A tentative comparison of the performance of Strategic Alliance and Design/Bid/Build project delivery methods

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Abstract

Project delivery methods that are based on the concept of supply chain integration are believed by many to lead towards a more effective and more efficient way of working than other, more traditional ways of project delivery like the design-bid-build (DBB) method. This tentative study compares the cost performance of strategic alliance (SA) with that of a DBB. based on cost estimates at the Pre-construction stage. The cost estimates of three SA's have been compared to three DBB cost estimates, which have been made by three external cost consultants, to see if there are indication of one project delivery method is superior.

Three large scale housing renovation projects which are delivered by a similar form of SA have been selected for this study. The three alliances exist of different clients, contractors and subcontractors which are working in different regions. The target cost estimates made by the SA's for the three projects have been compared with external cost estimates. These external cost estimates have been made by three different external cost consultants. The external cost estimates were made based on the assumption that the project would be delivered based on a traditional DBB method. The external cost consultants weren't informed about the SA that was set up to deliver the project.
Project costs per element were compared. Upon completion of the analysis, the hypothesis that SA projects are superior to DBB projects in regards to costs was researched.

Keywords: Strategic alliance, Design/Bid/Build, project delivery methods

1. Introduction

As budgets of social housing associations (SHA's) in the Netherlands continue to come under pressure, SHA's are seeking for ways to increase efficiency (De Wildt and Luijkx, 2011). To increase efficiency in comparison to the traditional design-bid-build (DBB) method, SHA's have adopted several different project delivery methods. One of these methods, strategic alliancing (SA), has been gaining the interest of a group of SHA's the last few years which resulted in a set of pilot projects. The following definitions for DBB and SA are used in this paper.

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Design/bid/build (DBB) is a project delivery method in which the owner enters into a contract with an architect/engineer (A/E) firm that provides design services based on the requirements provided by the owner. The A/E deliverables includes plans and specifications for the construction of the project. These documents are subsequently used by the owner as the basis to make a separate contract with a construction company. Although many methods are used for awarding this contract, the most common approach is to solicit bids from different construction companies. The company providing the lowest bid will then build the project based on the documents produced by the A/E. Therefore, two separate contracts, with two separate entities, are utilized by owners to complete one construction project, including two solicitations and procurement steps.

Strategic alliancing, in this paper, is a (project) delivery method in which the owner enters into a long-term collaborative multi-party agreement with a main contractor, multiple specialized (trade) contractors and an A/E firm. All alliance partners work together if they are one (virtual) company.

At the start the alliance partners are selected based on their capabilities shown in similar projects, reliability in previous projects, transparency in cost structures and communication, and aligned interests. When the alliance is in place, the owner sets high level targets for the alliance. Together they work on an integrated design using a process that resembles a target value design process as described by Ballard (2011). This process results in full plans, specifications and budget which incorporated the know-how of the alliance partners. When the plan fits within all the pre-set targets, the construction of the works is awarded to the alliance. The alliance is awarded a follow-up project when their performance keeps increasing in regard of pre-set Key Performance Indicators (KPI's). Other characteristics of this strategic alliance are:

- unanimous decision-making by a board containing all alliance partners;
- open book accounting, using a form of activity based costing with set margins;
- risk/reward schedule which looks like the Australian project alliance methods;
- performance measurement (costs, time, quality, customer satisfaction);
- target value design process;
- open communications (all information is shared within the alliance through a web portal);
- lean planning (traditional and location based);
- joint sessions to develop and enhance the joint processes (value stream mapping sessions, lean planning workshops, et cetera).

The modus operandi of this strategic alliance has a close resemblance with the project alliance delivery method known from Australia (Ross, 2003; Koolwijk, 2006; Lahdenpera,

2011). However, it is called a strategic alliance and not a project alliance because the alliance is set up for multiple (similar) projects. The intended relationship is long-term beyond a discrete project. Paragraph 2 will elaborate further on the different forms of strategic alliances.

As stated before, a group of SHA's have adopted the use of strategic alliances the last few years. Unfortunately many of them have difficulties assessing the impact of the use of this method because the information is spread over different SHA's. Fortunately a group of consultants which guide the pilot projects, one of them being the author of this paper, are in contact with each other, thus giving the opportunity for bringing together the project data for further analysis as being done in this first tentative study into this group of strategic alliances.

2. Strategic alliances

This paragraph will first describe strategic alliances in general. Then it is explained why strategic alliances are rare in the construction industry in regard of other industries like manufacturing. Finally the strategic alliances which are part of this paper, are described.

2.1 Strategic alliances in general

Strategic alliances are inter-firm cooperative arrangements aimed at achieving the strategic objectives of the partners (Das and Teng, 2001). Strategic alliances are voluntary organizational relationships that involve meaningful and durable exchange, sharing, or co-development of new knowledge, products, services or technologies (de Rond, 2003). Inkpen and Ross (2001) show us that strategic alliance provide organizations a way to bring together their resources to create value, value that each partner could not achieve if they acted alone. According to Nooteboom (1999), strategic alliance come in many forms, including horizontal alliances between competitors, vertical alliances between buyers and suppliers, and diagonal alliances between firms in different industries.

Alliance structures have been categorised in a large number of different types of alliance forms. The categories used most frequently, which have been made by Das and Teng (2001a), are the equity versus non-equity strategic alliance.

As stated by Doz and Hamel (1998), an equity alliance operates as either a distinct operating entity (e.g. joint venture) with its own authority structure, or involves an equity investment by one of one partner in the other. Joint ventures involve the creation of a separate entity by two or more partners, so that control of the alliance resides with the partners and also with the joint venture company.

A non-equity alliance (or contractual alliance) is formed among independent partners, based on written agreements and verbal understandings (Doz and Hamel, 1998). These alliances are medium or long-term relationships. An important source of control is the written agreement or contract. It typically lacks an ultimate standalone decision-making authority.

Non-equity alliances can take a unilateral or bilateral form (Das and Teng, 2001b; Colombo, 2003). Unilateral contractual alliances involve well-defined transfers of property rights. Examples include licensing agreements, distribution agreements and some research and development contracts. What makes it unilateral is that each partner undertakes their obligations independently, so contracts tend to be complete and very specific as to the expectations of each party. Limited coordination and cooperation is needed, and partners have limited engagement with each other.

Bilateral contractual alliances involve cooperation and coordination as both parties work together to achieve the alliance outcomes. Examples include joint research and development, joint marketing, joint product development, and some forms of supplier partnerships and outsourcing arrangements. The activities of partners are sometimes integrated and linked tightly.

2.2 Why strategic alliances are rare in construction

Strategic alliances are very rare in the construction industry in contrast, for example, to the manufacturing industry. One of the main reasons for this lay in the difference in production environment and the lack of a focal company.
The construction industry, as mainly a Engineer-to-Order (ETO) industry, is characterised by a high degree of uncertainty (Bertrand & Muntslag, 1993). Demand tends to be "lumpy", with each unit of demand representing a large proportion of capacity. Markets are difficult to forecast due to unknown sales volumes and unknown product specifications for future orders. Forecasting the demand, even at the product type level, is extremely difficult due to the customised nature of the products (Muntslag, 1994).
Also, Brown et al. (2001) express the prevailing conditions in the construction industry to be that ‘‘the majority of construction projects are one-off, which often means that no long-term business relationships can be established’’. A buyer is thus likely to switch suppliers from one episode (project) to the next, which makes expectations concerning future business featured by uncertainty (Gadde and Dubois, 2010). As a result, it is not likely for suppliers (and buyers) to undertake “asset-specific” (i.e., relationship-specific) investments, thus it is impossible for the buyer nor the supplier to get the benefits of such an investment.
Therefore, in construction most long term arrangements with suppliers are aimed at the management of building materials (Vrijhoef, 2011). A comprehensive approach which includes clients, developers, main contractor(s), sub-contractors and suppliers, like a strategic alliance, is generally lacking (Briscoe & Dainty, 2005). Another problem that is critical for the integration of the supply chain in the construction, is the absence of a generally accepted focal company initiating the integration of the supply chain, as is the case in manufacturing (Vrijhoef, 2011). Often the client organisation has been regarded as the likely proponent for integrating the supply chain (Briscoe et al., 2004). This because the client organisation is at the start as well as the end of the entire construction process, and gives the initiative to start this process as well as being the end customer of the product. This places the client in a dominant role. Many clients have limited in-house expertise in construction management and are heavily reliant on bought-in expertise, i.e. consultants. Consultants are less positive about partnering than clients and contractors; they perceive a loss of control (Black et al. 2000).

2.3 The strategic alliances in this study

A Dutch social housing association (SHA) called ComWonen and a large main contractor called Dura Vermeer started a program called chain collaboration in 2008. ComWonen and Dura Vermeer formed a SA for the development and construction of social rental houses. ComWonen and Dura Vermeer claim that their first project was delivered 12% cheaper, with a higher quality and 6 weeks earlier than business as usual. Because of this program, strategic alliances gained the interest of more SHA's in the Netherlands. At this moment, as far as the author can see, around eight different SHA's in the Netherlands are having pilot projects with SA's. Three of these SHA's have participated in this explorative study.
These SHA's are relatively skilled construction clients who own a large amount of relatively homogenous assets (houses). The smallest SHA in this study owns approximately 6.000 houses, while the largest SHA owns around 20.000 houses. These assets form the basis for a relatively stable production environment: the renovation projects are combined in such a way that they (potentially) form a more or less constant stream of production for the alliance. This makes it interesting for the alliance partners to make relationship-specific investments in order to improve their joint performance. The so-called 'shadow of the future' (Axelrod, 1984; Dal Bo, 2005) stimulates the alliance partners to keep improving project after project because performance targets are increased by the SHA after every project.
The strategic alliances can all be considered as non-equity bilateral contractual alliances (see paragraph 2.1). All alliance partners work closely together to achieve the alliance outcomes. A written agreement is the basis for control. As stated before in paragraph 1, the modus operandi resembles the project alliance delivery method as used in the Australian practice.

3. Research method

Because the amount of projects in this study is very small, the data sample is also limited. To perform a statistical analysis, like for instance Hale et al. (2009) did for American Design and Build projects, it's simply too early. Instead, a more straight forward method was chosen to gain some first insights in the performance of these SA's in comparison to the DBB method. This method is explained in paragraph 3.1. Potential limitations to this method are reviewed in paragraph 3.2.

3.1 Research method

There are three pilot projects part of this study. Each project is delivered by a different strategic alliance. Two of these alliances are setup for the renovation of relatively standard houses from the 1970's. One alliance is formed for the renovation of small monumental houses from the late 19th century.

The three pilot projects are being guided by the same group of consultants. One of them is the author of this paper. These consultants implemented a process that makes it possible to compare the outcomes of the pilots with traditional DBB delivery method. This process ensured that for every pilot project an external cost estimate was made by an experienced

cost consultant. For every project a different cost consultant was involved. In the following figure the office location of the three SHA's and the CC's has been marked per project.

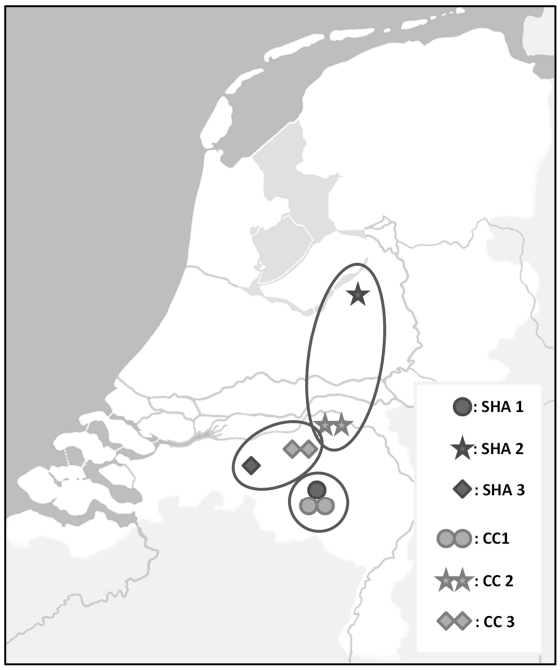

Figure 1. The office location of the three SHA's and three CC's which were part of this study.

To make a clean comparison of the cost estimate of the CC and the cost estimate of the SA the following steps where followed (also see figure 2):

- The SA's developed all project documents. When these where finished, at the pre-construction stage, all specifications, drawings, amounts and types of materials, and activities the SA has planned were shared with the CC's. This way a relatively high amount of cost related information was shared with the CC's.

- The planning data from the SA was not shared with the CC. The SA spent a relatively large amount of time on the efficiency of the production process. More than they are used to in a traditional process. This effect would be given away to the CC when the planning would be shared.

- The cost data of machinery, materials and man-hours was also not shared with the CC. The SA is transparent in their real costs through the use of the activity based costing method. Also, results from purchasing materials flows back to the project budget. This is different from traditional working methods and therefore not shared with the CC to make a clean comparison.

- The CC's did not know about the SA's. They estimated the works if they were tendered as a DBB project.

- The CC and the SA did not have any direct contact. All information, questions and changes were communicated through the project manager of the SHA.

- The project manager checked the final estimates of both the SA and the CC to make sure all information (amounts, specs, et cetera) in the documents is the same.

- The author of this paper did a second check on the data to see if there are differences that could influence the outcomes of both estimates.

- After this check, the information was further analysed for this study.

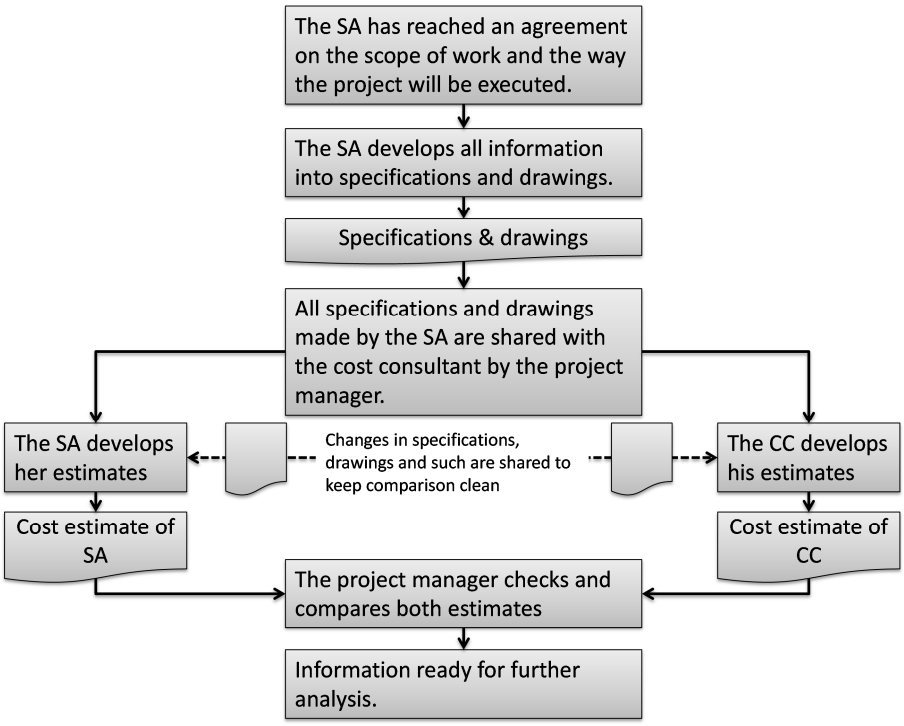

Figure 2. Method followed to get comparable estimates from the SA and CC

After the cost estimates of the SA and the CC where received and checked by the project manager, the cost data was further analysed. The analysis consisted of three steps:

- A check on differences in activities, types and/or amounts of materials, to see if both estimates are really comparable

- High level comparison: Making a comparison of the total estimated turnover between the CC-cost estimate and the SA-cost estimate.

- Low(er) level comparison: A comparison of the prices per element.

3.2 The use of (external) cost estimates to measure cost performance

The research method used for this study relies heavily on the accuracy of cost estimates by the SA as well as the CC. Therefore, it is necessary to place the findings of this research project in to the perspective of other studies done in this field.

Liu and Zhu (2004 and 2007), who summarized the findings on the cost estimation accuracy for construction projects dating back to the 70's, showed that estimation accuracy level for construction projects hardly changed the past four decades and remained around 10%. They also found that at the preconstruction stage, when the project scope clearly defined, the expected accuracy level is typically around 5%.

Liu and Zhu (2004 and 2007) also summarized the wide range of factors influencing cost estimation that has been identified by extant literature including government regulation, plan changes, quality of the contractor management team, priority on construction deadlines, completeness and timelines of project information, bidding situations, project characteristics, experience on similar type of project, the estimating process, and the experience of the estimators.

On the accuracy of cost estimates executed by external cost consultants in comparison to actual construction costs, regrettably no findings were found.

4. Checking the estimates before making the comparison

When the cost estimates where received, they have been checked to see if there are differences in activities, types and/or amounts of materials. A difference in the base of the estimates will have its influence on the comparability.
The first check was on the use of materials; if the materials specified are the same in both cost estimates. Things like brand, type and dimensions of tiles or plasterboard have been compared. It was found that most of the materials specified where the same.
The second check has been done on the activities. In this check, minor differences were found. Some activities done by the SA were not part of the cost estimate by the CC. Most of these activities have to do with extra quality that was put in the project by the SA at the last moment. Because these activities have been put in by the SA, these activities should have an negative effect on the SA-estimate in comparison with the CC-estimate. The SA simply delivers more than estimated by the CC.
The final check has been done on the amounts (m1, m2, units, et cetera) that have been calculated. In the next figure a comparison from one of the projects (#3) is shown. The other projects showed similar patterns, which are not further reviewed for this paper.

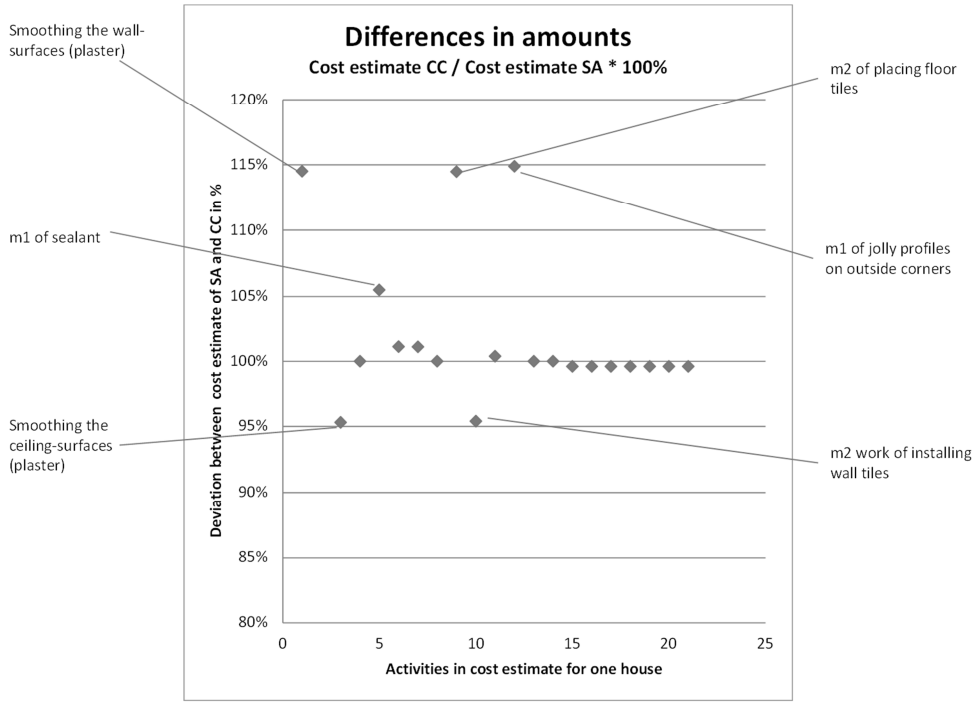

Figure 3. The differences in amounts between the estimate of the CC and SA

In figure 3 you can see that not all amounts in both estimates where the same. In the next table the activities with a difference more than 1% are further explained.

Table 1. Activities in one of the projects that had a large difference (>1%)

Activity	Difference in amount per house	Unit price SA (euro's)	Unit price CC (euro's)	Subtotals (euro's)
Smoothing ceiling surfaces	-1,2 m2	5,-	7,76	-3,31
Smoothing of wall surfaces	+2,1 m2	24,-	14,45	+20,01
Placing of jolly profiles on outer corners	+1,34 m1	3,6	2,65	+1,27
Sealant in bathroom	+2 m2	10,-	5,59	+8,82
Installing wall tiles	-0,6 m2	34,88	41,59	-4,03
Placing floor tiles	+0,15 m2	59,43	63,03	+3,6
			Total	+26,36 / house

In table 1 the difference in amounts between the two estimates is given. A '+' means the CC has estimated a larger amount than the SA. A'-' means the opposite. Also the price per element is given for both estimates. Here you can see larger differences. In this price per element, purchasing results and labour hours per element are reflected. Figure 4 (see next paragraph) will show the rather big differences found in prices per element.
The subtotal in table 1 shows the effect of the difference in amounts multiplied with the difference in price. The sum of all subtotals results in a total difference of 26,- per house. Project number 3 contains 100 houses, which means only a difference of approximately 2600,- in total can be explained by differences in amounts. A very small difference in regard of the total costs of this project.

5. Results

In table 2 the first comparison is made on the estimated turnover for each project.

Table 2. Direct and total costs estimates of the SA's and CC's compared

Project #	Costs	Estimate SA	Estimate CC	% difference
1	Direct costs	2.505.915,-	2.848.242,-	13,6%
	Total costs (excl. vat)	3.620.778,-	2.784.202,-	30,1%
2	Direct costs	738.082,-	771.889,-	-4.4%
	Total costs (excl. vat)	1.084.094,-	1.013.952,-	6,9%
3	Direct costs	2.188.279,-	2.663.796,-	21,7%
	Total costs (excl. vat)	2.980.272,-	2.352.553,-	26,7%

In table 2 it is shown that all three SA's perform better in comparison to the CC's when looking at the total costs. Looking at the direct costs, this difference gets smaller. Project 2 shows a negative result when looking at the direct costs.
Because the check on the activities, and types and/or amounts of materials can only explain a differences from around 1% (see paragraph 4), a comparison has been made between the prices per element to see if this could explain these differences. The following image emerges.

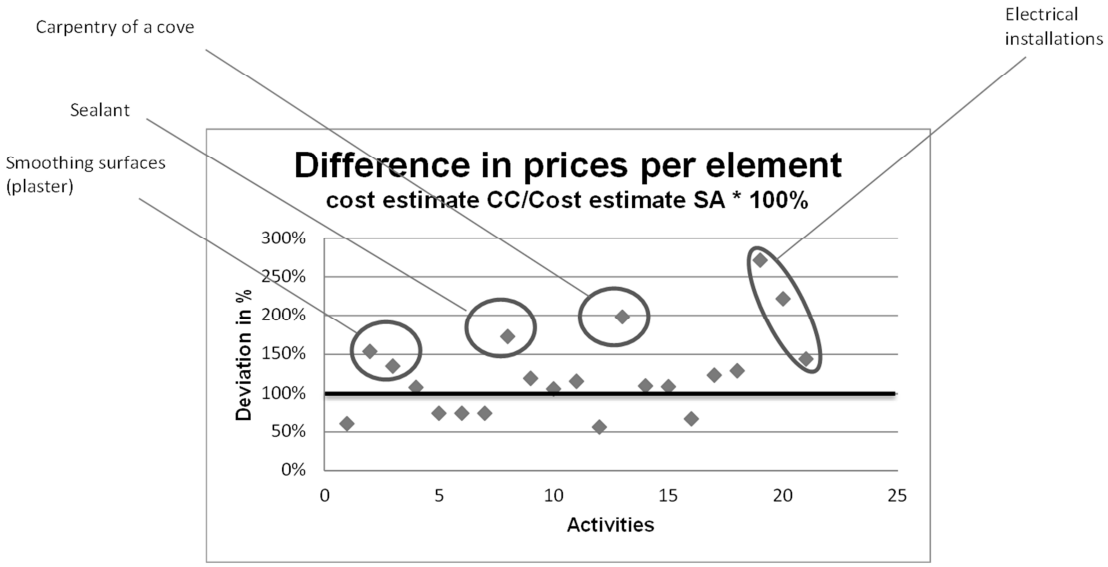

Figure 4. Comparison of prices per element between the estimate of the CC and SA

Figure 4 shows us that most of the prices per element are estimated higher by the CC than the SA (100% means the prices per element are the same). Some of these prices per element differ quite extremely (almost 300%), which looks like a fundamental different viewpoint of 'what needs to be done' between the CC and the SA. However, the information between the SA and the CC was shared almost one-on-one. Also questions could be asked about what needed to be done if there were doubts by the CC.

6. Conclusions and discussion

As noted in the first paragraph of this paper, this paper contains the first results from a tentative study. It compared cost data of an experienced CC, which calculated the same project if it was delivered by a DBB, with the cost data of a strategic alliance (SA) to see if there are indications of one project delivery method is superior in regards of costs. Because of the small data sample, only three projects where part of this study, this somewhat straight forward method was chosen to see if there are any differences in performance between the two delivery methods.

The first results are tentative; no firm conclusions can be drawn. However, the first results could indicate that a SA outperforms the DBB method in regard of costs. When we look at the price per element it looks like a SA can deliver the same product for a lower price. This could be the result of many things like a higher efficiency or lower profit margins per element among the alliance partners.

When looking at the total costs in comparison to the direct costs, the difference in the estimates gets bigger. This could be an effect of the activity based costing method applied by the SA's. The general expenses in the SA project are lower because only the costs that can be directly related to the project are paid by the client. Other costs, like acquisition costs, are not covered.

What could also be the case is that the three different cost consultants, which all have experience in estimating these type of projects based on full specifications, were wrong. In this case all three CC's were given the full specs of the project and all information from the alliance partners in regard of activities, and types and amounts of materials was shared.

They also had the opportunity to ask questions about the project through the project manager to gain more information. As stated by Liu and Zhu (2007), accurate prediction of construction costs is heavily dependent upon the availability of quality historical cost data and the level of professional expertise among other things. Both elements seem to be in place in this study. However, Liu and Zhu (2004), after reviewing studies on cost estimation accuracy, also concluded that the estimation accuracy level for construction projects is around 5% at the Pre-construction stage. This could also explain the difference, but one would expect that one or two SA's would score worse in regard of DBB.
What remains is to finish this first tentative study by looking at the post-calculations of all three projects. One of these post-calculations have already been received. It shows that the alliance returned 4% of its budget back to the SHA whereas this SHA is used paying between 6 and 8% extra for change orders in DBB projects. Also a comparison will be made with project that is similar to one of SA projects, but is delivered with de DBB method. The author hopes to carry out this study later this year. Finally, interviews with all participants can be held to gain an expert opinion about the effects (not only costs) of working with an SA.

References

Axelrod R M (1984) *The evolution of cooperation,* New York, Basic Books Inc. Publishers.

Ballard G (2011) "Target Value Design: Current Benchmark", *Lean Construction Journal*, **1**: 79-84.

Bertrand J and Muntslag D (1993) "Production control in engineer-to-order firms", *International Journal of Production Economics*, **30**: 3- 22.

Black C, Akintoye A and Fitzgerald E (2000) "An analysis of success factors and benefits of

partnering in construction." *International Journal of Project Management*, **18 (6)**: 423-

434.

Briscoe G, Dainty A., Millett S and Neale R (2004) "Client-led strategies for construction supply chain improvement", *Construction Management and Economics*, **22 (2)**: 193-201.

Briscoe G and Dainty A (2005) "Construction supply chain integration: an elusive goal?", *Supply Chain Management: An International Journal*, **10 (4)**: 319 – 326.

Brown D, Ashleigh J, Riley M and Shaw R (2001) "New project procurement process", *Journal of Management in Engineering*, **17 (4)**: 192–201.

Cagliano R, Caniato F and Spina G (2006) "The linkage between supply chain integration and manufacturing improvement programmes", *International Journal of Operations & Production Management*, **26 (3)**: 282-299.

Colombo M G (2003) “Alliance form: a test of the contractual and competence perspective”, *Strategic Management Journal*, **24**: 1209-1229.

Dal Bo P (2005) “Cooperation under the Shadow of the Future: Experimental Evidence from Infinitely Repeated Games”, *The American Economic review*, **95 (5)**: 1591-1604.

Das T and Teng B (2000) “A resource-based theory of strategic alliances”, *Journal of Management*, **26 (1)**: 31-61.

Das T and Teng B. (2001a) “A risk perception model of alliance structuring”, *Journal of International Management*, **7**: 1-29.

Das T and Teng B (2001b) “Trust, control and risk in strategic alliances: an integrated framework”, *Organization Stud*ies, **22 (2)**: 251-283.

Doz Y L and Hamel G (1998) *Alliance Advantage- The Art of Creating Value through Partnering*, Boston, MA, Harvard Business School Press.

De Rond M (2003) *Strategic Alliances as Social Facts*, Cambridge, Cambridge University Press.

De Wildt R and Luijkx T (2011) *Onrendabele nieuwbouw, investeringen in de sociale huursector* Amsterdam, Rigo Research en Advies BV, Report nr. P16140.

Gadde L and Dubois A (2010) “Partnering in the construction industry—Problems and opportunities”, *Journal of Purchasing and Supply management*, **16 (4)**: 254-263.

Hale D R, Shrestha P P, Gibson G E and Migliaccio, G C (2009) “Empirical Comparison of Design/Build and Design/Bid/Build project delivery methods”, *Journal of Construction*

Engineering and Management, **135 (7)**: 579-587.

Inkpen A C and Ross J (2001) “Why do some strategic alliances persist beyond their useful life?”, *California Management Review*, **44 (1)**: 132-148.

Koolwijk J S J and Geraedts R P (2006) *Projectallianties, procesinnovatie bij complexe bouwprojecten*, Delft, VSSD.

Lahdenperä P (2012) “Making sense of the multi-party contractual arrangements of project

partnering, project alliancing and integrated project delivery”, *Construction Management and Economics*, **30 (1)**: 57-79.

Liu L and Zhu K, (2004) “A stage-by-stage factor control framework for cost estimation of construction projects”, *Clients Driving Innovation International Conference*, 25-28 October 2004, Brisbane Australia

Liu L and Zhu K, (2007) “Improving cost estimates of construction projects using phased cost factors”, *Journal of Construction Engineering and Management*, **133 (1)**: 91-95.

Muntslag D.(1994) “Profit and risk evaluation in customer driven engineering and

Manufacture”, *International Journal of Production Economics*, **36**: 97-107.

Nooteboom B (1999) *Inter-firm Alliances - Analysis and Design*, London, Routledge.

Ross J (2003) “Introduction to Project Alliancing (on engineering & construction projects)”, *Alliance Contracting conference*, 30 April 2003, Sydney, Australia.

Vrijhoef R (2011) *Supply chain integration in the building industry: The emergence of integrated and repetitive strategies in a fragmented and project-driven industry*, Amsterdam, Amsterdam: IOS/Delft University Press.