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English summary

Introduction

The main purpose of the study is to assess the effects of partnering compared to more traditional implementation models for large investment projects. The study attempts to add knowledge about how and why partnering can help increase the efficiency of projects, both in terms of cost level and benefits to the user. In order to do this, we have based the study on theory from New Economic Geography and Transaction Cost Theory to identify those elements that may be important in understanding the interaction's ability to increase the efficiency of projects. We have also used elements from Information Economics (mainly Principal-Agent Theory) to shed light on the forces that may affect the possibility of achieving efficiency or productivity gains. These theories are elaborated in Chapter two.

We seek to shed light on the perspectives of the builders, the contractors and the consulting engineers, based on an embedded case study with multiple units, where we have implicitly compared partnering with more conventional implementation models. In the context of the theoretical basis for the study, the aim of the empirical analysis is to assess if partnering can be expected to be sustainable over time, as well as to identify key drivers for how partnering affects the development of the projects' effectiveness1.

A partnering contract can be made with a larger number of variations, for example in terms of the number of participants in the integrated work process, remuneration and incentives, the form of compensation given etc. There is

[1] The terms *productivity* and *effectiveness* are used throughout the report. Productivity (definition based on Norwegian literature) is about getting the most out of the inputs in the production processes (in the English language, productivity may correspond to *efficiency)*. Effectiveness encompasses a slightly broader perspective because it is also taken into consideration to what extent the project fulfills important objectives for users and society. Often these terms are used interchangeably, but we have done our best to use them in accordance with this distinction.

currently no standard contract model or contract terms in the construction industry. There are three main variants of partnering models:

Model A - Early contractor involvement with Design-Bid-Build (DBB) and fixed price: A two-party contract with contractor participation in the project development phase (phase one) and DBB with a fixed price in the execution phase (phase two).

Model B - Early contractor involvement with DBB and target price: A two-party contract with contractor participation in phase one and DBB with target price in phase two. This involves, among other things, a joint organization and the sharing of gains and losses in relation to the target price. The engineering group and subcontractors can participate in the compensation and incentive model through agreement with the DBB contractor.

Model C - Integrated Project Delivery (IPL/IPD): A multi-party contract in which the actors – builder, project manager and contractor(s) – through a joint organization develop, plan and execute the project based on cost coverage with the sharing of gains/losses relative to a target price agreed upon in phase one.

Theoretical basis

Chapter 2 of the report points to some theoretical contexts that may support why partnering can be a navigable path to achieving efficiency gains. As mentioned, we have used theory from new economic geography together with transaction cost theory to shed light on some mechanisms that can help partnering work. As far as we know, this approach is new. *Trust, transparency, organizational culture and incentives* are well-known cues that can create successful interactions. Somewhat less well known in this context are the key words *sharing, learning* and *matching*, which in short means that both investments in knowledge and infrastructure can be shared between the parties, different disciplines and stakeholders can contribute with their knowledge and experience in a learning process during the partnering, and one actively ensures to use parties and personnel that match both each other and the task at stake. Transparency is highlighted in the transaction cost theory as an important tool for avoiding costly control mechanisms and opportunistic behavior. If everyone is familiar with costs and resource use and that this is presented and communicated closely between the parties, then the risk of the project incurring unnecessary costs should be reduced. A project management that can build the necessary degree

of trust and culture, and that the parties have a competent understanding of the nature of partnering are important conditions for achieving well-functioning transparency in a partnering process.

Method and cases

Chapter 3 briefly describes the methodology (an embedded case design based on 17 in-person interviews with multiple analysis units). Within the framework of this study, we have not looked at cases where the interaction has been unsuccessful. We have emphasized 'saturating' of the material with cases where the interactions have seemed to work, by including construction projects of different size and type. A full 'saturation' of the data should also include partnering projects that have worked poorly or been unsuccessful. This is an incompleteness that we believe should be complemented by further research.

Chapter 4 briefly describes the six projects that form the units of analysis in the study. These are:

- Holmen primary school with the City of Oslo as builder (Model B)
- The highway E6 Kvål – Melhus with Nye Veier as a builder (Model C)
- The Tønsberg hospital project where Helse Sør-Øst/Sykehuset i Vestfold is the builder (Model C)
- The University Museum in Bergen with Statsbygg as builder (Model B)
- The apartment project Ulven with OBOS as builder (Model A, adapted)
- A cycle line at Lade in Trondheim with the Norwegian Public Roads Administration as builder (Model B, adapted).

These projects range widely in complexity spanning from a relatively basic cycle lane, via a larger highway project and to buildings of a different kind.

The empirical analysis is built around the following 6 main elements, followed by a theoretically funded proposition:

- *Competition.* Proposition: Partnering increases competition because the threshold for submitting tenders is lower.
- *Construction costs.* Proposition: Partnering results in reduced costs because of:
    - Better and more buildable solutions
    - Better opportunities for optimization of the project

    - Early risk clarification and a better distribution of risk between the parties
    - Reduced staffing and rig/operation costs
- *Quality*. Proposition: The mechanisms of partnering provide a better project with increased quality for the users.
- *Duration of the project implementation*. Proposition: Partnering results in a reduced overall implementation time for the project.
- *Risk*. Proposition: Partnering increases transparency with subsequent risk reduction and increased predictability in terms of costs for the partners.
- *Conflicts*. Proposition: Partnering leads to reduced level of conflict between the parties, mainly related to:
    - The actual implementation of the project.
    - Legal disputes between the parties.

We have also, with the help of additional questions, highlighted elements such as the design of incentives, building of partnering culture, trust and interaction, transfer of competence and balance of power (including changing competence needs) between the parties.

Main findings

Chapters five and six present and discuss the findings for the elements on which the study has focused, and we reproduce the most important ones in the following.

As regards the *competitive situation,* the interviews revealed several relevant points both for and against the assumption that partnering has contributed to increased competition due to lower barriers to entry. In smaller projects, a lack of management capacity was highlighted as a reason for the possible reduced participation from the smaller players in the tendering processes. This may result in reduced competition and the risk of increased costs, depending on how many players that initially make offers. When the competitive situation is affected, this can lead to increased uncertainty regarding observed net effects of partnering, because the productivity of the projects may be affected by the competition as such. In larger projects, the responses indicate that competition could increase over time as partnering becomes more familiar and proven in the industry. However, we are in the early stages of partnering in Norway and hence the study cannot say much about long-term effects on competition. We have not been

able to identify findings in the international literature that indicates adverse or positive effects on competition from partnering.

Regarding the *cost side* of the projects, the contractors in this range experienced a more predictable profit, better resource utilization and lower risk. It can thus be seen that some support for an important objective of partnering is given, namely better cost discipline and the possibility of cost reduction. The mechanisms for achieving this seem to be based on a transfer of responsibility from builder to contractor, and that the builder has a somewhat more secluded role with reduced staffing. Such a transfer is not in itself sufficient, it must be accompanied by the mechanisms that stimulate sharing and learning in the team behind the partnering. Here it is especially important to be able to include experiences from partnering projects that have failed.

With respect to the *quality* for the users, the partnering's positive impact was mainly confirmed by the interviewees. Fewer building defects and user involvement contribute to increased quality. However, some believed that partnering as the implementation model itself did not affect quality, but that the quality depended on how much the builder was willing to invest in interaction with the users. Involving the users more can also contribute to a more secure valuation of the "marginal" measures, interpreted as the trade-off between "same quality, costs below budget" against "increased quality, costs according to budget". We believe that it will be beneficial to look at forms of closer involvement of the users, especially in larger projects where it is obvious that there may be important trade-offs that the users should be involved in.

The implementation time seems to be shortened through the solution methods that the partnering has developed and implemented. The main reasons were more parallelism in the early phase, faster mobilization of resources and more predictability in the implementation phase. There are indications that the gains are to some extent linked to a shorter time before the contractor gets involved, rather than that the contractors perceive that they were able to build significantly faster.

When it comes to managing *risk,* the respondents' understanding was mainly that partnering reduces cost risk for the builder and contractor, but to a lesser extent for projecting/planning. The variation in the answers was small, and no one disagreed with the claim that partnering reduces risk and increases predictability for the parties with respect to the project's costs. For the builder and contractor, risk is reduced both through the form of competition and the

joint development of the project. The projecting engineers are to a greater extent dependent on the mechanisms chosen in the builder's contract strategy. There may be reason to pay attention to the design of appropriate incentives towards the projecting partner in order to meet the transparency requirement and ensure active and inclusive participation in the partnering also for this important part of the development work.

The study also looked at whether the interaction had affected the degree of *conflict*. The interviews indicate a reduced incidence of conflicts both during the construction process and afterwards. The variation in the answers is small. We consider this a good indication of that the partnering projects that we have studied, and represent many of those conducted so far, have worked as intended.

As mentioned above, we asked some additional questions, mainly related to incentives, partnering culture including trust and interactions, balance of power and changes related to competence needs in the partnering projects. In terms *of incentive schemes,* they were consistently reported to function satisfactorily, but that a somewhat stronger incentive structure was sought for the projecting/planning engineers. When it comes to *culture*, good management and organization design emerge as a premise for trust and transparency. Again, an expansion in a future study with examples from failed partnering projects will be able to add important knowledge here. The *balance of power* between the actors is highlighted in the literature as an important premise for avoiding opportunistic behaviour and reluctance to adapt to the project partners, with the aim of bringing about a positive productivity development. As a matter of fact, in most cases the balance of power is skewed simply because one of the parties possesses the financial means. The interviews revealed examples of unfortunate imbalance. Balance of power and exercise are an important topic that should be observed in the future. When it comes to *competence needs,* there is obviously a need for the contractors to upgrade their skills to take over traditional builder-led tasks. At the same time, it is also important to ensure that the builders retain a high buyer competence to be an equal and competent participant in the partnering processes.

The findings of this study are considered to be analytically generalizable based on the theoretical framework of the study, but there is some uncertainty about the importance of competitive conditions in the market and the extent to which the use of partnering affects them. In our view, to a significant extent the empirical findings combined with the theoretical framework reflect what one can expect to find in other, reasonably well-functioning partnering projects. There is nothing in the findings that violates what recognized theories provide

support for. However, to some extent rival theories related to competitive conditions create some uncertainty associated with causes and effects regarding this point. It could also well be that e.g. weak management and various corporate cultures that do not easily play together, may transform well-functioning cooperation into information asymmetry, experienced imbalance in power structures and the risk of opportunistic behavior. This may entail a subsequent need for costly control mechanisms. Positive productivity effects can then easily evaporate.

Discussion and tentative conclusions

Partnering models have been relatively recently adopted in Norway. As a point of departure, they are demanding to adapt to for the parties involved. An insightful and present management is required, together with a suitable competence profile in the team and an understanding of the requirements for successful partnering. Furthermore, the partners need an extensive ability to conduct development work that raises demand for flexibility and the ability to make compromises. Important framework conditions for partnering are contractual designs with bonus/malus schemes and mechanisms for risk sharing. The main idea with partnering is to reduce the information asymmetry between the parties that often creates the need for complete contracts, control mechanisms and the risk of opportunistic behavior. The purpose is to use the expertise of the participants to increase the productivity of the construction projects.

This study has pointed to the use of classic theories of new economic geography and industrial organization as means for gaining a better understand of the nature of partnering. The conceptual ideas behind partnering (Model C in particular, Integrated Project Delivery) corresponds well with this theoretical framework. The study has also briefly described what can happen if asymmetry between the parties occurs in terms of power balance and flow of information. This asymmetry problem may be very demanding to handle in the individual project, but it can also represent challenges in the longer run. In principle, partnering can reveal individual partners' cost profiles as well as ideas for improvements that they may fear come into play, and perhaps give the other partners comparative advantages in future competitions. This may often be more about informal and tacit knowledge, and not necessarily about formally regulated Intellectual Property Rights (IPR). Thus, it is probably not sufficient to establish good systems in the individual project if this does not entail an

understanding of how governments, builders, industry and users can contribute in a longer run to establish forms of competition that can make the partners confident that the competition takes place on a level playing field. One possible inherent factor that can contribute to this is that larger and more complex projects cannot easily be imitated based on previous experiences but will have a need for a development process that stands of its own[2]. Furthermore, there is every reason to pay attention to the mechanisms that can undermine the partnering process and affect the competitive climate. Setting specific requirements that may result in larger initial investments among those who participate in a competition may cause concentration to fewer players. Large tenders entailing substantial capital requirements for the players are also likely to entail a concentrated marked. Too few actors may tend to curb the power of innovation. Failure to meet the necessary management capacity and transparency culture may result in closed books, costly control mechanisms and the productivity gains outlined in chapter 2 (illustrated in Figures 7 and 8) are excluded. This can be an important topic if actors with vastly different corporate cultures are to interact. This may happen e.g. in a situation with a stronger focus on international competition. So, there will be some trade-offs that there may be good reasons to examine, also based on international experiences.

Finally, an important reminder is that the interactions should be used for what they are intended for, namely to improve the implementation and quality for the end customers within the budget, through processes where the partners' innovation potential is fully utilized. This means that a unilateral cost focus is not necessarily what should be at the forefront, even if increased productivity in the various processes should be an objective in its own. In this case, one may miss out on important added value of the projects. Rather, one should have a

[2] In some industry clusters within e.g. electromechanical industry, the use of such informal (tacit) knowledge among other actors in the cluster is a well-known phenomenon that has been used to explain why these clusters have been quite prosperous through a relatively long period of time. In an international context, there has been a low propensity to claim IPR in the form of patents within these clusters. At the same time, this industry culture has not been aimed at imitating the neighbouring companies, but rather to use the knowledge for one's own innovations. In principle, this represents a long-term reciprocal balance between the parties that is in line with the principle of reciprocity that Axelrod (1990) highlights as an equilibrium in repeated games, briefly described in chapter 2.

broader *efficiency perspective* that also includes more productive solution methods and increased quality for the user.

Some characteristics of partnering are illuminated here, along with a discussion of important premises that should be in place to make partnering work. We have also pointed to some factors that can reduce or eliminate gains from partnering. Many of these are known from common market games where the parties are in asymmetric power-dependency relationships and where they are not necessarily willing to share information.

Partnering is a demanding implementation model. We believe that this conceptually interesting way of working should be examined further through follow-up studies, along with an emphasis on gaining a better understanding of the factors that can reduce or remove the benefits that the interactions can provide. One aspect that may be worth paying attention to is whether the rate of innovation decreases as the concept of partnering matures, i.e. there is a declining marginal utility connected to the development aspect of the partnering contracts as time passes. If this were to happen, one moves towards a situation where the subsequent project is more likely to imitate the previous one. This may in turn affect the motivation to participate and perhaps even influence the competitive situation in the market. Some topics for further research are described in more detail in chapter 6.

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