>The client mentioned that non-financial goals are established for a good reason. He argued that it is better if both financial and non-financial goals are taken into consideration.</p>
(8) Reimbursement type	Fixed price	<p>The contractor mentioned that the sharing arrangement was a way to reward the contractor for finding additional savings within the already agreed 'Aanneemsom'. The contractor concluded that these additional savings are put in the 'Fonds' of which the contractor only receives a shared amount, while he is actually the one who funds it. The contractor argued that these additional savings are traditionally for his own benefit.</p> <p>This phenomenon is described by Badenfelt (2011) in academic literature as: 'fixing the contract after the contract is fixed'. The 'Fonds' contains many similarities with the risks-reward compensation model mentioned by Love (2011).</p> <p>The client mentioned the discussions about which expenses must be paid out of this 'Fonds' and which not.</p>
(9) Pay-out mechanism	Pay-out not linked to non-financial performance targets	<p>The contractor mentioned that he does not want to be dependent on the performance of other parties when it is his pay-out concerns. The contractor argued that it is good that the pay-out is not linked to non-financial performance targets.</p> <p>The client argued that the main reward should be to improve the collaboration in which the pay-off does not necessarily have to be a financial bonus (increased trust is better).</p>
(10) Commitments	Capped liability (maximum loss)	<p>The client argued that a capped client commitment is considered necessary to keep the costs of the contractor under control.</p> <p>The contractor argued that a capped client commitment is only fair if the financial goal ('Aanneemsom') is set at a fair price.</p>
(11) Additional incentives	Negative	All parties argued that a penalty for a too late delivery is considered 'acceptable' since it is a normal stimulus for staying within the planning.

Table 6.3: Observations concerned with the applied key elements of the value appropriation model of 'Succesvol Bouwen' (2)

6.3 Case 2 'Co Green'

The 'Co Green' collaboration is established for - in first instance - the realization of the 'Stadstuin Overtoom' project. This project consists of three phases (named projects in this study). The collaboration consists of a housing association (Eigen Haard), a contractor/developer (Era Contour), a design consultant (KOW) and a demolishing company (Oranje). A value appropriation model is used to steer the collaboration and to enhance the common performance. The value appropriation model of 'Succesvol bouwen' has been adjusted several times, making it quite complicated to describe it. This case study mainly elaborates on the most current version.



Value mechanism

The 'collaboration agreements on goals' are set in the collaboration agreement (S.O.K.) in which the parties are confident that a desired level of profit can be obtained by a more efficient process (through the continuous search for improvements). The alignment of goals is thus crucial, translated by the joint establishment of common goals. The main common goal of the collaboration is to realize 'climate neutral' residences without having to make additional expenses (called 'cost neutrality'). 'Cost neutrality' means that a 'climate neutral' residence is built for a similar price as a residence that complies with the standard 'Building Code regulations' (in Dutch: ('volgens bouwbesluit')). The additional costs of the 'climate neutral' measures are roughly estimated at €18K for each residence.

This common goal is translated by the following six main smart-formulated essentials: 'a strategic collaboration between parties'; 'cost neutrality'; 'lower exploitation costs for residents'; 'sustainable demolition, building and living'; 'ecological sustainability linked to quality of life'; and a 'repeatable formula'. This 'repeatable formula' essential demands for a concept that is applicable for multiple projects. Additionally, the parties agreed on a sharing arrangement in which each party is made financial accountable for accomplishing these common goals. Furthermore, the parties agreed to apply a three-dimensional building model (BIM) in which data from all parties are integrated early on in the process.

The 'project specific agreements on goals' are set for each phase (project) and are in line with the goals of the collaboration. The project specific financial goal includes both development and building costs (in Dutch: 'Stichtingskosten'). Besides, a 'financial gap' (in Dutch: 'Onrendabele top') is taken in to consideration within this financial goal.

The project specific non-financial goals derived from the collaboration essentials. The 'climate neutral' principle is also translated to the execution phase of the project. Meaning that at least 10% of the demolished materials must be processed within the project, the other 90% must be recycled and processed within a radius of twenty kilometers. In addition, at least 80% of the new materials must have a 'socially responsible' origin. Besides, a CO2 reduction of at least 50% must be obtained compared to a traditional building process. Furthermore, one of the requirements of the 'climate neutral' principle is that energy (for heating, cooling, water, etc.) must be saved and/or locally generated in a sustainable manner without the use of fossil fuels. Hereby residents must be actively guided to reduce energy consumption in which still an optimal user comfort is guaranteed. Another requirement is that rainwater must be reused, next to other water-savings measures. Besides, maintenance must be possible in a sustainable manner. Also, the layout of the apartments must be flexible. Finally, measures must be taken to increase the social involvement in the neighborhood. All these project specific non-financial goals are smart-formulated.

Concern 3: What to include in the project specific financial goal?

The parties mapped all costs - from the initiative phase to the commission phase - needed to realize the project. In addition, this budget estimate also included the 'financial gap' (in Dutch: 'Onrendabele top'). All parties mentioned that more optimization steps can be obtained by looking at the 'total cost picture'. All parties therefore argued that is good that the project specific financial goal includes both development and building costs if the chain is indeed able to steer this 'total cost picture'.

The 'total cost picture' (project specific financial goal) is described by Rider (2010) in academic literature as the 'total landed cost'.

Concern 4: The project specific financial goal in relation to the 'climate neutral' ambition

The parties argued that it is hard to build 'climate neutral' residences without making additional expenses. In addition, the parties would have liked to see that a 'climate neutral' residence is sold for a higher selling price (in relation to a 'not-climate neutral residence'), which eventually did not happen. The parties obtained the belief that the occupants should be able to borrow a higher loan (mortgage amount) due to the lower energy costs. However, the banks did not admit hereto. Therefore, the residences were put on the market for a lower selling price (€5K lower for each residence).

The 'project specific determination on outcomes' is the extent to which both the financial and non-financial goals are met. The financial outcome is displayed by a balance sheet that contains all costs and savings. This balance sheet - based on all development and building costs (in Dutch: 'Stichtingskosten') - continuously monitored. The final financial performance outcome will be set after all three phases are realized. The non-financial performance outcome is jointly determined by measuring the extent to which the smart-formulated non-financial goals are met.

Applied contributors

The financial outcome is mapped by applying a full open-book accounting approach. The project specific balance sheet provides a clear and transparent overview of all cost and savings.

The 'cost neutrality' principle - as stated in the 'collaboration agreements on goals' - means that sustainability measures are implemented without increasing costs. Again, the aim of the 'Co Green' collaboration is to perform better than the chains that work in a traditional manner. For that reason, a base case estimate was used to arrive at an ambitious financial goal. Subsequently, a 'cost ceiling' - related to this base case - served as a guiding element for the budget estimate of the contractor.

An independent cost advisor (MBM) was involved in the process of establishing the 'cost ceiling'. Subsequently, the client checked whether the budget estimate of the parties stayed under this 'cost ceiling'. Major deviations between the 'cost ceiling' of the independent cost advisor and the estimates of the parties were mutually discussed. Eventually, a negotiating process led to a final financial goal that was considered acceptable to all parties.

The applied contributors of the value appropriation model of 'Co Green' are listed in table 6.4.

Contributors	'Co Green'	Observations
(A) Accounting approach	Full open-book	<p>The contractor argued that a full open-book accounting approach is a nice wish, but does not necessarily increase the level of trust.</p> <p>The client argued that a full open-book accounting approach is still not fully transparent. The client still observed cluttered cost items unless the fact of a full accessibility to all project balance sheets and budget estimates.</p> <p>This phenomenon is described by Dekker (2003) in academic literature as: "An imbalance in transactions arises quickly if one party has more or better cost information than the other".</p>
(B) Benchmarking	Base cost estimate	<p>The contractor argued that the 'cost ceiling' was not fully in line with the current market conditions.</p> <p>The client argued that a base cost estimate - with an associated 'cost ceiling' - provides a workable means of controlling costs while still room exists for all parties to make their own budget estimates.</p>
(C) Independent advice	Cost advisor	<p>All parties argued that the advice of an independent cost advisor is desirable in order to derive at a financial goal that is acceptable to all parties.</p>

Table 6.4: Observations concerned with the applied contributors of the value appropriation model of 'Co Green'

Appropriation mechanism

The 'collaboration agreements on appropriation' are characterized by the fact that the profit amount of the individual parties are directly linked to the achievement of common goals. The parties agreed on a multilateral (strategic) shareholder structure in which the four initiating parties of the collaboration - Eigen Haard, Era Contour, KOW, and Oranje - hold a share. Again, the 'Stadstuin Overtoom' project consists of three phases. The parties agreed to put quite some effort in the development of the project at the beginning of the collaboration. Moreover, the parties argued that the first phase is about investing in the collaboration in which no additional profits are expected. In addition, lower costs are expected in the second and third phases (due to these investments) resulting in a considerably high amount of additional profits. Therefore, the created value is assessed after each phase but the moment of 'surplus' appropriation is set after the realization of all phases (moment of 'surplus' appropriation after a series of project). The non-financial performance outcome is continuously monitored but determined after the realization of phase 3. In addition, the parties applied profit pooling.

The ‘project specific agreements on appropriation’ are made on profit margins, sharing principle, risks and contingencies. The profit margin of every party was ‘parked’ in the ‘Success pot’ and placed ‘at risk’ (shared profit). This ‘Success pot’ functions as a mechanism to absorb financial setbacks and to overcome additional costs that cannot be assigned to a particular party. The goal of the collaboration is to end in a surplus in which a certain amount remains from the ‘Success pot’. The parties get paid out of this ‘Success pot’ to the extent to which the common goals of the collaboration are met. The sharing ratio is set ‘customized’ - for the most part equity based – in which the smaller parties (KOW and Oranje) obtained a slightly higher share in relation to their relative turnover. The share of the client (Eigen Haard) is of a similar size as the share of the contractor (Era Contour). The development department of the contractor (Era Contour) also holds a share in the value appropriation model. The share of the smaller parties (KOW and Oranje) are of an equal size, but is still considerably smaller than the share of the bigger parties. In addition, the ‘Co Green’ collaboration obtained the belief that all risks are the responsibility of all parties (joint risk model). The parties applied the principle that the party who is best able to deal with a risk also takes the lead in collectively handling that risk. In addition, the lead party then obtains an appropriate award for dealing properly with a risk.

The ‘project specific assessment of performance’ is based on a value assessment conducted at the end of the third phase. The value assessment is done by identifying the discrepancy of the project specific goals and outcomes, both financial and non-financial (plural).

The ‘pay-out’ is characterized by a target cost contract (reimbursement type) in which the pay-out is partially linked to non-financial performance outcomes. The parties involved are thus financial accountable for obtaining these non-financial goals. This means that the amount of the ‘Success pot’ shrinks if less non-financial goals are not met. Nevertheless, all parties are reimbursement for their ‘direct project costs’ and ‘project specific overheads’ as specified in their cost estimates. The ‘more/less work’ principle is applied the moment a change of scope occurs, meaning that a change in design-specification is for the full expenditure of the client. Additional savings (without a change of scope) are deposited in the ‘success pot’. In addition, addition costs which cannot be assigned to a particular party are paid with this ‘Success pot’ as well. The amount of the ‘Success pot’ decreases if additional costs prove to be higher than expected. The better the projects is managed, the less additional costs arise, the more money remains in the ‘success pot’. The pay-out of this ‘success pot’ has not yet been carried out since the balance will be drafted after the third, when the project is completely realized. The pay out of the ‘Success pot’ will be distributed in accordance to the predetermined sharing ratio. In this manner, both the benefits and the burdens are borne jointly by the parties involved. The parties have agreed that the larger parties take more responsibilities in case of a budget overrun. Meaning that the smaller parties (KOW and Oranje) have a capped commitment in case of a budget overrun (maximum loss). No additional incentive are applied.

The applied key elements of the value appropriation model of ‘Co Green’ are listed in tables 6.6 and 6.7.

Key elements	‘Co Green’	Observations
(1) Number of parties	Multilateral (strategic)	All parties argued that a multilateral shareholder structure - in which all strategic parties with a significant impact on the value creation process hold a share - is highly desirable. In addition, all parties mentioned that a multilateral (strategic) shareholder structure is the best way to foster commitment.
(2) Moment of ‘surplus’ appropriation	After a series of projects	All parties argued that the moment of appropriation after a series of projects is adequate since the expected benefits are expected to become visible in the second and third phases. Although, all parties mentioned that directly visible benefits have a strengthening effect on the collaboration. This phenomenon is described by Van der Veen (2012) in academic literature as: “short-term successes are needed for gaining momentum”.
(3) Type of pooling	Profit pooling	All parties argued that profit pooling is the only appropriate way. All parties mentioned that solely pooling of either revenues or costs is impracticable and inappropriate in the construction industry.

Table 6.5: Observations concerned with the applied key elements of the value appropriation model of ‘Co Green’ (1)

Key elements	'Co Green'	Observations
(4) Profit margins	Shared (profits parked 'at risk')	<p>The contractor mentioned that profits were kept on the prospect for a long period of time.</p> <p>This phenomenon is described by Naoum (2003) in academic literature as: "The 'parking' of individual profits is called the 'fee at risk' principle, where the parties tie a certain proportion of their profit fee to the overall success of the chain."</p> <p>The client argued that a nice element of this 'parking' system is that the interests of the parties increase as the collaboration progresses due to the fact that the respective profits of the individual parties 'grows' as well. The client mentions that the chance that parties renounce hereby reduces.</p> <p>This phenomenon is described by Jap (1999) in academic literature as: "The chance of free-riding behavior declines if individual profits are held on the prospect".</p>
(5) Sharing ratio	Customized (combination rules of thumb)	All parties argued that equity sharing is the most proper way for determining the sharing ration in a vertical collaboration since the 'bigger' parties have a greater impact on the value creation process and are often better able to carry a loss in case of a disappointing results. Furthermore, a combined method is still needed to ensure that all parties have to correct share.
(6) Risks and contingencies	Joint (responsibility for all risks)	<p>The contractor argued that - while he understands the advantages of a joint risk management approach - it is hard to exactly understand which party is responsible for taking the lead in handling a risk. The contractor mentioned that some risks were assigned to a particular party at the start of the collaboration. However, the size of the risks was hard to determine at the beginning. Besides, the contractor mentioned that the dealing with risks remained a difficult process from an operational point of view since it was often unclear under which conditions risks were transferred from one party to another.</p> <p>The client argued that the joint risk model was not embedded properly in the contracts signed at the beginning. Besides, the client mentioned that it is hard to accept risks while the size of the risks are unclear. Unfortunately, the <i>joint risk model</i> (intention) looked more like a <i>shared risk model</i> in practice. The client mentioned that the parties still used the existing asymmetry to mitigate individual risks instead of mitigating joint risks.</p>
(7) Value assessment	Plural (both financial & non-financial)	All parties argued that a plural value assessment is considered highly desirable. All parties recognized the importance of assessing both financial and non-financial performance items in order to pursue maximum value.
(8) Reimbursement type	Target cost	<p>The contractor argued that a target cost contract is a suitable reimbursement type if the input delivered by all parties is indeed brought to the right perspective.</p> <p>The client argued that a target cost worked properly.</p>
(9) Pay-out mechanism	Pay-out fully linked to non-financial performance targets	<p>The contractor argued that some of the non-financial performance targets were out of his reach.</p> <p>The client argued that it works best if the pay-out is fully linked to non-financial performance targets since all parties are then more focused on achieving a good performance.</p>
(10) Commitments	Capped liability (maximum loss)	All parties understood that a capped liability for the smaller parties was considered necessary in order to involve them in the sharing arrangement.
(11) Additional incentives	No	All parties argued that no additional incentives were considered necessary.

Table 6.6: Observations concerned with the applied key elements of the value appropriation model of 'Co Green' (2)

6.4 Case 3 'WALTZ'

The OV SAAL Zuidtak project is executed by two alliances. The WALTZ (Westerlijke Alliantie Team Zuidtak) is responsible for the trace between Riekerpolder and station Amsterdam Zuid (Zuidtak West). The WALTZ alliance consists of a client (Prorail) and a consortium ('Consortium Nieuwe Meer Sporen') which is a combination of Van Hattum van Blankevoort and VolkerRail (called contractor in this case study). The collaboration is steered by some sort of value appropriation model with the aim to enhance the common performance.



Value mechanism

The 'collaboration agreements on goals' are laid down in the 'Alliance agreement' (in Dutch: 'Alliantieovereenkomst') and the 'Basic agreement' (in Dutch: 'Basisovereenkomst'). The parties have established these formal collaboration agreements to capture the most important arrangements. The 'Alliance agreement' is about the shared 'duties and responsibilities' of both parties. The 'Basic agreement' is merely about the 'duties and responsibilities' of the construction consortium. In order to have a better control, the project is broken up in several 'working packages' (in Dutch: 'Kunstwerken'). The main goal is to optimize the project in which the parties try to find improvements during the design phase.

In addition, the 'project specific agreements on goals' are also related to both the 'Alliance agreement' and the 'Basic agreement'. In addition, different financial goals and non-financial goals are established for both agreements. This means that the two project specific financial goals are the 'Alliance sum' (in Dutch: 'Alliantiesom') and the 'Execution sum' (in Dutch: 'Uitvoeringsom'). The 'Alliance sum' (in Dutch: 'Alliantiesom') is the amount reserved for running all alliance activities, categorized by organization, design and risk costs. The 'Execution sum' is the amount the contractor receives for executing the execution/building works. Of course, the 'Alliance sum' and the 'Execution sum' are communicating concepts. The main non-financial goals of the alliance are the time of completion (planning: lead time; predictability; moment of delivery) and number of 'out of services' (in Dutch: 'buitendienst zetten') of associated train tracks.

Concern 5: Two separate 'communicating' project specific financial goals

Interesting about the WALTZ case is that two different financial goals were established ('Alliance sum' and 'execution sum'). In this respect, the parties believed to be better to manage the costs of the project.

The distinction between two financial goals - on two levels so to speak - has some similarities with the 'Co Green' case. The financial goal of the 'Co Green' case was established on 'exploitation costs' (in Dutch: 'Stichtingskosten') that contains both development and building costs. Besides, a 'financial gap' (in Dutch: 'Onrendabele top') was taken into consideration within these 'exploitation costs'.

The 'project specific determination on outcomes' is set after the project is completely realized. The balance of both the 'Alliance sum' and the 'Execution sum' are set after the project is completely realized. The project specific non-financial outcome is the total time needed to complete the project and the number of 'out of services'.

Applied contributors

The 'partial open book' principle was the accounting approach used. The 'Alliance agreement' stipulates that the contractor provides openness in all relevant cost items. The budget estimate of the contractor is checked and modified by the client on the basis of market figures. The market cost indicators form an important input for the negotiation process of establishing the 'Execution sum'. No independent cost advisor was asked to check the cost estimate of the contract. Also no independent advisor was asked to provide a second opinion of the budget estimate. The applied contributors of the value appropriation model of 'WALTZ' are listed in table 6.8.

Contributors	'WALTZ'	Observations
(A) Accounting approach	Partial open-book	Both parties argued that the partial open-book accounting approach is convenient enough since only relevant cost information must be exchanged between both parties.
(B) Benchmarking	Market cost indicators	Both parties argued that it is most fair to apply price indicators from a benchmark that are corrected by current market conditions.
(C) Independent advice	n/a	Both parties argued that they had the proper intentions and the right competences to be able to draft both types of financial targets.

Table 6.7: Observations concerned with the applied contributors of the value appropriation model of 'WALTZ'

Appropriation mechanism

The ‘collaboration agreements on appropriation’ were laid down in the ‘Alliance agreement’. The parties agreed on a bilateral shareholder structure in which only the client (Prorail) and the consortium (Nieuwe Meer Sporen) hold a share. The moment of ‘surplus’ appropriation was set after the project (realization). The parties applied profit pooling.

The ‘project specific agreements on appropriation’ stated that the consortium incorporates an individual profit margin in the ‘Execution sum’. The sharing ratio was - in relation to the ‘Alliance sum’ - set by equality sharing (rule of thumb) in case of a budget underrun (50-50 split). Meaning that both parties hold an equal share in the remainder of the ‘Alliance sum’ if the alliance proved to be profitable. In addition, both parties agreed to apply a three-limb structure in case of a loss (remainder of the ‘Alliance sum’ ends up in a negative amount). The loss is then shared equally in case of a budget overrun that is less than 10% (limb 1: 50-50). A loss is heavier borne by the client in case of a budget overrun between 25% and 50% (limb 2: 75-25). A loss is even more heavily borne by the client in case of a budget overrun of more than 50% (limb 3: 90-10).

Furthermore, all risks were mapped by a solid risk management approach that withhold technical due diligence and additional control measures. Both parties were responsible for this risk management approach in which a risk profile plus an associated risk budget was set for each ‘work package’. These risk profiles were continuously monitored for the entire project in which recalculations and adjustments of risk profiles were done on the basis of the experiences from previous ‘work packages’.

The parties obtain the belief that most of the risks must be shared together instead of the sole division of risks. For that reason, a ‘three-type’ risk model is applied in which all identified risks are placed in three different categories, namely: (1) shared risks of the alliance, (2) individual risks of the client, and (3) individual risks of the contractor. Both parties used an individual contingency budget (for individual risks) next to a shared contingency budget (for shared risks). The shared contingency budget (‘Alliance funds’) is established to cover (foreseen and unforeseen) costs associated with shared risks like final design, final constructions, underground issues, third party issues, site availability risks. The individual contingency budget of the client is established to cover (foreseen and unforeseen) costs associated with individual risks like building permits and surrounding risks (in Dutch: ‘bouwvergunningen’ or ‘Omgevingsvergunningen’). The individual contingency budget of the contractor is established to cover (foreseen and unforeseen) costs associated with individual risks like execution risks and contemporary construction risks.

Concern 6: Shared risk-reward model

The value appropriation model of the WALTZ collaboration looks similar to a risk-reward model as used by alliance projects. Both parties agreed to apply a shared contingency budget to cover possible expenses concerned with the identified shared risks. In addition, the contractor reserved an additional amount in his ‘execution sum’ to cover possible expenses concerned with his individual risks. In other words, the client paid the contractor for taken some of the risks involved in the project.

The concern about the project specific financial goal is described by Baccharini (2007) in academic literature as: “An important element of a strategic collaboration is that all participants work together on shared risks”.

The ‘project specific assessment of performance’ is done by a value assessment based on the project specific financial performance outcome (singular: only financial). The non-financial performance outcome (planning and number of ‘out of service’) are not included in the value assessment but are subjected to additional incentives.

The ‘pay-out’ is characterized by a target cost contract. The pay-out was not linked to non-financial performance targets. The parties agreed to obtain a capped client commitment, meaning that an overrun of the ‘Execution sum’ becomes more for the expenses of the contractor if the loss increases (read: ‘project specific agreements on appropriation’). Besides, two main positive incentives (bonuses) were put in place. The first positive incentive is paid to the contractor if the project is executed on time. A second positive incentive is paid if the number of ‘out of service’ does not exceeds a certain range.

The applied key elements of the value appropriation model of ‘WALTZ’ are listed in tables 6.9 and 6.10.

Key elements	‘WALTZ’	Observations
(1) Number of parties	Bilateral	Both parties agreed that it could be desirable to involve the designing/engineering parties into the sharing arrangement next time.
(2) Moment of ‘surplus’ appropriation	After each single project	The contractor mentioned that it was also possible to appropriate the value after the realization of each ‘working package’ (in Dutch: ‘Kunstwerken’). The client argued that the value creation process must be reviewed on the total life-cycle of the project.

Table 6.8: Observations concerned with the applied key elements of the value appropriation model of ‘WALTZ’ (1)

Key elements	'WALTZ'	Observations
(3) Type of pooling	Profit pooling	Both parties argued that profit pooling is the only appropriate way.
(4) Profit margins	Incorporated (individual profit margins)	Both parties argued that a party should retrieve a reasonable profit from the collaboration. A collaboration without an individual profit margin is therefore unworkable.
(5) Sharing ratio	Rule of thumb (equity or equality sharing)	All parties argued that a 50-50 sharing ratio is fair in a client-contractor relationship since it illustrates an equal situation.
(6) Risks and contingencies	Shared (assigned, 'three-type' risk)	Both parties noticed that a lot of discussion arose due to the fact that it was unclear to which category some risks belonged. The parties tried to tackle this problem by placing cases of doubt in the 'special issues' category.
(7) Value assessment	Singular (only financial)	The contractor argued that a value assessment should be mainly based on time and budget elements since the product needs to meet (of course) predefined specs at all times. The client argued that the alliance should steer more on non-financial performance targets in the following projects.
(8) Reimbursement type	Target cost	Both parties agreed that a target cost contract creates more awareness in each other business. For that reason, the application of a target cost worked very well for both the establishment of the 'alliance sum' and the 'execution sum'.
(9) Pay-out mechanism	Pay-out not linked to non-financial performance targets	Both parties argued that non-financial targets should be taken into consideration as well. Nevertheless, both parties openly argued about what should happen with the amount that is held back for not obtaining a goal.
(10) Commitments	Capped liability (maximum loss)	Both parties agreed that a capped client - in relation to the 'execution sum' - is considered normal since a budget overrun is always for the cost of the contractor. Nevertheless, both parties agreed that it is a good idea to investigate how a greater 'we-are-all-in-it-together' feeling can be established.
(11) Additional incentives	Positive	Both parties argued that it is desirable to reward the contractor if a certain cornerstone is achieved. In their opinion, a bonus works more stimulating than a penalty.

Table 6.9: Observations concerned with the applied key elements of the value appropriation model of 'WALTZ' (2)

6.5 Overview cases

The applied contributors to the value appropriation models of the three cases are listed in table 6.11.

Contributors	'Succesvol Bouwen'	'Co Green'	'WALTZ'
(A) Accounting approach	Partial open-book	Full open-book	Partial open-book
(B) Benchmarking	Traditional cost indicators	Base cost estimate	Market cost indicators
(C) Independent advice	Cost advisor + Mediator/Accountant	Cost advisor	n/a

Table 6.10: Overview cases, applied contributors

The applied key elements of the value appropriation models of the three cases are listed in table 6.12.

Key elements	'Succesvol Bouwen'	'Co Green'	'WALTZ'
(1) Number of parties	Bilateral	Multilateral (strategic)	Bilateral
(2) Moment of 'surplus' appropriation	After each single project	After a series of projects	After each single project
(3) Type of pooling	Profit pooling	Profit pooling	Profit pooling
(4) Profit margins	Incorporated (individual profit margins)	Shared (profits 'parked at risk')	Incorporated (individual profit margins)
(5) Sharing ratio	Rule of thumb (equity or equality sharing)	Customized (combination rules of thumb)	Rule of thumb (equity or equality sharing)
(6) Risks and contingencies	Separate (individual, traditional)	Joint (responsibility for all risks)	Shared (assigned, 'three-type' risk)
(7) Value assessment	Singular: Only financial	Plural: Both financial & non-financial	Singular: Only financial
(8) Reimbursement type	Fixed price	Target cost	Target cost
(9) Pay-out mechanism	Pay-out not linked to non-financial performance targets	Pay-out fully linked to non-financial performance targets	Pay-out not linked to non-financial performance targets
(10) Commitments	Capped liability (maximum loss)	Capped liability (maximum loss)	Capped liability (maximum loss)
(11) Additional incentives	Negative	No	Positive

Table 6.11: Overview cases, applied key elements

6.6 Preliminary findings

The preliminary findings of the value appropriation model (third generalized version) are covered with this paragraph. The selection of one option for each contributor and each key element derived from the views and insights of the findings from practice.

Preliminary Findings
of the
Value Appropriation
Model

4

Fourth generalized version of the value appropriation model

The reasoning's for choosing a certain option for each contributor and each key elements are given in the preliminary findings of the value appropriation model (figure 5.12). The main criteria is that the interviewees of at least two of the three cases indicate a preference for a certain option in order to select that option if the arguments of these interviewees are indeed more sufficient than the counterarguments.

(A) 'Accounting approach': A **partial open-book** accounting approach is observed in two out of three cases. The general view of the interviewees is that a partial open-book accounting approach must be applied in which only relevant cost information is exchanged between the parties.

(B) 'Benchmarking': The general view of the interviewees is that a **base cost estimate** helps by arriving at a more ambitious financial goal. This ambitious goal must always be set by taken prices from a benchmark in which the cost indicators are corrected by current market conditions.

(C) 'Independent advice': The use of an independent **cost advisor** is observed in two out of three cases. The general view of the interviewees is that a second opinion of an independent third party is desirable to tackle most part of the discussion about finding a price - for the product and service in question - that is acceptable to all parties.

Fourth generalized version of the value appropriation model

- (1) **'Number of parties'**: All interviewees argued that it is desirable to apply a **multilateral (strategic)** shareholder structure. The general view is that all strategic parties must be involved in the sharing arrangement. This means that all parties with a significant impact on the value creation process must hold a share.
- (2) **'Moment of surplus appropriation'**: All interviewees argued that the collaborating parties must embrace the win-win feeling. This feeling must be translated to the fact that the (1) interest of the parties in the collaboration grow so that it becomes inconvenient to leave the collaboration and (2) parties have a clear desire to appropriate the true benefits of the collaboration as often as possible. In short, the general view is that the moment of appropriation must be set after each project in which part of the gain must be reinvested in the collaboration. A **combined moment of surplus appropriation** is therefore appointed as most desirable by most interviewees.
- (3) **'Type of pooling'**: **Profit pooling** is observed in all three cases. All interviewees argued that profit pooling is the only workable way for the construction industry.
- (4) **'Profit margins'**: All interviewees understand that a certain shared feeling for cost and rewards must be obtained. The general view is that it is good to have a **shared profit** amount, meaning that a certain amount of profit from each party is parked and put 'at risk'.
- (5) **'Sharing ratio'**: All interviewees argued that the sharing ratio should be **customized** for each collaboration. However, the general view is that the sharing ratio must be based on a feeling of equality, meaning 50-50 split in case of client-contractor relationship.
- (6) **'Risks and contingencies'**: All interviewees understand that the identification of **shared risks** distinguishes supply chain collaboration from any traditional form of collaboration. However, all interviews also argue that it is incredibly difficult to determine which risk must be borne by which party in practice. Nevertheless, all interviewees agreed that both a separate and a joint risk model are very difficult to manage.
- (7) **'Value assessment'**: All interviewees argued that a **plural value assessment** is considered highly desirable. All parties recognized the importance of assessing both financial and non-financial performance items in order to pursue maximum value.
- (8) **'Reimbursement type'**: Most interviewees argued that a **target cost** probably works best.
- (9) **'Pay-out mechanism'**: The general view is that all parties must be focused on achieving the highest possible level of performance, which can be stimulated by **fully linking the pay-out to non-financial performance targets**.
- (10) **'Commitments'**: A **capped liability** was observed in all three cases. All interviewees argue that it could be desirable to obtain caps for a maximum loss for some parties. The best argument for applying a maximum loss is that it could be unbearable for some parties if the chance of taking a major loss becomes too high.
- (11) **'Additional incentives'**: The general view is that a bonus works more stimulating than a penalty. For that reason, most interviewees prefer an additional **positive incentive** payments.

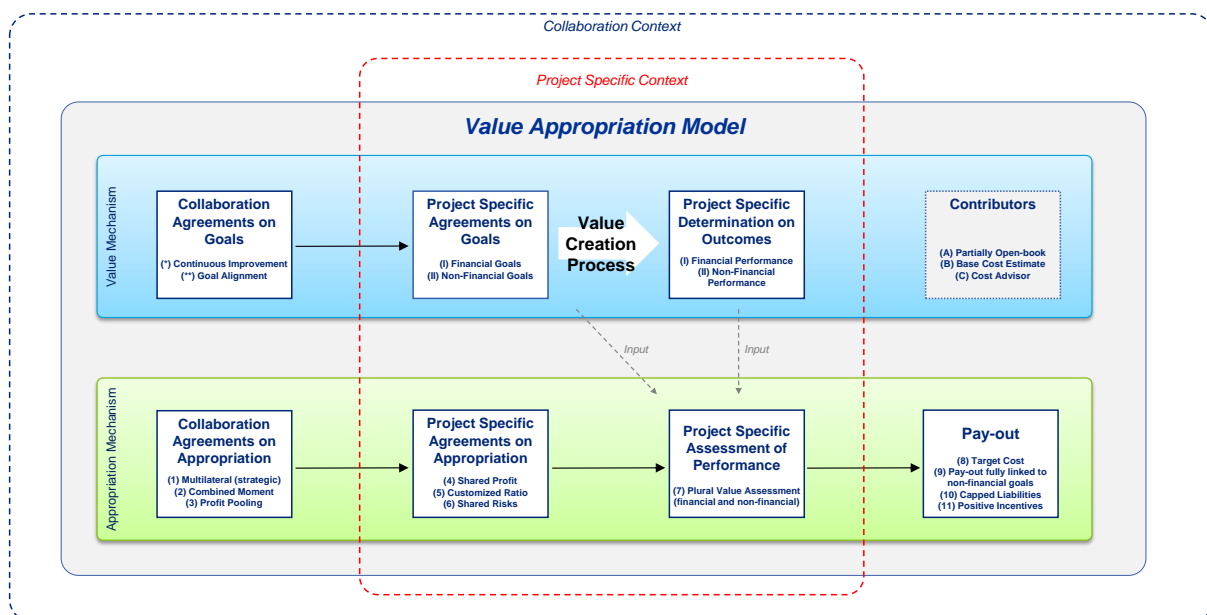


Figure 5.14: Preliminary findings of the value appropriation model (fourth generalized version)

Chapter 7. Validating the Preliminary Findings

The process of validating the preliminary findings by the expert panel is described in this chapter. The preliminary findings of the value appropriation model (third generalized version) - derived from the findings from practice (paragraph 6.6) - are validated by the expert panel. The result of the validation of the selected options is given in paragraph 7.2 in which the three members of the expert panel clarify why a certain selected option must be validated or rejected in their opinion. Paragraph 7.3 finalizes the validation process in which is mentioned whether or not a certain selected option is incorporated in the final value appropriation model.

Paragraph overview:

- 7.1 Introduction
- 7.2 Validating the selected options
- 7.3 Finalization of the validation process

7.1 Introduction

The validation of the preliminary findings is done by experts with sufficient knowledge about the research subject. In addition, two out of three experts have a proven track record in the construction industry. All validations of the three experts are compared in order to arrive at the conclusions. The main criteria is that at least two out of three experts must validate a selected option, provided that the arguments of those two experts are indeed more sufficient than the arguments of the one expert that rejected that certain option. The validated options will be put in the conclusion, the final findings of the value appropriation model (fifth generalized version). The rejected options are put aside and further research concerns (to be considered later). The general view of the expert panel is thus decisive in the validation of the selected options.

7.2 Validating the selected options

The expert panel consists of the following persons:

- Mr. Van der Veen - Professor at Nyenrode Business University - an expert in the field of supply chain management;
- Mr. De Man - Professor at VU University Amsterdam - an expert in the field of collaborations, alliances and partnerships;
- Mr. Janssen - researcher at TNO and PhD candidate at VU University Amsterdam - is conducting a research in the field of value appropriation models in inter-firm collaborations (within the logistics industry).

Validations of Professor Van der Veen

The validations of Professor Van der Veen are listed in tables 7.1, 7.2, 7.3 and 7.4.




Contributors	Option 1	Option 2	Option 3
(A) Accounting approach 	Closed-book	Partial open-book	Full open-book
	Van der Veen mentions that the accounting approach is about the extent to which cost information is exchanged. Van der Veen believes that a collaboration is based on the basis of trust and argues that (in general) cost information must be exchanged to improve the collaboration. Van der Veen argues that the parties must only share relevant cost information. Van der Veen states that each other's operations should not be interfered by the exchange of information that contains full details. In short, Van der Veen argues that a partial open-book accounting approach (option 2) is sufficient.		
(B) Benchmarking 	Traditional cost indicators	Market cost indicators	Base cost estimate
	Van der Veen argues that benchmarking is about the process of determining the actual costs of a product. Furthermore, Van der Veen mentions that the first two options are too conservative and do not promote any form of innovation. The essence of supply chain collaboration is that it leads to a win-win situation. According to Van der Veen, the parties should try to 'beat the benchmark', which means that the performance must be better than the competitors within the market. The market is characterized by parties who are 'fighting' on the lowest tender price to get the assignment. The cost estimate must be corrected on market cost indicators, especially when competitors apply prices that are under the cost price. Van der Veen mentions that cost says something about the capabilities of a party, while price is influenced by e.g. market conditions. The nuance of Van der Veen is that adjustments of the ambitious financial estimate are made by these market conditions.		
(C) Independent advice 	Cost advisor	Mediator	Accountant
	Van der Veen mentions that a discussion between parties about the costs of an object frequently arises. According to Van der Veen, there must be a certain independent orchestrator ('chain director') who steers the collaboration due to fact that parties are often not able to agree on all cost items without debate. Van der Veen argues that is best for the collaboration if an independent party is seen as an authority who is able to make a decision. Moreover, Van der Veen believes that a mediator is also able to keep all parties 'sharp', not only in respect to costs but also in respect to effort and behavior. Van der Veen concludes that a mediator is therefore disable to overcome disputes during the total life-cycle of the project (option 2).		

Table 7.1: Validation of the preliminary findings by Professor Van der Veen (1)

Key elements	Option 1	Option 2	Option 3
(1) Number of parties	Bilateral	Multilateral (strategic)	Multilateral (large group)
	Van der Veen mentions that the construction industry is traditionally characterized by bilateral contractual relations. According to Van der Veen, the complexity of a collaboration increases exponentially if more parties are involved in the collaboration. In other words, the collaboration is more complex if more parties are involved ('two is group, three is a crowd'). Van der Veen believes that not all parties should be incorporated in the sharing arrangement. Van der Veen argues that the strategic parties must also be 'risk-bearing', making a multilateral (strategic) shareholder structure (option 2) best suitable.		
(2) Moment of 'surplus' appropriation	After a series of projects	After each single project	Combined (part of the gain reinvested)
	Van der Veen mentions that the construction industry has always been focused on individual projects. For this reason, the performance must be measured on each project as well. If some project specific goals are not achieved, a part of the 'surplus' must not be paid out. However, if the remainder is for the client it leads to opportunistic behavior of that client. To eliminate this perverse incentive, Van der Veen argues that it is a good idea to reinvest part of the gain (remainder) in the collaboration in order to ensure that that more non-financial goals are achieved in the following project. In short, Van der Veen concludes that the third option is most desirable.		
(3) Type of pooling	Cost pooling	Revenue pooling	Profit pooling
	Van der Veen argues that both cost and revenue pooling are not really applicable within the construction industry. According to Van der Veen, profit pooling is the most suitable option.		
(4) Profit margins	Incorporated (individual profit margins)	Shared (profits parked 'at risk')	Joint (no individual profit margins)
	Van der Veen confirms that clear agreements must be made about the profit margins of the individual parties. According to Van der Veen, parties make decisions about a guaranteed amount of profit before entering into a collaboration from a practical point of view. However, Van der Veen argues that a guaranteed individual profit is not a fundamental element of supply chain collaboration. Van der Veen mentions that the alternative of individual profit margins is that profits are parked 'at risk' and shared between the parties, which feels very uncomfortable for most parties. Van der Veen argues that this issue is about the belief that each party should retrieve a profit from the collaboration. According to Van der Veen, the essence of supply chain collaboration is about creating a joint feeling for risks and rewards. Traditionally, parties are paid for taking a risk which causes buffers. The profit amount is thus directly linked with how risky the project is. The <i>joint profit model</i> is maybe fundamentally right, but is hardly applicable in practice. In short, Van der Veen argues that profits must be put 'at risk' (option 2).		
(5) Sharing ratio	Rule of thumb (equity or equality sharing)	Customized (combination rules of thumb)	Cooperative game theories
	Van der Veen argues that the equity rule cannot be obtained in a vertical collaboration due to the fact that both a client and a contractor are involved. This means that one party is paying the other. According to Van der Veen, the sharing ratio must always be determined in a customized way. Furthermore, Van der Veen concludes that cooperative game theories are practically inapplicable.		

Table 7.2: Validation of the preliminary findings by Professor Van der Veen (2)






Key elements	Option 1	Option 2	Option 3
(6) Risks and contingencies 	Separate (individual, traditional)	Shared (assigned, 'three-type' risk)	Joint (responsibility for all risks)
	<p>Van der Veen mentions that most collaborations apply a <i>separate risk model</i> in practice. However, Van der Veen argues that supply chain collaboration is by nature about risk sharing. According to Van der Veen, the parties should apply a <i>shared risk model</i> in which a substantial part of the risks are shared. In fact, the <i>shared risk model</i> should lay as close as possible to a <i>joint risk model</i>. Respectively, the number of shared risks should be larger than the individual risks due to the fact that the incentive to collaborate increases if a large number of risks are shared. For that reason, Van der Veen argues that a risk should be labeled as a 'shared risk' if it can be influenced by more than one party. Van der Veen concludes that a full <i>joint risk model</i> is difficult to apply. According to Van der Veen, the trick is to apply a model in which most of the risks are taken jointly. Again, construction entities are traditionally keen on assigning risks to individual parties who are paid a certain amount for taking on these risks. Van der Veen mentions that parties do not want to be too transparent on risks because they get the reward even if a risk does not materialize. Van der Veen argues that the transparency of a <i>joint risk model</i> seems 'explosive' because parties might be 'robbed' from their perceived earning model.</p> <p>Whereas there is much more joint risk taking in supply chain collaboration with the consequence that entities help each other in mitigating these risks.</p>		
(7) Value assessment 	Singular (only financial)	Singular (only non-financial)	Plural (both financial & non-financial)
	<p>Van der Veen argues that both financial and non-financial items must be taken into consideration. Moreover, Van der Veen mentions that these two are 'communicating elements' since they cannot be viewed separately. In short, Van der Veen concludes that a plural value assessment is most suitable.</p>		
(8) Reimbursement type 	Fixed price	Prime cost	Target cost
	<p>Van der Veen mentions that this one is a little bit confusing, since it is about the reimbursement of the made costs. According to Van der Veen, the reimbursement type is directly linked to how is dealt risks. Van der Veen states that the price of a cost item must be fixed if the associated risk of that cost item is borne by an individual party. Furthermore, Van der Veen also states that the price of a cost item must be 'prime cost' if the associated risk of that cost item is borne jointly.</p>		
(9) Pay-out mechanism 	Pay-out not linked to non-financial performance targets	Pay-out partially linked to non-financial performance targets	Pay-out fully linked to non-financial performance targets
	<p>Van der Veen agrees that supply chain collaboration is not only about money. Instead, quality, planning and sustainability should be taken into consideration as well. Van der Veen sees purely financial driven nature of a value appropriation model as a major drawback. For instance, if the costs of an object are a bit higher but the quality (as perceived by the client) is much higher, the result is that all parties need to pay (i.e. do not benefit from a better quality but suffer the higher cost). For that reason, Van der Veen confirms that the 'surplus' pay-out must be fully linked to non-financial performance targets.</p>		
(10) Commitments 	Capped profit (maximum gain)	Capped liability (maximum loss)	Capped commitment range (boundaries, maximum profit and liability)
	<p>Van der Veen argues that it is unfair if parties have a too big stake in a possible major loss. Van der Veen concludes that a capped liability (maximum loss) could be desirable for some parties. According to Van der Veen, supply chain collaboration will never work if parties need to take an unbearably risk.</p>		

Table 7.3: Validation of the preliminary findings by Professor Van der Veen (3)


Key elements	Option 1	Option 2	Option 3
(11) Additional incentives	Positive	Negative	No
	<p>Van der Veen argues that supply chain collaboration is all about incentivizing the common interest. For that reason, Van der Veen is not in favor of additional incentives since the aim is ‘to-be-in-it-together’ in which the individual parties must not be awarded separately. Van der Veen mentions that parties are risk-adverse from a traditional point of view. Parties are by nature afraid that other parties are not able to deliver what they should deliver. In his opinion, the application of additional incentives is not the correct manner to tackle these problematics. In short, Van der Veen concludes that no additional incentives should be applied (option 3).</p>		

Table 7.4: Validation of the preliminary findings by Professor Van der Veen (4)

Van der Veen mentions that this research provides a good overview of all relevant matter concerned with an inter-firm collaboration. Moreover, Van der Veen agrees that the preliminary findings corresponds in many ways with the principles of supply chain collaboration. Besides, Van der Veen argues that the essence of supply chain collaboration is that the goals of the collaboration are realized. Moreover, the establishment of common goals is the only way to arrive at a win-win situation. Van der Veen understand the structuring of value creation (value mechanism) and value appropriation (appropriation mechanism). Besides, Van der Veen raises the question whether or not all configurations are also ‘possible’ since most of the options cannot be considered separately. Van der Veen concludes that the value appropriation should be as simple as possible.

Van der Veen mentions that the fact that the client is part of the chain is a fundamental issue of a supply chain collaboration in the construction industry. Van der Veen mentions that it is interesting that the client holds a share in the value appropriation model and is the one who is paying and at the same time. In other words, Van der Veen argues that a vertical collaboration differs from a horizontal collaboration, which makes the application of value appropriation model in the construction industry very interesting. Opposing interests are by nature the case in a client-supplier relationship. Van der Veen argues that some perverse incentives are directly tackled by the application of a value appropriation model. Instead, the application of a value appropriation model should stimulate the dialogue between the parties to mitigate these perverse incentives. Moreover, Van der Veen argues that - due to the maturity of the sector - an independent orchestrator (‘chain director’) must steer this dialogue in order to the make the final decision for each trade-off.

Van der Veen find it understandable that the ‘additional values’ (paragraph 1.10) are not taken into consideration. However, he also mentions that this pose quite a restriction. After all, organizations are frequently interested in starting collaboration efforts for exactly these reasons in practice (reputation, continuity and differentiation), where the short-term benefits are considered less important. In fact, Van der Veen believes that these considerations are more important than short-term gains, since supply chain collaboration is a strategic initiative. However, he continues that short-term successes are needed for gaining momentum and to fuel the necessary transition ("success breeds success") where supply chain collaboration does include a major change-management effort. In addition, Van der Veen mentions that he normally uses the term ‘Dynamic Earning Model’. The term ‘dynamic’ is appropriate since value is an ‘ever changing variable’ within a collaboration. Again, the term ‘earning’ is necessary for parties to participate in the sharing arrangement.

Validations of Professor De Man

The validations of Professor De Man are listed in tables 7.5, 7.6, 7.7, 7.8 and 7.9


Contributors	Option 1	Option 2	Option 3
(A) Accounting approach	Closed-book	Partial open-book	Full open-book
	<p>Mr. De Man mentions that most collaborations apply a closed-book accounting approach. The advantage of a strategic collaboration is to benefit from information across the supply chain. Sharing of relevant cost information contributes to the process of improving the collaboration. Mr. De Man concludes that an accounting approach normally ‘grows’ as the collaboration progresses. This means - in general - that parties start with a partial open-book accounting approach with the aim to apply a full open-book accounting approach later on.</p>		

Table 7.5: Validation of the preliminary findings by Professor De Man (1)



Contributors	Option 1	Option 2	Option 3
(B) Benchmarking	Traditional cost indicators	Market cost indicators	Base cost estimate
	Mr. De Man confirms that the overall performance must be increased over the consecutive projects in order to make a long-term ‘project-unbounded’ collaboration a success. A more ambitious goal - by applying a base cost estimate – is thereby thus a convenient means. However, Mr. De Man mentions that traditional and market cost indicators will always be considered in practice since the (financial) goals have to be in accordance to the ‘outside world’. In addition, some parts will always be compared with market cost indicators like the costs of commodities (e.g. concrete and steel). De Man argues that a project must be split in different parts and so that each part can obtain its own benchmark methodology.		
(C) Independent advice	Cost advisor	Mediator	Accountant
	Mr. De Man argues that is quite questionable whether the parties really need an independent advisor. Mr. De Man argues that the need for an independent advisor mainly depends on the competences of the parties involved. For example, the client should at least know what a reasonable/realistic price is for the product he buys. Besides, De Man continuous with the fact that the need for independent advice depends on the accounting approach used (e.g. the client is better able the check the prices by an open-book accounting). De Man openly argues what the exact role of the mediator must be in a project. The role of the mediator could be to judge whether a change in costs is realistic which could be done by the parties themselves in a proper functioning collaboration. The question is whether or not the parties possess those competences. De Man argues that an accountant is for operational concerns. The administrative activities of an accountant can be execute by the parties themselves or by an independent party if that is considered necessary. In short, De Man does not really see the benefits on an independent advisor.		

Table 7.6: Validation of the preliminary findings by Professor De Man (2)



Key elements	Option 1	Option 2	Option 3
(1) Number of parties	Bilateral	Multilateral (strategic)	Multilateral (large group)
	Mr. De Man mentions that a bilateral sharing arrangement is often applied in practice. Mr. De Man concludes that a multilateral shareholder structure in which all strategic parties are involved is most desirable. However, De Man argues that it is often very difficult to determine which parties are strategic and which not. Nevertheless, De Man mentions that more benefits can be achieved if a larger group of parties is involved, while this is much related to the maturity of a sector. A multilateral shareholder structure of a large group of parties comes maybe a little too early for the construction industry. Collaborations known in the IT industry have already made the step to option 3, while this took decades.		
(2) Moment of ‘surplus’ appropriation	After a series of projects	After each single project	Combined (part of the gain reinvested)
	De Man mentions that option 1 (‘after a series of projects’) will impair the collaboration. De Man argues that it is better to ‘come clean’ after each project so that discussions of the past do not lead to issues in the present. De Man emphasizes that a collaboration becomes less controllable if issues are transferred from one project to the other. However, De Man mentions that the appropriation of value must be seen as a continuous process in which all parties are trying to gain from the situation in which a ‘surplus’ arises. In addition, De Man mentions that a combined moment of ‘surplus’ appropriation is not applicable at any time. In short, De Man prefers option 2 ‘after each single project’.		

Table 7.7: Validation of the preliminary findings by Professor De Man (3)

Key elements	Option 1	Option 2	Option 3
(3) Type of pooling	Cost pooling	Revenue pooling	Profit pooling
	De Man mentions that the question is what the boundaries of the project are and whether or not the total life-cycle costs are taken into consideration (e.g. costs of exploitation phase). De Man describes that the parties will always have a discussion about what the degree of pooling is and what the margins of a party on a project should be. In a vertical collaboration, it is hard to apply cost or revenue pooling since the costs of one party are the revenues of the other. De Man mentions that option 1 and 2 are not applicable for this reason. De Man argues that profits can be pooled in a vertical collaboration. The main issue of designing a value appropriation model is to determine to which extent profits are pooled.		
(4) Profit margins	Incorporated (individual profit margins)	Shared (profits parked 'at risk')	Joint (no individual profit margins)
	De Man believes that the parties must have some kind system in which a common profit is applied. However, De Man argues that this common profit often involves individual thresholds for particular parties. De Man believes that a shared profit is a good idea if it applied in combination with some commitment caps for individual parties. Furthermore, De Man argues that a joint risk model is only applicable if thresholds are put in place.		
(5) Sharing ratio	Rule of thumb (equity or equality sharing)	Customized (combination rules of thumb)	Cooperative game theories
	De Man argues that option 2 is a 'collection tray' and therefore the most biased one. De Man mentions that a rule of thumb is the easiest method but is often not desirable. De Man believes that cooperative game theories are not really applicable in practice.		
(6) Risks and contingencies	Separate (individual, traditional)	Shared (assigned, 'three-type' risk)	Joint (responsibility for all risks)
	De Man argues that the risks and contingencies are maybe the most difficult elements of a sharing arrangement. De Man mentions that a separate risk model leads - by nature - to opportunistic behavior in which parties try to shift risks to the other party. On the other hand, De Man mentions that parties are not encouraged to deal properly with risks if a joint risks model is applied since all risks are the responsibility of all parties. This type of opportunistic behavior must be merely seen as laziness and thus differs from option 1. De Man believes that parties will lose their attention to act adequately towards risks. De Man therefore concludes that the best option is to apply a shared risk model. De Man believes that a certain extent of individual risks demands for an individual responsible behavior. De Man mentions that in either case the parties must put a system into operation in which all risks identified. Subsequently, some risks can then be borne by a particular party and other risks can then be shared between the parties.		
(7) Value assessment	Singular (only financial)	Singular (only non-financial)	Plural (both financial & non-financial)
	De Man argues that value is created on both financial and non-financial items. De Man therefore believes that a plural value assessment is most appropriate.		
(8) Reimbursement type	Fixed price	Prime cost	Target cost
	De Man mentions that it is difficult to validate this chosen option. De Man argues that a target cost contract is most desirable since it creates more awareness in each other's costs. However, a lot of cost elements will be fixed price (e.g. prices of commodities). These fixed price cost items can be corrected by e.g. market conditions etc. (more prime cost). In short, De Man argues that the reimbursement type is always a combination of these three options.		

Table 7.8: Validation of the preliminary findings by Professor De Man (4)

Key elements	Option 1	Option 2	Option 3
(9) Pay-out mechanism	Pay-out not linked to non-financial performance targets	Pay-out partially linked to non-financial performance targets	Pay-out fully linked to non-financial performance targets
	De Man argues that the pay-out must be linked to common goals. De Man mentions that the parties are traditional focused on financial goals. However, De Man believes that the management of achieving non-financial goals is indirectly linked to obtaining financial goals since parties put effort in finding smart solutions. As a result, a better product can be realized for the same price or the same product can be realized for a lower price. In short, De Man argues that the 'surplus' pay out should be fully linked to non-financial performance targets.		
(10) Commitments	Capped profit (maximum gain)	Capped liability (maximum loss)	Capped commitment range (boundaries, maximum profit and liability)
	De Man mentions that the desired degree of commitment caps is very project (collaboration) specific. A maximum gain could be applicable if a party has a stake in the development process or exploitation phase. De Man argues that a capped commitment for downside risks is probably more applicable for the construction industry (maximum loss). For that reason, a capped liability could be applied if considered needed. De Man mentions that a capped profit is not really applicable within the construction since profits will never go sky high, especially if we compare it with innovation projects. A capped commitment range for certain parties seems therefore also not particularly necessary. In short, De Man argues that only option 2 'capped liability' is useful.		
(11) Additional incentives	Positive	Negative	No
	De Man argues that the application of positive additional incentive payments could be desirable if they are linked to particular goals. De Man believes that the construction industry can increase e.g. safety measures by the application of additional incentives. However, De Man believes that most important is that the total sharing arrangement is positive, meaning a well-balanced. De Man believes that negative incentives are not desirable from psychological reasons. De Man believes that penalties/punishments negatively impact a collaboration. Positive incentives payments are believed to be better than negative incentives.		

Table 7.9: Validation of the preliminary findings by Professor De Man (5)

De Man mentions that the construction industry is characterized by the application of standardized forms of collaborations for each new project. Moreover, De Man noticed that a new form of collaboration is hardly established within this conservative sector. De Man mentions the importance of noticing that each collaboration is somehow unique and that for each specific collaboration different agreements must be made.

The validations of De Man concern his main view on all types of collaborations. However, De Man argues that there is not one solution/configuration (one set of options) for all collaborations. De Man concludes that the configuration of options for a particular collaboration is very dependent on the preferences, values and competences of the parties involved. De Man believes that it is way more important to look at the bigger picture of the collaboration. Again, De Man believes that a collaboration must not be seen as a physical world and can for that reason also not contain a physical set of characteristics.

In fact, he argues that the configuration of options must be customized for each particular collaboration. Moreover, De Man mentions that this research provides a checklist of elements that must be customized for each collaboration. The main advantages of applying such a checklist is that all mentioned elements are then discussed between the parties. De Man mentions that it could be nice to draft three different types (pioneer, medium, mature). Subsequently, a different value appropriation model can be configured for each type of collaboration.

In short, De Man concludes that not the configuration (set of options) is decisive, but the overall picture of elements is decisive. The fact that parties consider the mentioned options already adds value to the collaboration. De Man argues that a constructive discussion about these elements is most crucial to ensure prolonged success.

Validations of Mr. Jansen

The validations of Mr. Jansen are listed in tables 7.10, 7.11, 7.12 and 7.13.




Contributors	Option 1	Option 2	Option 3
(A) Accounting approach	Closed-book	Partial open-book	Full open-book
	Jansen argues that - by looking at the logistics industry - a full-open book accounting approach is often considered as the most optimal situation to foster transparency. Nevertheless, parties only want to share information that actually matter to others. In other words, a full-open book approach rather turns out to be partial open-book in practice. Some sort of information sharing concerned with costs is needed, but a full open-book accounting approach is likely to require a major cultural shift. This is substantiated with the fact that parties do not necessarily need (or want to provide) full transparency, but only want to provide the transparency needed and not more (sharing of ('as-needed' information)).		
(B) Benchmarking	Traditional cost indicators	Market cost indicators	Base cost estimate
	Cost indicators corrected on market conditions is a minimum requirement. Obtaining a more ambitious common goal idea since it is the 'hope variant' that is best for all parties. However, it is considered difficult to jointly determine what the cost price of a product or service is. Ambitious is good if it complies with the alignment of goals and when it is still considered as a realistic cost price. Besides, continuous improvement is made 'palpable' (in Dutch: 'tastbaar') by setting more ambitious (financial) goals.		
(C) Independent advice	Cost advisor	Mediator	Accountant
	The question whether or not to involve an independent adviser mainly concerns the negotiation of pricing concerns. Within a vertical collaboration, the problem for arriving at the 'correct' price - that is profitable for both parties - will never change. A second opinion could indeed help the parties by making an agreement about the common financial goal if the parties are not able to find an agreement themselves. Meaning that the possibility to call in a cost advisor - for an additional price estimate - must always be ensured. Mr. Jansen argues that the parties are already too late to solve the debate if a mediator is needed.		

Table 7.10: Validation of the preliminary findings by Mr. Jansen (1)



Key elements	Option 1	Option 2	Option 3
(1) Number of parties	Bilateral	Multilateral (strategic)	Multilateral (large group)
	The number of parties to involve in the sharing arrangement is dependent on the type of collaboration. If it concerns a collaboration between a client and a contractor, it definitely results in a bilateral shareholder structure. Both a small and large group of parties can be undesirable for various reasons. Nevertheless, it could be difficult to determine which parties are defined as being 'strategic'. Mr. Jansen mentions that the choice for a multilateral (strategic) shareholder structure can be labeled as the 'centrally bias decision'.		
(2) Moment of 'surplus' appropriation	After a series of projects	After each single project	Combined (part of the gain reinvested)
	A combined moment of 'surplus' appropriation is probably most stable for the collaboration for two reasons. First, settlements must be made during the execution of the project, meaning that a party sends his invoices after each delivered item or phase. Cash is needed for a party to finance an operation and a party is not cheerful about too much pre-financing. So the execution (operation) must lead to a certain amount of settlements in order to generate a desirable cash flow. The 'surplus' that arises due to a better collaboration can indeed be re-invested.		

Table 7.11: Validation of the preliminary findings by Mr. Jansen (2)

Key elements	Option 1	Option 2	Option 3
(3) Type of pooling 	Cost pooling	Revenue pooling	Profit pooling
	Mr. Jansen defines ‘pooling’ as the settlement of collective consumption, meaning to charge each other for using each other’s resources. Mr. Jansen refers to the costs of ‘teaming’ and ‘pooling’ as the possible resources that can be pooled within a construction project (‘cost pooling’). Mr. Jansen refers to the ‘pay-per-use principle’ of pooling (paying for the resources used). Mr. Jansen openly argues how pooling can be applied in the construction industry.		
(4) Profit margins 	Incorporated (individual profit margins)	Shared (profits parked ‘at risk’)	Joint (no individual profit margins)
	Mr. Jansen argues that often a ‘bullwhip effect’ (stacking of buffers) arises if individual profit margins are incorporated. Applying a shared profit account seems nice since the financial interweaving (‘Lock-in’) of parties is good for the collaboration and associated involvement. A joint feeling for profits is the way for establishing a collaboration, at the same time it is rather challenging in practice.		
(5) Sharing ratio 	Rule of thumb (equity or equality sharing)	Customized (combination rules of thumb)	Cooperative game theories
	Mr. Jansen argues that one general rule of thumb never fits in all situations. Very important, the sharing ratio must be in line with the reward-contribution ratio. A construction project is characterized by its integrated set up. Splitting it up in more manageable components/phase - that all apply a different sharing ratio - could be desirable. The surplus can then be calculated for each element/phase. A more hybrid model seems therefore more appropriate.		
(6) Risks and contingencies 	Separate (individual, traditional)	Shared (assigned, ‘three-type’ risk)	Joint (responsibility for all risks)
	Mr. Jansen argues that the amount of risks reflects the complexity of a collaboration. The individual contingency budgets will become larger if the collaboration is observed higher. Nevertheless, a collaboration is - by nature - characterized by risk sharing. However, it is about the question which risks are borne by which party, knowing that a 100% risk for a certain party will not be accepted. So part of the risks must be shared due to the “we are all in too together” principle, while there are always individual risks for a particular party. A shared risk model is a difficult process since it is hard to exactly determine which risks must be shared and which not. Nevertheless, a full joint risk model is surreal (‘pipe dream’).		
(7) Value assessment 	Singular (only financial)	Singular (only non-financial)	Plural (both financial & non-financial)
	Parties are always acting towards achieving predefined goals, especially when these parties are reviewed on obtaining these goals. For that reason, both financial and non-financial goals must be taken into consideration by executing a value assessment.		
(8) Reimbursement type 	Fixed price	Prime cost	Target cost
	Mr. Jansen notices that the given options are contracts which are drafted ex-ante, instead of an ex post reimbursement. Some kind of ‘ex-ante value assessment’ is a good idea for the collaboration. A target-cost can be seen as an ex-ante value assessment and therefore seems most appropriate for a long-term relationship. The joint established of the target cost create more awareness in each other’s costs and will therefore lead to a greater of fairness.		

Table 7.12: Validation of the preliminary findings by Mr. Jansen (3)




Key elements	Option 1	Option 2	Option 3
(9) Pay-out mechanism 	Pay-out not linked to non-financial performance targets	Pay-out partially linked to non-financial performance targets	Pay-out fully linked to non-financial performance targets
	The actions of a party are always related to the reward a party gets for a certain action. A party is thus rewarded for the product/service he delivers, which probably works well in the construction industry. A performance based compensation seems thereby appropriate. This can be substantiated with the 'bonus-penalty' argument. The penalty is that often a party can only go from a 100% to an 80% bonus in case of a lower performance. At the same time, a party should also go from a 100% to 120% bonus in case of a performance score of 120%. However, how can the financial 'surplus' be determined? As a matter of fact, it is considered difficult to substantiate the 'surplus' that arises within a vertical collaboration. Subsequently, the question remains if this 'surplus' must be the benefit for all parties? This is a normative question. In practice, the surplus on one element is often directly already issued to cover additional cost on another element.		
(10) Commitments 	Capped profit (maximum gain)	Capped liability (maximum loss)	Capped commitment range (boundaries, maximum profit and liability)
	The philosophy of a collaboration is 'sharing' which also means that a party stand surety for another party ('sharing is caring'). Caps and thresholds are often incorporated in contracts. The application of commitments is depended on how is dealt with risks, since some parties don't want to have a too big stake in a possible major loss.		
(11) Additional incentives 	Positive	Negative	No
	An incentive can be applied if the chain feels a need to emphasize/stimulate one particular performance goal. One of the requirements for applying an additional incentive payment is that this particular goal don't gets an unreasonable level of attention in relation to the other goals. The main trade-off is whether or not a certain incentive indeed leads to a better collaboration. Some incentives could be good for the collaboration if it indeed leads to the desired effect.		

Table 7.13: Validation of the preliminary findings by Mr. Jansen (4)

Jansen concludes that a collaboration - especially an inter-firm collaboration - is (by nature) complex. This research provides in his opinion a clear overview of the most important elements (plus associated options) of a collaboration. Besides, Jansen mentions that the research shows that a lot of different configurations are possible.

Jansen argues that the research is successful if the researcher can substantiate that - by applying a case study and an expert panel - the selected options are somehow correct. Jansen mentions that the goal of the preliminary findings is to provide a normative outcome. However, Mr. Jansen argues that the selection of one set options is hardly impossible, since each collaboration differs from another collaboration.

Jansen continuous that is it better to provide the recipe of a cake, without mentioning the amount of ingredients. In his opinion, the researcher has defined a lot different elements and options in correct manner. In short, Jansen concludes that it is most important to only provide a list of elements of the value appropriation model ('keep it stupid simple').

7.3 Finalization of the validation process

At least two out of three expert panel members must have validated a certain option in order to validate that certain option. Of course, the arguments of those two members must than indeed be more sufficient than the arguments of the one member that rejected that certain option. The general view of the expert panel is thus decisive in the validation of each selected option in order to draw the conclusions. The main results of the validation phase this research are listed in tables 7.14 and 7.15.

Contributors	Finding	Van der Veen	De Man	Jansen	Validated
(A) Accounting approach	Partial open-book	✓	✓	✓	Yes
(B) Benchmarking	Base cost estimate	✓	—	✓	Yes
(C) Independent advice	Cost advisor	✗	—	✓	No

Table 7.14: Overview expert validations (1)

Key elements	Finding	Van der Veen	De Man	Jansen	Validated
(1) Number of parties	Multilateral (strategic)	✓	✓	—	Yes
(2) Moment of 'surplus' appropriation	Combined (part of the gain reinvested)	✓	✗	✓	Yes
(3) Type of pooling	Profit pooling	✓	✓	—	Yes
(4) Profit margins	Shared (profits parked 'at risk')	✓	✓	✓	Yes
(5) Sharing ratio	Customized (combination rules of thumb)	✓	✓	✓	Yes
(6) Risks and contingencies	Shared (assigned, 'three-type' risk)	✓	✓	✓	Yes
(7) Value assessment	Plural (both financial & non-financial)	✓	✓	✓	Yes
(8) Reimbursement type	Target cost	✓	—	✓	Yes
(9) Pay-out mechanism	Pay-out fully linked to non-financial performance targets	✓	✓	✓	Yes
(10) Commitments	Capped liability (maximum loss)	✓	✓	✓	Yes
(11) Additional incentives	Positive	✗	✓	—	No

Table 7.15: Overview expert validations (2)

Chapter 8. Conclusions, Discussion and Recommendations

This chapter covers the conclusion, discussion and recommendations of this research. This chapter elaborates on the interpretation of the research results in the light of the research area. First of all, the conclusion of this research provides the final findings of the value appropriation model (fifth generalized version), as can be read in paragraph 8.2. A broader interpretation of the conclusion is given in paragraph 8.3; the reflections. In fact, an answer is given about whether or not the final findings indeed solve the posed problem. Subsequently, the associated recommendations of this research are mentioned in paragraph 8.4. Finally, the directions for the future are listed in paragraph 8.5.

Paragraph overview:

- 8.1 Introduction
- 8.2 Conclusions
- 8.3 Reflections
- 8.4 Recommendations
- 8.5 Directions for the future

8.1 Introduction

The set of parties that execute construction projects in supply chain collaboration can use the value appropriation model presented in this research in their daily operations. This model followed from the findings from literature, relevant experiences from practice and sufficient validations experts.

8.2 Conclusion

The main conclusion of this research provides the answer to the central research question (paragraph 1.7).

Central research question: How should the value appropriation model for construction projects executed in supply chain collaboration function?

The value appropriation model is a tool that helps the parties to strengthen the collaboration by ensuring the appropriation of value to complete satisfaction of all of participants. The parties must understand that there are many aspects involved in the application of a value appropriation model for which agreements must be made on both the collaboration and project specific level. These aspects are discussed in the three sub questions of this research. As a matter of fact, the answers to these three sub questions provide the final findings of the value appropriation model; the fifth and final generalized version (figure 8.1).

Final Findings
of the
Value Appropriation
Model

5

Fifth generalized version of the value appropriation model

Sub question 1: In what context functions the value appropriation model?

In conclusion, the context in which the value appropriation model functions is supply chain collaboration. Compliance with all pillars of supply chain collaboration is thus crucial (paragraph 3.2). The recognition of a 'project specific context' (next to a 'collaboration context') is essential due to the fact that value is always derived from the execution projects.

Notably, previous research showed that a sharing arrangement plays a significant role in motivating a party to act more in the common interest. Although, a sharing arrangement could also negatively impact the organizational relationships when interpreted unfair. In other words, the chance that a party starts showing 'opportunistic behavior' increases if that party believes that he makes asymmetric contributions in relation to the compensation he receives (effort-reward ratio). A transformation from both a (1) 'non-cooperative' towards 'cooperative' behavior, and a (2) 'risk averse' towards 'risk neutral' behavior of all participants is crucial for the proper functioning of the value appropriation model.

Sub question 2: How does the value mechanism of the value appropriation model function?

In conclusion, 'value' is in this research defined as the extent to which the common goals of the collaboration are achieved. It is very important that the parties find consensus on the common goals of the collaboration. Continuous improvement and goal alignment are essential in the establishment of these common goals. The value mechanism measures the extent to which these common goals are actually achieved. The value mechanism directly shows the discrepancy between the project specific goals and outcomes (both financial and non-financial).

However, it can be concluded that the determination of financial goals is a difficult process since it is heavily subjected to the bargaining power of the parties involved. The client is doing everything he can to reduce the budget estimates, since he wants the lowest possible price for the product he buys. On the other hand, the contractor tries to convince the client that a high price is necessary to realize the product that meets all specifications. In general, three main contributors are distinguished to help the parties in arriving at the common financial goals.

(A) 'Accounting approach': The **partial open-book** accounting approach is the most suitable way to exchange only relevant cost information.

(B) 'Benchmarking': The aim of supply chain collaboration is to perform better than has been consistently achieved by individual parties working in a traditional manner. In other words, the essence is to perform better than the competing chains within the market ('beat the benchmark'). A **base cost estimate** in which an ambitious financial goal is established, corrected on market conditions, has the best fit. However, it is considered very difficult to jointly determine a cost price that is both

Fifth generalized version of the value appropriation model

ambitious and still realistic. In order to stimulate continuous improvement, the ambition must be set higher on each subsequent project.

(C) 'Independent advice': There is still discussion about whether or not the advice of an independent third party is needed. It can be concluded that this necessity largely depends on the preferences and capabilities of the parties involved.

Sub question 3: How does the appropriation mechanism of the value appropriation model function?

In conclusion, the appropriation mechanism facilitates the pay-out to the collaborating parties. In other words, the appropriation mechanism ensures that all parties are paid out to their respective effort in the value creation process. Making certain agreements on both the collaboration level and the project specific level is hereby crucial.

(1) 'Number of parties': A **multilateral shareholder structure** in which only the **strategic party's** hold a share in the value appropriation model is needed.

(2) 'Moment of 'surplus' appropriation': The construction industry is characterized by the fact that the performance of the chain is measured on each project. For that reason, the moment of 'surplus' appropriation is set after each project whereby only part of gain is to be distributed between the parties. The other part is to be reinvested to improve the collaboration. In short, a **combined moment of 'surplus' appropriation** is most suitable.

(3) 'Type of pooling': Both costs and revenues are shared between the parties that hold a share in the value appropriation model. Therefore, **profit pooling** is most appropriate for the construction industry.

(4) 'Profit margins': A **shared profit** is crucial for a value appropriation model. A shared profit model in which the profit margins of the individual parties are (partly) 'parked' (in a shared account) and put 'at risk' is thereby most appropriate. These individual profit margins are then used as some kind of leverage to cover shared risks. By applying a 'parking' system, it becomes intuitively more attractive to perform better because the individual 'parked profit amount' increases similarly to the individual turnover (if the individual profit margin is linked to the turnover). If the chain is successful, the overall savings can be deposited in the shared account, thereby increasing the 'surplus' amount. If the chain is not successful, the additional costs can be subtracted from the shared account, thereby decreasing the 'surplus' amount.

(5) 'Sharing ratio': It is considered very important that the sharing ratio is perceived as 'acceptable' by all participants (effort-reward ratio). A **customized** way to determine the sharing ratio is thereby most appropriate, meaning that several rules of thumb methods (e.g. equity and equality sharing) are combined to ensure a ratio that fits the collaboration best. A construction project is characterized by its integrated set up. Splitting the project in more manageable components/phases - in which a different sharing ratio is applied for each component/phase - could be desirable. A more hybrid model is therefore more appropriate in some occasions. In that case, the 'surplus' amount can be calculated for each component/phase.

(6) 'Risks and contingencies': It can be concluded that the issue of dealing with risks and contingencies is one of the most difficult elements of the value appropriation model. Again, it can be concluded that construction entities are traditionally keen on assigning risks to specific parties (who are paid a certain amount for taking a risk), whereas there is much more shared risk taking in supply chain collaboration. In other words, supply chain collaboration is all about risk sharing ('we-are-all-in-it-together' principle) in which entities help each other in mitigating these shared risks. A **shared risk** model is therefore most appropriate in which part of the risks are shared between the parties and part of the risks are borne by the individual parties. In order to be able to deal with these shared risks, a shared contingency budget can be applied, while individual contingency budgets can still be applied to deal with the individual risks. The main conclusion is that the incentive to collaborate increases if a larger amount of risks is shared, despite the fact that a shared risk model will not completely prevent parties from shifting risks away. In other words, the trick is to ensure that a large number of risks are shared. The general rule is that a risk can be labeled as a 'shared risk' if more than one party has a significant influence on that risk. The consequence of applying a shared risk model is that parties work more together to ensure that all risks are addressed in the right way. A better common understanding of the risks involved in the collaboration is thus absolutely crucial.

(7) 'Value assessment': It can be concluded that value is created on both financial and non-financial items. Actually, financial and non-financial items are two 'communicating elements' which cannot be assessed separately from each other. In conclusion, parties are always acting towards the achievement of predefined goals if they are indeed reviewed on obtaining these goals. In this respect, a value assessment that covers both financial and non-financial items is most appropriate. In short, a **plural value assessment** ensures that the common performance of the collaboration is truly assessed.

Fifth generalized version of the value appropriation model

(8) 'Reimbursement type': The ex-post reimbursement ensures that all made cost are refunded properly. The ex-ante establishment of a common 'target cost estimate' is considered very valuable to create more awareness of each other's business. A **target cost** is an ex-ante financial value assessment of the project. In other words, it is the estimated capital expenditure needed to deliver the project. It can be concluded that it is most appropriate to obtain a fixed cost price for a cost item of which the associated risk of that cost item is fully borne by an individual party. Subsequently, it is most appropriate to obtain a prime based cost price for a cost item of which the associated risk is shared between the parties. This means that all acceptable and reasonable direct and indirect costs of a party related to a cost item with a shared risk, are then fully reimbursed by the client.

(9) 'Pay-out mechanism': It can be concluded that a client wants the highest possible level of quality for the amount he deems appropriate. At the same time, a party acts towards the reward that that party gets for their action. As a matter of fact, the parties put effort in finding smart solutions if a performance based compensation is applied. As a result of this effort, the product can be realized at a lower price, or a better product can be realized against a similar price. It can be concluded that this effort is incentivized by **linking the 'surplus' pay-out fully to non-financial performance outcomes**.

(10) 'Commitments': One of the findings is that a collaboration is not successful if parties are forced to take an unbearable amount of risk. Moreover, forcing parties to take great risks results in a situation in which parties do not want to participate in the value appropriation model. The philosophy of supply chain collaboration is about 'sharing', which also means that all parties stand surety for each other ('sharing is caring'). A **capped liability (maximum loss)** is desirable if a party is not able to take a major loss. In other words, a capped liability for downside risks could be desirable for some parties. As a matter of fact, the desired degree of commitment caps is very specific for each collaboration. Yet, the application of caps and thresholds are depended on how is dealt with risks and contingencies.

(11) 'Additional incentives': Some discussion exists about whether additional incentive payments are a good idea. In general, supply chain collaboration is all about the alignment of common interest. In that respect, individual parties should not be awarded separately with additional incentive payments for obtaining certain performance targets. An additional incentive payment can be applied if the collaborating parties have to believe that one particular performance item needs to be stimulated (e.g. safety measures). One of the requirements is that this particular item does not get unreasonable much attention with respect to other items. The main trade-off is whether or not a certain incentive payment indeed leads to a better performance. In this respect, positive incentive payments are believed to be better than negative incentive payments due to psychological reasons. In other words, the application of additional incentives is only a good idea if it indeed leads to a better performance (desired effect). Most important is that the value appropriation model functions as a positive and well-balanced incentive mechanism in total, in which the common interest is followed at all times.

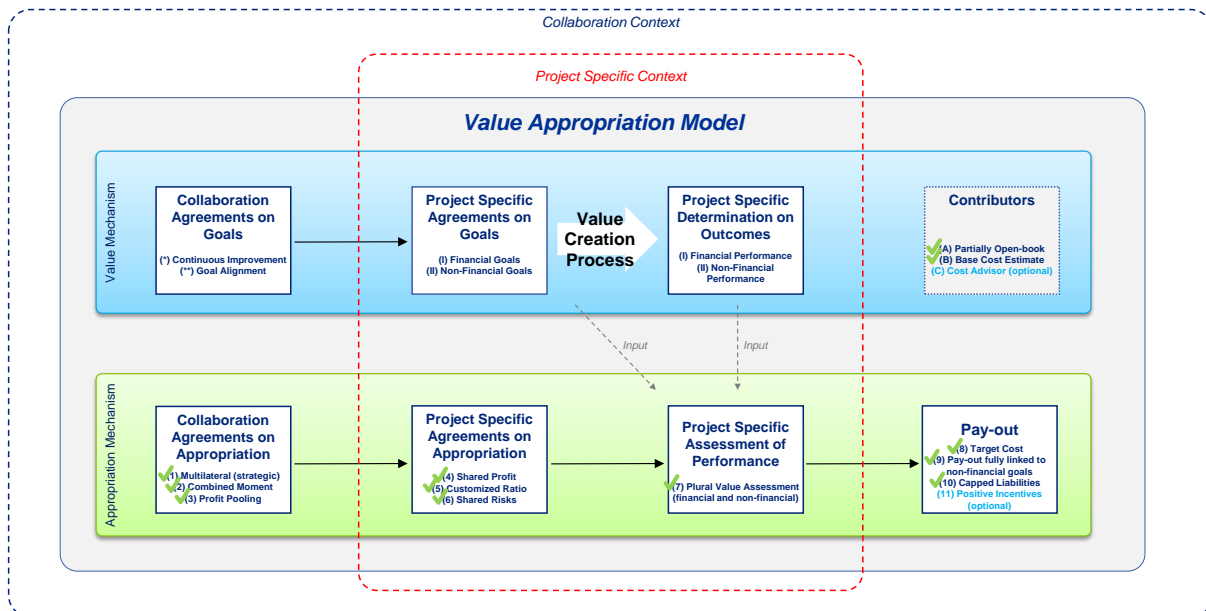


Figure 8.1: Final findings of the value appropriation model (fifth generalized version)

8.3 Reflections

The research problem stated that the parties involved in a strategic collaboration - active in the (Dutch) construction industry - have difficulties with the development of a clear and solid model in which value appropriation is ensured in a reliable, practical and manageable manner. Thus, the parties that execute construction projects in supply chain collaboration find it difficult to share risks, revenues and costs to complete satisfaction of all of participants (paragraph 1.2).

In general, the main thought is that supply chain collaboration is most successful if the interests of all parties are aligned. However, the main concern is that a goal alignment of 100% is hardly possible since supply chain collaboration in the construction industry is characterized by several vertical relationships. Contradicting interests and perverse incentives can therefore never be completely eliminated. The essence of this research is to ensure that the value appropriation model reduces these contradicting interests to a maximum extent.

This research provides a clear insight in the relevant matters that need to be taken into consideration if parties want to execute their construction projects in supply chain collaboration. Moreover, the value appropriation model presented in this research is the first model that combines all relevant matters in a single model.

This research emphasizes the fact that it is essential to discuss these matters in an open and transparent manner in order to reduce the traditional existing frictions between the parties. Actually - irrelevant of the chosen configuration of options - the reduction of frictions is the most important driver of a strategic collaboration. The establishment of a greater common interest and a substantial amount of shared risks contributes well to this process. The reduction of frictions leads to a reduction of traditional buffers, higher product quality, and a more pleasant collaboration.

Constraints of the research

The constraints of the research mainly derived from the already set limitations of the research (paragraph 2.4). For that reason, the constraints are described by the same items.

'Target group': This research has mainly focused on the predefined target group (paragraph 1.6). Choosing this focus can be substantiated by the fact that the demand for this research directly derived from this particular target group.

'Main assumption': The research assumes that the value appropriation model consists of two mechanism - a value mechanism and an appropriation mechanism - and functions within a context. However, it is highly questionable whether this assumption reflects the value appropriation model in a correct manner. Nevertheless, this assumption is of an indicative nature and was considered necessary to provide more structure to the research.

'Additional values': Value has been defined in this research as the extent to which the common goals of the collaboration are met. However, a lot more types of value can be distinguished that are not taken into consideration within this research. These 'additional values' are e.g. reputation, continuity and differentiation. This research thereby poses quite a restriction. After all, organizations are frequently interested in starting collaboration efforts for exactly these reasons in practice. The short-term benefits are then considered as less important. The exclusion of these 'additional values' appears to be grounded to keep this research manageable.

'Options': Only three different options are given for each contributor (3) and key element (11). In fact, more than three options are likely to be possible. Actually, it is desirable to have the opportunity to select different options due to the fact that all parties have different preferences and competences, next to the fact that each collaboration faces different circumstances. Nevertheless, the choice for providing only three options is grounded since it provides a solid base for a great amount of configurations. Still 2.744 different configurations seem possible (14^3). However, it must be kept in mind that actually less configurations are possible since most options are interwoven. As a matter of fact, all options are directly or indirectly linked to each other.

'Case studies': This research analyzed only a limited number of cases (two residential and one infra). A major constraint of this research is therefore that general observations are constructed from only a limited number of practical situations.

'Expert validation': The expert panel consisted of three members. This means that only a limited number of validations are executed. It would have been better to execute the validation stage by more experts.

'Scope': This research solely focused on one particular pillar of supply chain collaboration, while it is known that all pillars are interrelated and must function together to ensure maximum success (paragraph 1.2). Besides, the research did not include an in-depth analysis on issues like 'legal compliance', 'common feeling of trust and commitment', 'game theories', 'financial details', 'risk management' and 'value' related to the value appropriation model (paragraph 1.10).

Contributions to theory

The theoretical framework (paragraph 5.9) can be regarded as the main contribution to the theory. In addition, further research is needed to test and expand the concepts within this framework (paragraph 8.5). Nevertheless, the theoretical contribution must be interpreted as a proposed adaption of several existing theories, rather than the development of a new theory. These existing theories mainly refer to the theory concerned with supply chain collaboration on one hand and the theory concerned with value appropriation in collaborations on the other.

The theoretical expansion (combination of existing theories) provides the main elements, contributors and key elements of the value appropriation model. This expansion suggest an innovative inter-organizational value appropriation model - a coordination of processes and relations across corporate boundaries - in which frictions are reduced by a better alignment of goals, interests and operations.

Contributions to practice

The findings from practice (chapter 6) must be regarded as an aggregation of issues that mainly indicate the problematics and complexity of supply chain collaboration. Nevertheless, the conclusion of this research provides a solution space for the parties that execute construction projects in supply chain collaboration. Nevertheless, each collaboration is different and demands for a customized configuration of options.

8.4 Recommendations

The research recommends how that the participants should jointly establish goals, determine costs estimates, share risks, deal with contingency budgets, reimburse costs correctly, get awarded appropriately and determine the maximum loss of each participant.

The parties should apply a multilateral shareholder structure in which only the strategic parties participate in the value appropriation model. Value must be defined as the extent to which the common goals of the collaboration are achieved on both financial and non-financial items. It is essential that the participants try to ensure that the collaboration goals, individual goals and project-specific goal are aligned. As usual in the construction industry, value is created on the individual projects. The value assessment of the value appropriation model must therefore identify the discrepancy between the agreements on common project-specific goals and the project-specific determination on outcomes on both financial and non-financial items.

The financial goal can defined on different levels (e.g. 'establishment sum' and 'execution sum') and should be set higher (more ambitious) for each subsequent project (in order to stimulate continuous improvement). In addition, the parties should create awareness in each other's business and only exchange relevant cost information and determine - on the basis of their preferences and capabilities - whether or not the advice of an independent third party is needed. Besides, a common benchmarking method seems handfull to establish an ambitious financial goal that is both realistic and complies with current market conditions.

The parties must work together to ensure that all risks are addressed in the right way. Again, supply chain collaboration is about risk sharing ('we-are-all-in-it-together' principle). The parties must therefore determine which risks are borne collectively and which are borne individually. In the former a shared contingency budget is applied and in the latter several individual contingency budgets are applied. The research states that the incentive to collaborate is more appealing if a substantial part of the risks are borne collectively. The parties should therefore try to ensure that a large number of risks are borne collectively. The general rule is that a risk should be labeled as a 'shared risk' when more than one participant has a significant influence on that risk. In this way the individual contingency budgets are kept minimal. Additionally, the parties should apply a shared contingency budget to deal with the shared risks, while individual contingency budgets can be applied to deal with the individual risks. In addition, the parties should 'park' their individual profits and use it as a leverage for the shared contingency budget. The leveraged shared contingency budget then basically functions as some kind of risk-reward budget. The belief is that the total amount reserved for the contingency budgets (and additional buffers) will decrease as the collaboration matures.

The financial outcome is the total cost of a project. The participants must be reimbursed for all reasonable and acceptable direct project costs. The difference between financial goal and the financial outcome must then be added to the remainder of the leveraged shared contingency budget. This results in the 'surplus', which can either be positive or negative.

The non-financial outcome should be expressed by an average performance score. It is known that parties act more towards the achievement of predefined common goals if their pay-out is somehow linked hereto. The parties must therefore make the common performance score decisive in the determination of which part of the 'surplus' is paid out amongst the participants and which part is reinvested in the collaboration.

The parties must apply a hybrid system for determining the sharing ratio of the 'surplus' pay out. Several rules of thumb methods (e.g. equity and equality sharing) can be combined in order to ensure a sharing ratio that fits the collaboration best. The parties should try to ensure that the sharing ratio is perceived as 'acceptable' by all participants (effort-reward ratio).

The parties should apply a capped liability (maximum loss) if a party is not able to bear a possible major loss. Besides, additional incentive payments can be applied if it leads to a better performance (desired effect).

Most important is that the value appropriation model functions (in total) as a positive and well-balanced incentive mechanism. The parties can hereby ensure that the common interest is followed, costs are reimbursed correctly, risks are borne properly, and parties are awarded appropriately for their effort in the value creation process.

8.5 Directions for the future

The research provides a temporary result in a continuum of research efforts. Moreover, many directions can be mentioned to improve the final generalized version of the value appropriation model. Here the focus lies on the limitations (paragraph 2.4) and constraints (paragraph 8.3) of the research mentioned earlier. Based this, further research could be conducted to further theoretical development and practical applicability of the value appropriation model.

'Target group': It could be interesting to investigate the application of this model on different types of collaborations.

'Main assumption': The main assumption of this research provided the structure of the generalized version of the value appropriation model (paragraph 1.5). Nevertheless, the assumption that the value appropriation model consists of two mechanisms and functions within a context, must be further examined. Specifically, a more extensive validity of the model and associated internal relationships must be executed to strengthen the derived findings.

'Additional values': How the 'additional values' - that derive from the strategic collaboration - can be taken into consideration is for further research as well (paragraph 1.10).

'Options': The contributors and key elements of the value appropriation model are interrelated. Even so, the options within each pillar are interrelated as well. This means that several options are so interwoven that the selection of a certain option in one pillar directly excludes another option in a different pillar. It is therefore interesting to do further research on the interrelations between all options so that the total process of configuration becomes clearer.

'Case studies': The relation between the possible different configurations of options and the subsequent outcomes is very interesting. Further research is therefore desirable to map the relation between different configurations of options and the level of acceptance by its participants. Empirical research and sufficient data is then needed to analyze a large number of configurations.

'Expert validation': Two selected options of the preliminary findings were rejected (not validated) by the members of the expert panel ('independent advice' and 'additional incentives'). Further research is thus needed to investigate if and under which circumstances the advice of an independent third party is desirable. In addition, the question whether or not the application of additional incentive payments are desirable demands for further research as well.

'Line of reasoning': Empirical evidence is needed to confirm (or disconfirm) the benefits of applying the value appropriation model that emerged from this research. As a matter of fact, if - and to which extent - the final value appropriation model indeed leads to a better collaboration (paragraph 1.3) must be determined by analyzing the performance on a larger number of real life cases as well.

'Scope': Additional theoretical domains are for further research concerns, e.g. legal, financial, behavioral and risk (paragraph 1.10). In other words, how the sharing arrangement should be formed in a legal framework is for further research. In addition, research about the in-depth financial field is needed since the elaboration of the model is kept very simple. In addition, this research states that dealing properly with shared risks is a crucial element of the value appropriation model. The total package of risk management activities (e.g. how to mitigate risks and the associated frictions) must therefore be further analyzed to support this research.

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Appendix B: Questionnaire

Casestudie naar de toepassingen van een waardeverdeelmiddel bij bouwprojecten die worden uitgevoerd in ketensamenwerking (door Tim de Gussem)

De manier waarop het samenwerkingsverband is omgegaan met de **verdeling van waarde** staat centraal in dit onderzoek. Inzicht is gewenst op gebied van 'waarde bepaling' en het 'mechanisme van verdelen' (zowel financieel gerelateerd als niet financieel gerelateerd). Zowel de formele 'harde' aspecten ('**Hoe werkt het?**' en '**Welke afspraken zijn gemaakt?**') als de informele 'zachte' aspecten ('**Hoe heeft u het ervaren?**') zijn per onderdeel van belang. Tevens is de rolverdeling van de verschillende partijen (taken en verantwoordelijkheden) moeten per onderdeel interessant. Tevens is het goed om een beeld te krijgen bij de geconstateerde problemen en verbetermogelijkheden. De volgende agendapunten/vragen kunt u het komende uur verwachten:

- U wordt kort toegelicht over het onderzoek. De opgedane kennis (ervaringen) wordt anoniem verwerkt.

Algemeen

- Wat kunt u zeggen over wat als waarde wordt gezien binnen het samenwerkingsverband?
(Financiële en niet-financiële waarde-drijvers; prestatie-indicatoren KPI's)
- Wat kunt u zeggen over de gestelde doelen van het samenwerkingsverband?
(Samenwerkingsdoelen, project specifieke doelen, financieel en niet-financieel)
- Wat kunt u zeggen over de gemaakte afspraken van het samenwerkingsverband?
(Afspraken op samenwerkingsniveau, afspraken op project specifiek-niveau, nakomen van afspraken).

Waarde

- Wat kunt u zeggen over het proces voor het vaststellen van de minimaal te behalen waarde?
(Doelen vooraf 'target value', 'financieel target', 'niet-financieel target', wanneer gebeurd dit en wie bepaald het?)
- Wat kunt u zeggen over het proces voor het vaststellen van de daadwerkelijk behaalde waarde?
(Prestaties achteraf 'actual value', 'financiële uitkomsten', 'niet-financiële uitkomsten' wanneer gebeurd dit en wie bepaald het?)

'Contributors'

- Wat kunt u zeggen over het proces van bepalen en uitwisselen van informatie m.b.t. het gezamenlijke financiële doel?
(gesloten-boek of open-boek begrotingen, manier van prijsbepalen/benchmarken, advies van een onafhankelijke partij).

Verdelen

- Wat kunt u zeggen over de afspraken die gemaakt zijn op samenwerkingsniveau over het verdelen van waarde?
(aantal partijen, moment van verdelen, wat verdeeld wordt)
- Wat kunt u zeggen over de afspraken die gemaakt zijn op samenwerkingsniveau over het verdelen van waarde?
(winstmarges, verdelingsratio, risico's en contingenties)
- In hoeverre worden de behaalde doelen meegenomen in het verdelingsmechanisme?
(waarde-beoordeling)
- Wat kunt u zeggen over het proces voor het 'belonen' van partijen bij goede prestaties of voor het 'straffen' van partijen bij slechte prestaties?
(Compensatiestructuur, betalings-ratio's, incentive systeem, maximale garantstellingen, aparte bonussen/penalty's)

Overig

- Wat kunt u zeggen over de eventuele (externe) factoren die het functioneren van het waardeverdeelmiddel beïnvloeden?
(Impact van deze factoren)
- Wat kunt u zeggen over hoe belangrijk wederzijds vertrouwen is, en hoe dit gevoel van vertrouwen werd beïnvloed door de toepassing van het waardeverdeelmiddel?

Appendix C: ‘Succesvol Bouwen’

The following persons have been interviewed in order to analyse the ‘Succesvol Bouwen’ case:

- Ms. B. (Babette) van den Ancker (supply chain manager of the client - Havensteder)
- Mr. A. (Andre) Klouwen (supply chain manager of the contractor - Dura Vermeer)
- Ms. I. (Ilse) Brouwers (supply chain manager of the contractor - Ballast Nedam)
- Mr. D. (Dick) van Woenzel (project director of the client - Havensteder)
- Mr. R. (Rob) Lansbergen (project director of the contractor - Dura Vermeer)
- Mr. W. (Willy) Driessen (independent consultant and project accountant - WD BKA)



Contributors	Option 1	Option 2	Option 3
(A) Accounting approach	Closed-book	Partial open-book	Full open-book
(B) Benchmarking	Traditional cost indicators	Market cost indicators	Base cost estimate
(C) Independent advice	Cost advisor	Mediator	Accountant

Table X: The applied contributors of the value appropriation model of ‘Succesvol Bouwen’

Key elements	Option 1	Option 2	Option 3
(1) Number of parties	Bilateral	Multilateral (strategic)	Multilateral (large group)
(2) Moment of ‘surplus’ appropriation	After a series of projects	After each single project	Combined (part of the gain reinvested)
(3) Type of pooling	Cost pooling	Revenue pooling	Profit pooling
(4) Profit margins	Incorporated (individual profit margins)	Shared (profits parked ‘at risk’)	Joint (no individual profit margins)
(5) Sharing ratio	Rule of thumb (equity or equality sharing)	Customized (combination rules of thumb)	Cooperative game theories
(6) Risks and contingencies	Separate (individual, traditional)	Shared (assigned, ‘three-type’ risk)	Joint (responsibility for all risks)
(7) Value assessment	Singular (only financial)	Singular (only non-financial)	Plural (both financial & non-financial)
(8) Reimbursement type	Fixed price	Prime cost	Target cost
(9) Pay-out mechanism	Pay-out not linked to non-financial performance targets	Pay-out partially linked to non-financial performance targets	Pay-out fully linked to non-financial performance targets
(10) Commitments	Capped profit (maximum gain)	Capped liability (maximum loss)	Capped commitment range (boundaries, maximum profit and liability)
(11) Additional incentives	Positive	Negative	No

Table X: Table X: The applied key elements of the value appropriation model of ‘Succesvol Bouwen’

Appendix D: ‘Co Green’

The following persons have been interviewed in order to analyse the ‘Co Green’ case:

- Mr. J. (Jurgen) van de Laarschot (Eigen Haard - client / housing association)
- Mr. R. (Rob) van der Plas (Era Contour - contractor)
- Mr. E. (Edward) van Dongen (Era Contour - contractor)(formerly: KOW Concept - architect)
- Ms. C. (Cecile) van Oppen (Copper8 - consultant)(formerly: Squerewise – consultant)
- Mr. R. (Robert) van Ieperen (Fakton - consultant)
- Mr. W. Wim Weide (Fakton - consultant)



Contributors	Option 1	Option 2	Option 3
(A) Accounting approach	Closed-book	Partial open-book	Full open-book
(B) Benchmarking	Traditional cost indicators	Market cost indicators	Base cost estimate
(C) Independent advice	Cost advisor	Mediator	Accountant

Table X: The applied contributors of the value appropriation model of ‘Co Green’

Key elements	Option 1	Option 2	Option 3
(1) Number of parties	Bilateral	Multilateral (strategic)	Multilateral (large group)
(2) Moment of ‘surplus’ appropriation	After a series of projects	After each single project	Combined (part of the gain reinvested)
(3) Type of pooling	Cost pooling	Revenue pooling	Profit pooling
(4) Profit margins	Incorporated (individual profit margins)	Shared (profits parked ‘at risk’)	Joint (no individual profit margins)
(5) Sharing ratio	Rule of thumb (equity or equality sharing)	Customized (combination rules of thumb)	Cooperative game theories
(6) Risks and contingencies	Separate (individual, traditional)	Shared (assigned, ‘three-type’ risk)	Joint (responsibility for all risks)
(7) Value assessment	Singular (only financial)	Singular (only non-financial)	Plural (both financial & non-financial)
(8) Reimbursement type	Fixed price	Prime cost	Target cost
(9) Pay-out mechanism	Pay-out not linked to non-financial performance targets	Pay-out partially linked to non-financial performance targets	Pay-out fully linked to non-financial performance targets
(10) Commitments	Capped profit (maximum gain)	Capped liability (maximum loss)	Capped commitment range (boundaries, maximum profit and liability)
(11) Additional incentives	Positive	Negative	No

Table X: Table X: The applied key elements of the value appropriation model of ‘Co Green’

Appendix E: 'WALTZ'

The following persons have been interviewed:

- Mr. K. (Koen) Ingles (ProRail - client)
- Mr. H. (Henrico) Plantinga (ProRail - client)
- Mr. J. (Jan) Derks (ProRail - client)
- Mr. E. (Edwin) Slijkhuis
- Mr. C. (Cor) van Vliet (Van Hattum en Blankenvoort - contractor)



Contributors	Option 1	Option 2	Option 3
(A) Accounting approach	Closed-book	Partial open-book	Full open-book
(B) Benchmarking	Traditional cost indicators	Market cost indicators	Base cost estimate
(C) Independent advice	Cost advisor	Mediator	Accountant

Table X: The applied contributors of the value appropriation model of 'WALTZ'

Key elements	Option 1	Option 2	Option 3
(1) Number of parties	Bilateral	Multilateral (strategic)	Multilateral (large group)
(2) Moment of 'surplus' appropriation	After a series of projects	After each single project	Combined (part of the gain reinvested)
(3) Type of pooling	Cost pooling	Revenue pooling	Profit pooling
(4) Profit margins	Incorporated (individual profit margins)	Shared (profits parked 'at risk')	Joint (no individual profit margins)
(5) Sharing ratio	Rule of thumb (equity or equality sharing)	Customized (combination rules of thumb)	Cooperative game theories
(6) Risks and contingencies	Separate (individual, traditional)	Shared (assigned, 'three-type' risk)	Joint (responsibility for all risks)
(7) Value assessment	Singular (only financial)	Singular (only non-financial)	Plural (both financial & non-financial)
(8) Reimbursement type	Fixed price	Prime cost	Target cost
(9) Pay-out mechanism	Pay-out not linked to non-financial performance targets	Pay-out partially linked to non-financial performance targets	Pay-out fully linked to non-financial performance targets
(10) Commitments	Capped profit (maximum gain)	Capped liability (maximum loss)	Capped commitment range (boundaries, maximum profit and liability)
(11) Additional incentives	Positive	Negative	No

Table X: Table X: The applied key elements of the value appropriation model of 'WALTZ'

Appendix F: Numerical example

The dynamics of the value appropriation model is illustrated by a numerical (fictive) example. Three different scenarios illustrate three different configurations of options. Nevertheless, it should be kept in mind that this numerical example is based on a composition of many assumptions. As a matter of fact, this numerical example does not reflect the total complexity.

Example characteristics

Imagine, a client (housing association) wants to redevelop a deprived neighborhood in the coming ten years. The partner selection process has already been carried out. Two strategic partners have been selected, namely a (main) contractor and an engineering firm (architecture and structural design). All three parties have incorporated the principles of supply chain collaboration in their corporate strategy. The set of parties (three parties) have entered into a strategic 'project unbounded' collaboration for the duration of these ten years. A value appropriation model is put in operation to steer the collaboration. Three different scenarios are given to illustrate the consequences of the different configurations on the appropriation of value.

In the first scenario, the project specific financial goal of the client ('Establishment sum') is set at €100M for the total development works. The project specific financial goal of the contractor ('Execution sum') is set at €70M for the execution works. The costs of the engineering firm ('Design sum') are set at €5M.

In the second and third scenario, the parties agreed to establish a more ambitious financial goal. This means that the 'Establishment sum' is set at €99.5M and €99M respectively and the 'Execution sum' is set at €69.5M and €69M respectively.

This numerical example assumes that the collaboration functions inefficient in the first scenario, functions better in the second scenario, and functions best in the third scenario. As a consequence, the parties are better able to jointly mitigate risks and eliminate wastes. This means that more buffers are excluded and more risks are shared between the parties in the later scenarios. As a consequence, less budget is needed for both individual and shared contingency budgets in scenario's 2 and 3.

Different scenarios

In the first scenario, the non-financial goals are not taken into consideration in the pay-out mechanism. In scenario's 2 and 3, the non-financial goals are taken into consideration. As a matter of fact, 85% of non-financial goals were achieved in scenario 2 and 90% of non-financial goals were achieved in scenario 3.

In scenario 1, no additional savings were achieved and therefore no budget remained. In the second scenario, €10M budget remained of which €1.5M is to be reinvested in the collaboration (since only 85% of non-financial goals were achieved). The rest (€8.5M) was shared by the client and contractor (bilateral shareholder structure) by a 50-50 split (equality sharing).

In the third scenario, €14M budget remained of which €1.4M is to be reinvested in the collaboration (since only 90% of non-financial goals were achieved). The rest (€12.6M) was shared by a combined sharing ratio. This means a 50-50 split (equality sharing) between the client and contractor/engineer (bilateral shareholder structure). In addition, the contractor and engineer shared their profit amount by a 69-5 ratio (equality sharing). In short, the client receives a €6.3M profit, the contractor receives a €5.88M profit and the engineering firm receives a €0.42M profit.

Scenario 1: 'Pioneer collaboration'

Selected options contributors:

- Closed book
- Traditional cost indicators
- Mediator

Selected options key elements:

- Bilateral shareholder structure, only the client and contractor hold a share in the value appropriation model.
- After each single project
- Profit pooling
- Incorporated (individual profit margins), (individual contingencies)
- Singular value assessment (only financial)
- Fixed price
- Pay-out not linked to non-financial performance targets
- No commitments
- No additional incentives

Result: All parties needed their buffers to cover expenses related to the frictions between the parties and no additional budget remained (no 'surplus').

- Client: revenue of €100M, profit of €3M
- Contractor: revenue of €70M, profit of €1M
- Engineer: revenue of €5M, profit of €0.5M

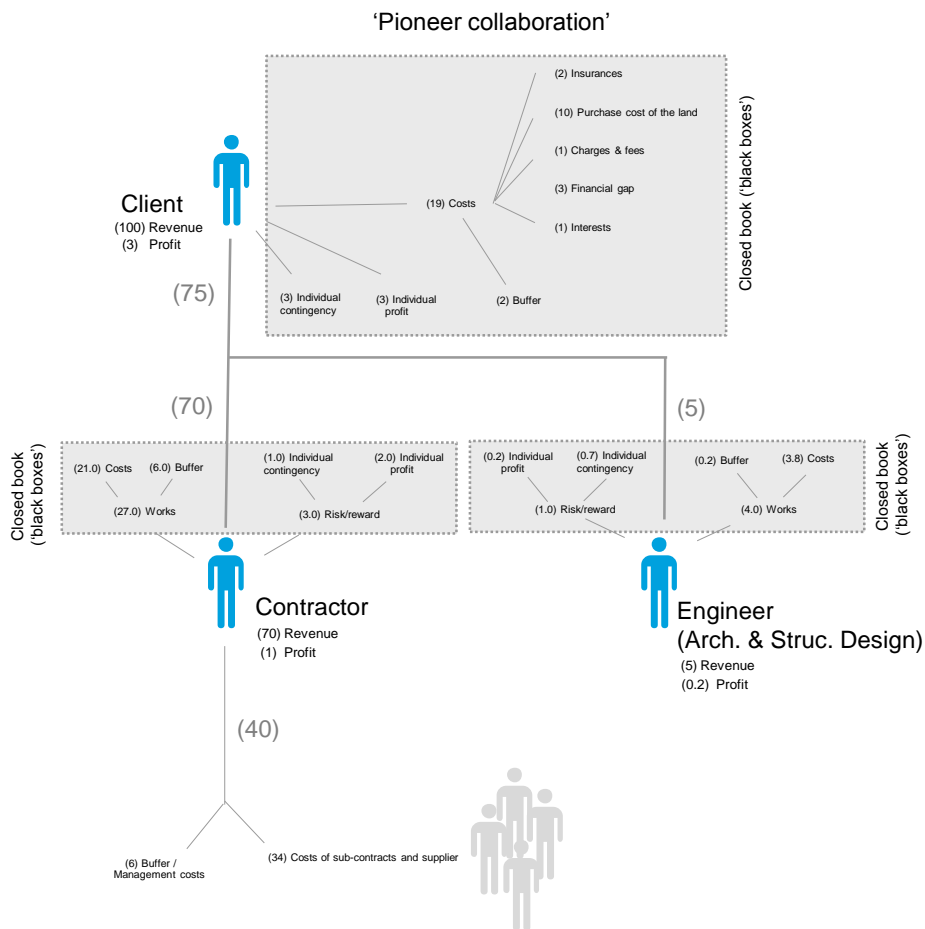


Figure 7.1: Numerical example, scenario 1 'Pioneer collaboration'

Scenario 2: 'Medium collaboration'

Selected options contributors:

- Partial open-book
- Market cost indicators
- Cost advisor

Selected options key elements:

- Bilateral shareholder structure, only the client and contractor hold a share in the value appropriation model.
- After each single project
- Profit pooling
- Shared profits (parked 'at risk'), (both individual and shared contingencies)
- Plural value assessment
- Prime cost
- Pay-out fully linked to non-financial performance targets
- Capped client commitment
- No additional incentives

Result: Part of the buffers are eliminated, smaller contingencies were needed to cover unforeseen circumstances, and 85% of non-financial goals are met. The shared profit ('surplus') is €10M of which 85% will be paid out and 15% will be reinvested:

- Client: revenue of €99.5M, profit of €4.25M
- Contractor: revenue of €69.5M, profit of €4.25M
- Engineer: revenue of €5M, profit of €0.6M
- Remainder: €1.5M to be reinvested in the collaboration.

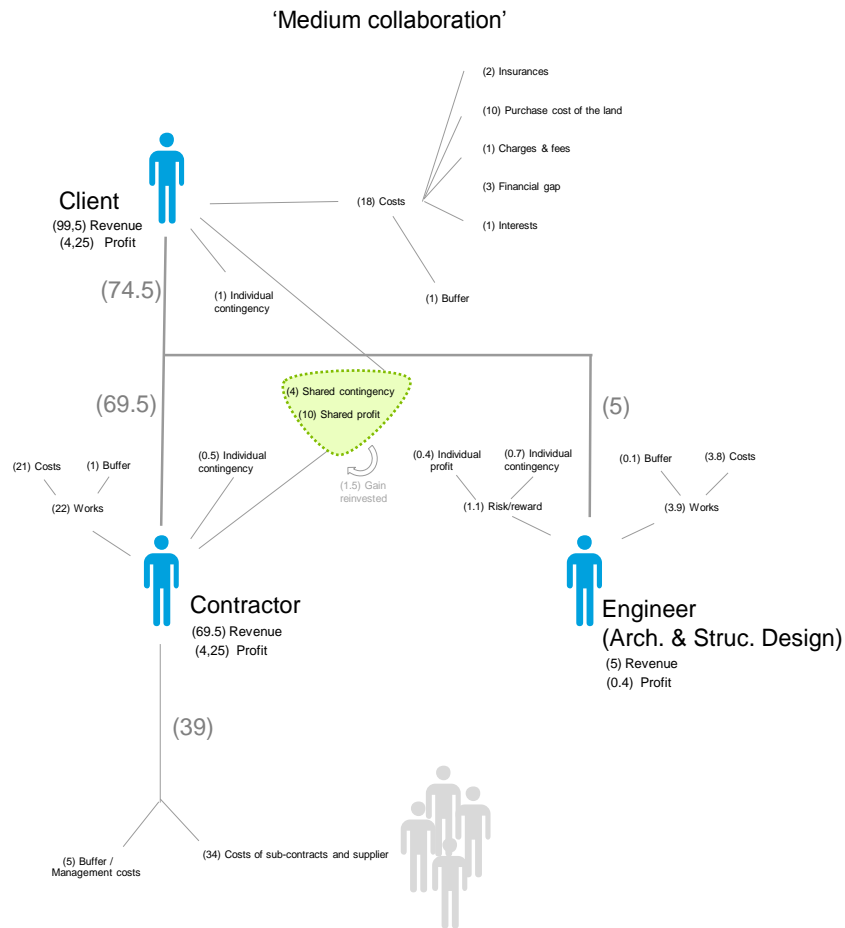


Figure 7.2: Numerical example, scenario 2 'Medium collaboration'

Scenario 3: 'Mature collaboration'

Selected options contributors:

- Partial open-book
- Base cost estimate
- n/a (no independent advice)

Selected options key elements:

- Multilateral (strategic) shareholder structure, all three parties hold a share in the value appropriation model.
- Combined moment of 'surplus' appropriation (part of the gain reinvested)
- Profit pooling
- Shared profits (parked 'at risk'), (both individual and shared contingencies)
- Sharing ratio (customized), (client - contractor/engineer: equality sharing), (contractor - engineer: equity sharing)
- Plural value assessment
- Target cost
- Pay-out fully linked to non-financial performance targets
- Capped liability (maximum loss)
- No additional incentives

Result: All buffers are eliminated, even smaller contingencies were needed, and 90% of non-financial goals are met. The shared profit is €14M, of which 90% will be paid out and the other 10% will be reinvested.

- Client: revenue of €99M, profit of €6.3M
- Contractor: revenue of €69M, profit of €5.88M
- Engineer: revenue of €5M, profit of €0.42M
- Remainder: €1.4M to be reinvested in the collaboration.

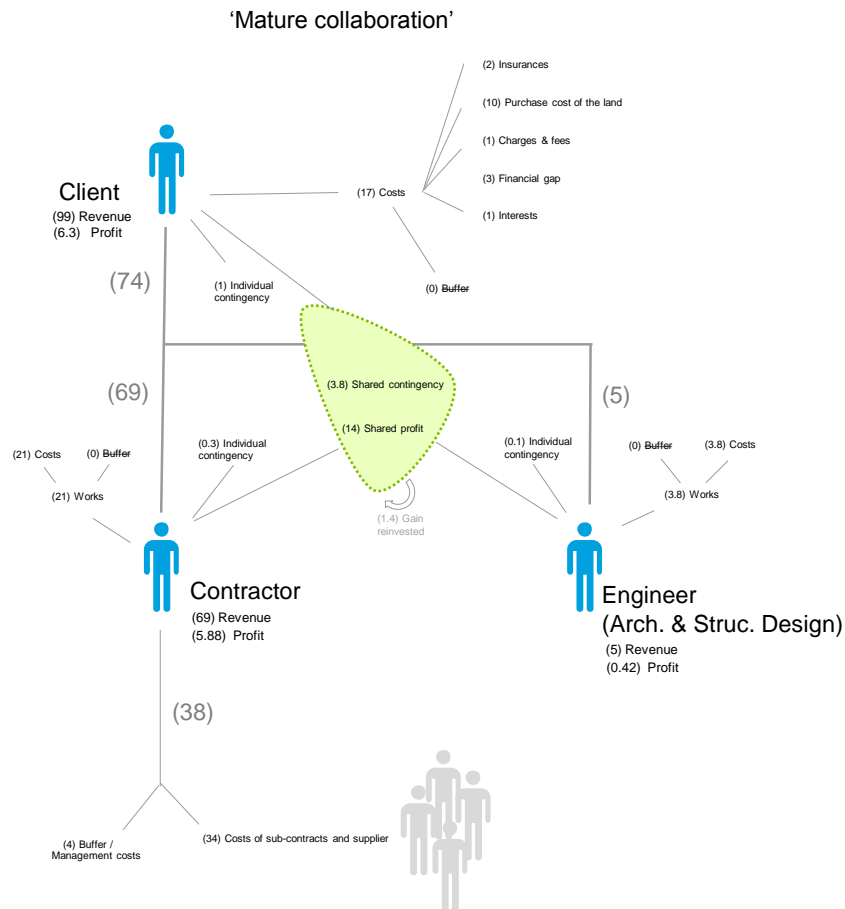


Figure 7.3: Numerical example, scenario 2 'Mature collaboration'