

# USE OF PROJECT PARTNERING IN CONSTRUCTION

Examining the Effect of Project Integration and Target Pricing in Three Pilot Projects

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## ABSTRACT

There is a trend in organizing the building process with stronger focus on better integration of the different actors and use of new procurement methods. Our experiences started with the research project “*The Integrated Building Process 1996 - 1999*”, where we developed and tested different partnering models in several small scale building projects. These experiences has led us into a number of other development projects using different elements of partnering models with procurement based on negotiations, target pricing and incentives.

In our recent studies we have examined three pilot construction projects, two small road projects and one railway crossing point, all involving a tunnel and a roadbed. One of the projects was classified as a research project and based on a negotiated contract, one contract was based on competitive bidding among pre-qualified contractors and one contract was made between two separate divisions within the same public agency. The goals in these projects have been to create better integration and co-operation between the clients, the external consultants and the contractor. This integration is leading to a better result with respect to total costs and quality. The contracts between the public clients and contractors have been based on an agreed target price with incentives linked to the final costs.

The studies show that the integrated project organizations and target pricing contracts are valued considerably higher by the participants than traditional procurement methods and standard contracts (NS 3430 / NS 3431). The integrated organizations with the programming and the production teams have been able to find better and more cost effective technical solutions and the participants find the model more inspiring than the traditional way of working. There are less changes and alterations creating conflicts between the partners and the overall result seems to be on an agreed quality level.

Our studies confirm the general international understanding of the success-factors for partnering in construction projects:

- Teambuilding - creating an integrated team based on trust and with a common workplace
- Risk analysis and better planning in the early stages
- Efficient project management with clear definitions of roles and responsibilities combined with good leadership
- A change from comprehensive formal communication and documentation between the project partners to well structured, but more open and informal communication

## Keywords:

Partnering, Integrated project teams, Incentive contracts, Mutual trust.

## Introduction

Since the late 1980s we have seen the development and use of different partnering models in the construction industry. This has been a primary management strategy for improving organizational relations and project performance (Li et al. 2000). The driving forces for this strategy have been studies based on the concepts of total quality management (TQM) and business process re-engineering (BPR). These studies of the construction industry have documented an industry with low productivity and efficiency.

To increase productivity and efficiency in the construction industry, a strong focus has been set on better integration of the different parties (including the client, architects, engineers, general contractors, subcontractors, suppliers, etc.) in one integrated project organization. The different parties are normally independent firms and organizations, with separate goals and objectives and different operation procedures. Typically problems that occur are lack of communications and co-ordination leading to changes and alterations during the process. This again causes disputes, rising costs and reduced performance and quality.

Li et al. (2000) gives a thorough international overview of the background for partnering in construction since the late 1980s, different partnering definitions and the status and future regarding research in this area. Future studies are recommended to emphasize on the identification of performance measures and critical success factors, development and test of partnering models and processes, and the formation and selection of partnering strategy.

Compared to the international arena, the development of partnering models in Norway started in the early 1990s. Our experiences started with the research project "*The Integrated Building Process 1996 - 1999*" (Haugen 1999), where we developed and tested partnering models in different small scale building projects. Our basic findings (Bølviken 2000) regarding the establishment of a successful integrated organization are:

- Focus on the process
- Common goals and objectives
- Mutual trust - openness
- Knowledge transfer between the parties
- Teambuilding
- Project management – routines
- Commitment from top management
- Rules for conflicts and sanctions

These findings correspond well to the different views on trust in the partnering literature. This is discussed by Thomassen (1999) who especially refers to Barlow (1997) giving six elements of successful partnering (in order mentioned); a) the need for trust; b) the "right personalities"; c) openness in communication d) organizational culture and organizational learning e) teambuilding and f) the role of management.

Our first experiences related to partnering and integrated project organizations has led us into a number of other development projects using different elements of partnering models with procurement based on negotiations, target pricing and incentives. The first development of partnering models was done in the private sector. Today in Norway we see a growing interest for partnering models used in the public sector, both for infrastructure projects, in health care and education. There are initiatives for using Public-Private-Co-operation (PPC) in a few

infrastructure projects, and several public projects are involving various kinds of BOOT-contracts (Build-Own-Operate-Transfer). This is not only a trend in Norway, we also see this trend in different Scandinavian countries (By & Boligministeriet 2000), (Barok 2000).

In the first pilot projects we tried out some very simplified and idealistic contract models, focusing on the elements and process in creating an integrated project organization. These simplified contract models and procurement methods can only be used in research projects where there is a strong focus on success and commitment from all the participants. We are therefore in the process of developing new procurement and contract models for project partnering in construction, taking into account legal issues, risk, conflict resolution etc.

For the three pilot projects we will be discussing in the following, a new contract model based on an agreed target price and incentives has been developed.

### **CASE STUDIES - 3 PILOT PROJECTS**

In our recent studies we have examined three pilot construction projects, two small road projects and one railway crossing point, all involving a tunnel and a roadbed. One of the projects was classified as a research project and based on a negotiated contract, one contract was based on competitive bidding among pre-qualified contractors and one contract was made between two separate units within the same public agency. The projects are called Stokkajuvet (Case 1), Kleivbrottet (Case 2) and Nykirke (Case 3).

The three projects have some comparable aspects:

- The contract sums are between 30 and 50 mill. NOK.
- The length of new roadbeds are ranging from 1000 to 2000 meters.
- The tunnels have lengths ranging from 100 to 300 meters.
- The clients and the contractors share site offices with canteen, telephonist, computer servers, printers a.s.o.
- The contractors have participated in the programming teams

### **Goals and objectives for the pilot projects**

The goals for the three projects can be summarized to:

*The two parties, the public client and the general contractor, have a common interest in creating an integrated project organization and a goal of achieving a better total project performance. The basis for the work will be a contract with an agreed target price and incentives for both parties.*

Objectives for a better total project performance:

- Produce better technical results/solutions
- Improve the project economy for both parts
- Optimize the use of resources in the project

Objectives for an integrated project organization:

- Mutual confidence in the relationship between the client and the contractor
- An inspiring and pleasant working atmosphere

- Mutual transfer of experiences between all parts in the project

### **The contract model**

The characteristic of the target price contract used in the three projects is the formula:

$$K = F + S + (M-S)/2$$

Where: K = contract sum  
 F = the contractors preset profit  
 S = actual laid-down costs of the contractor (and eventually of the client)  
 M = target price, i.e. pre-assumed laid-down cost

The proportions of F and M are set after tender competitions and/or negotiations. The target price formula offers incentives to both the client and the general contractor. If S also includes the laid-down costs of the client, the parties are rewarded when the extent of tasks for the client in the project is reduced.

### **Research methodology**

We have interviewed project participants from all 3 projects. All the interviews were based on an interview guide, with some slight revisions from project to project. The questions were qualitative focusing on the following topics:

- Individual background and competence
- Teambuilding – agreement on common goals and objectives
- Contractual allocation of responsibility and power
- Communication and involvement
- Documentation and written communication
- Partnering structure and –management
- Feedback and openness
- Trust and co-operation
- Learning and knowledge transfer
- Shared risk
- Overall results regarding technical and economical performance

For a number of the topics the respondent was asked for a quantitative value from 1 – 7, (neutral is 4) compared to a traditional construction project.

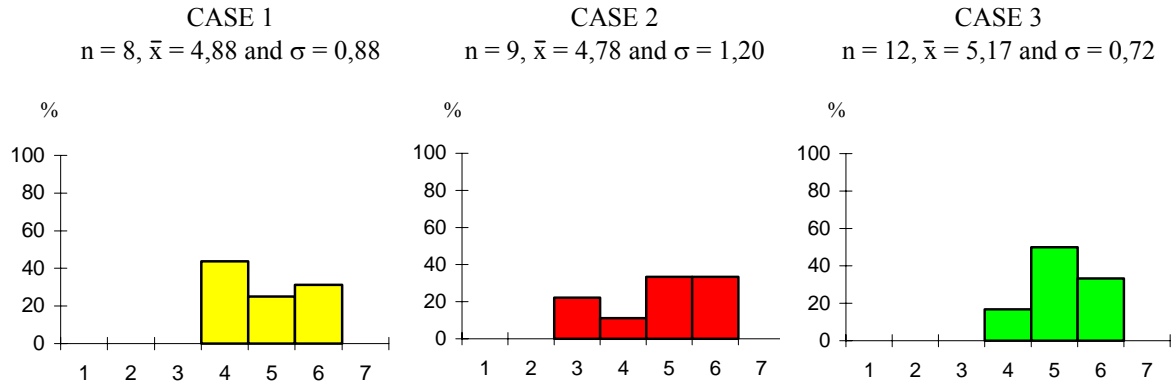
At Kleivbrottet we did the interviews at the end of the programming period, but before the production had started. At Stokkajuvet and at Nykirke we did the interviews midway in the production period, where the participants in the programming period were mostly identical with the participants in the production period.

Written reports from the interviews have been sent to each of the respondents for verification, and this has been the basis for a neutral intermediate reporting back to the project parties. In this way our work represents action research. But the feedback has been on a very practical level in order to get a more thorough discussion and involvement from the parties involved. The studies will be finally reported in the summer of 2001.

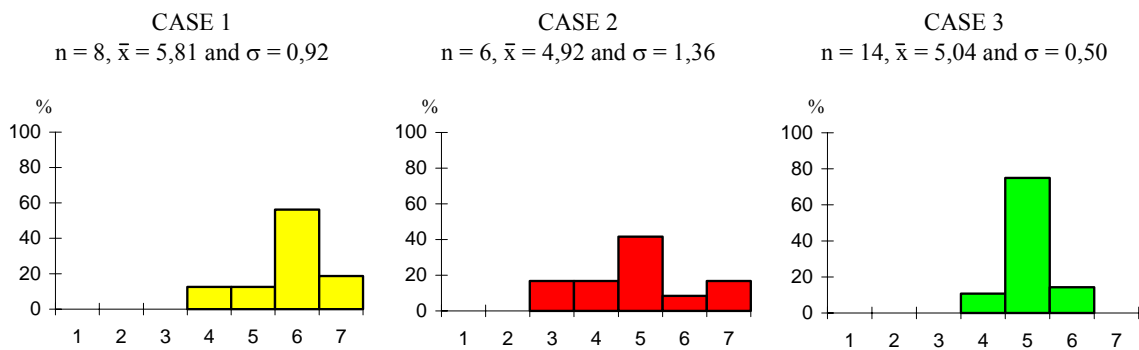
## Quantitative Results

Our respondents gave characters as below on the quantitative questions:

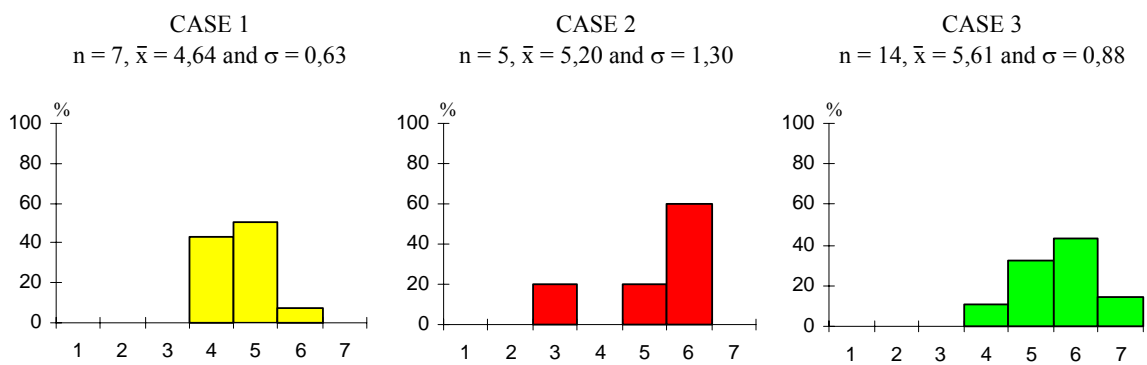
Are your expectations regarding the project integration satisfied?  
 (Scale 1-7 where 1 is worst, 7 is best and 4 is neutral)



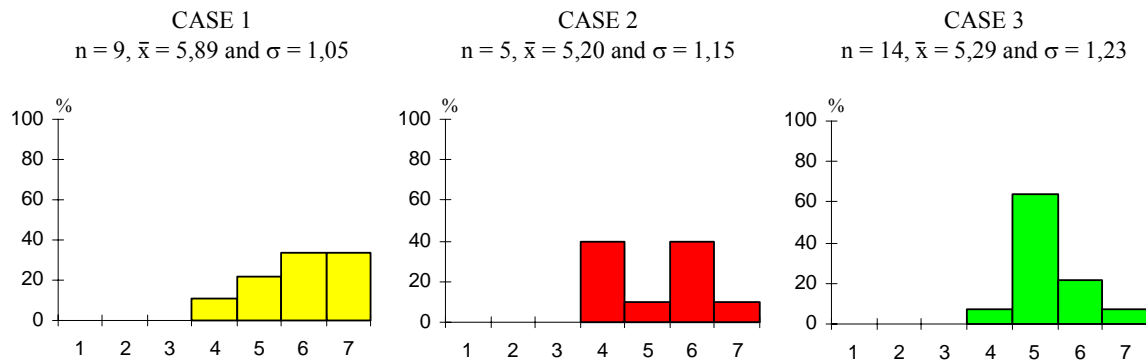
Co-operation and results in this project compared with earlier projects?



Your engagement in this project compared with other projects?



In what degree are your point of view and professional utterances regarded in this project compared with other projects?



For standard deviation and mean value we used the following formulas:

$$\sigma^2 = \frac{n \sum x^2 - (\sum x)^2}{n(n-1)} \quad \bar{x} = \frac{\sum x}{n}$$

Our histograms are based on small samples, but they indicate some trends. The histograms are skewed to the right, and we mean that this indicates positive trends. The respondents have experienced co-operation, professional engagement and equality between the participants. The histograms from case 2 are not as skewed to the right as the others, but that can be linked to the fact that we in case 2 completed the interviews before the construction period started.

### Some Findings Based on the Interviews

- The design of target price contracts used in the projects varied. Theoretically, all formal project routines were described in the various contracts. Practically, the participants had to adjust the project management routines as time went by.
- The participants in the three cases were individually chosen for the projects. Personal skills and former experience were emphasized for participation in the integrated teams.
- The target price was considerably reduced in two of the cases, as the contractor proposed technical solutions differing from the original plans.
- Both parties tried to find technical solutions that were more cost-effective and better for the total project organization, not only for one single party in the project. The target price contract is the basis for creating the win-win situation.
- Good was defined as sufficient quality. The expenditure cuts are often the result of simplification of technical solutions. Potential expenditure cuts are cashed out, and the financial savings were not directly used to improve the product quality.
- The contractor's employees find the partnering model inspiring, as they can use their experience and competence regarding technical solutions during programming and the final design.
- Sharing site office makes it easier for the project participants to communicate and to have less formal information and documentation in the project.

- For all three projects, the external consultants only visited the construction sites from time to time. Therefore they did not take part in the integrated organization, and tended to be outside of the core circle of the project.
- Both parties have to review the program and specifications thoroughly to find any disagreements from the initial functional specifications. In all cases they reported that more time should have been spent on planning in order to examine risks and possible changes during production.
- In our research we reported directly back to the participants in separate workshops. The respondents were very positive to this feedback and discussion, and we got a clarification of various disagreements. We also see that our findings were used in the ongoing project development process.

## **Summing up**

Relating the results and findings in the three pilot studies to our previous work on partnering issues, we can sum up the following:

### Common goals and objectives

Common goals and mutual confidence encouraged to a co-operation leading to optimization of technical solutions and expenditure cuts. Even though the savings were not directly spent on improving the project quality, the products often achieved a better quality than originally intended.

### Mutual trust - openness

The traditional roles as client and contractor are not forgotten even though the parties are co-operative. This underlying suspiciousness is possibly advantageous, because the positive potential of the target price contract is dependent on the participant's personal will to make the parties co-operate. The contractor has more responsibility than in a traditional unit price contract.

### Knowledge transfer between the parties

The possibilities of mutual transfer of experiences will be best exploited if the necessary arrangements are made. For an instance, special project meetings where the participants give each other feedback will have a positive effect. There is a change from comprehensive formal communication and documentation between the project partners to well structured, but more open and informal communication

### Teambuilding

The external consultants, the client and the contractor should all be integrated in the project organization. The external consultants do not tend to be as integrated as desired in the three cases, despite their important roles. Contracts with incentives to the external consultants should be tested in future projects.

### Project management – routines

Using a target price contract can be an excuse for the participants to play roles that are different from traditional roles. Risk analysis and better planning in the early stages are needed. There is also a need for efficient project management with clear definitions of roles and responsibilities combined with good leadership.

### Rules for conflicts and sanctions

A target price contract should have thorough specifications of technical quality. This to avoid that the contractor calculates with a quality level not satisfying the demands of the client, and that the client demands better quality than intended at the time of contracting. If the contract has specified posts with payment both by the hour and per unit, it should be clearly specified what is included in the payment per unit posts. Clear contract specifications will prevent later unpleasant surprises and discussions between the involved parties.

### **Acknowledgements**

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More information about the projects can be found on the following addresses:

[www.trekantsambandet.no](http://www.trekantsambandet.no)

[www.vegvesen.no/vestfold/prosjekter/start.stm](http://www.vegvesen.no/vestfold/prosjekter/start.stm)

[www.jernbaneverket.no/presse/pressemeldinger/article.jhtml?articleID=1027826](http://www.jernbaneverket.no/presse/pressemeldinger/article.jhtml?articleID=1027826) or

[www.veidekke.no/prosjekter/nykirke](http://www.veidekke.no/prosjekter/nykirke)

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