



Moral hazard and construction procurement: A conceptual framework

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Abstract

The first aim of this paper is to clarify the meaning of moral hazard in the context of construction procurement. Two important points are that typically there is a *double* moral hazard problem, as the client also can “misbehave” in a number of ways, and that both *internal moral hazard* (within the client and contractor organization) and *external moral hazard* (between client and contractor) must be handled.

The second aim of the paper is to give an overview of strategies to reduce the risk of moral hazard. Eight different strategies are identified: 1) “the shadow of the future”, promises of future work if effort is high 2) selection mechanism for contractor/employee, 3) length of contract, length of warranties, 4) level of detail in the contract, 5) payment systems, 6) monitoring intensity, 7) social norms, and 8) relation specific investments.

At the end of the paper a number of questions for future research are identified. Can the strategies be grouped into an ideal type of hard/formal strategies (with e.g. detailed contracts, more monitoring, and choose the bidder with the lowest price) and soft/informal strategies (with e.g. long term relations and more flexible contracts)? How are methods used internally and methods used externally to reduce moral hazard related? What are the differences in these respects between private sector procurement and public sector procurement methods?

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1. Introduction

The construction industry is of major importance when developing a modern and sustainable society, since it heavily impacts on the so called triple bottom line of economic, social, and environmental sustainability: 1) it is one of the major sectors in the economy in most countries (8% of GDP in Sweden) and its products (e.g. commercial buildings, plant facilities, and infrastructures) have major economic effects on other industrial sectors as well; 2) its products and processes chiefly impact the social dimension of our modern society in terms of “quality of life” (e.g. architectural quality and indoor climate); and 3) its products and processes are also responsible for high energy-consumption, waste generation, and pollutions (CIB, 1999; Ortiz et al., 2009; Bradley, Robichaud & Anantatmula, 2011).

Production processes and their output in terms of constructed products are performed in inter-organizational project-based relationships in which clients and their suppliers (e.g. contractors and their subcontractors) together create sustainable value. These inter-organizational relationships are heavily affected by the clients’ procurement strategies. How the client procure and govern a project will affect the actors’ attitudes and behaviors, not only towards each other but towards the surrounding society and its quest for sustainable development. Especially, procurement strategies may guide project actors’ collaborative and opportunistic behaviors and thereby affect project performance.

In the literature on inter-organizational relationships, the phenomenon of moral hazard and opportunism has received a lot of interest (Heide & John, 1990; Rindfleisch & Heide, 1997; Lado et al., 2008). Hence, designing governance mechanisms that reduce transacting partners’ will of and opportunities for behaving opportunistically is an important aspect of purchasing and supply chain management (Wathne & Heide, 2000). Literature on inter-organizational relationships is mostly based on either transaction cost economics (TCE) (e.g. Williamson, 1979; 1985) or relational contracting (RC) (e.g., Macneil, 1978; Uzzi, 1997).

Classic TCE has a rather negative view of decision makers, picturing them as “the economic man” that will make rational choices based on self-interest, which may involve opportunistic behaviors (Ghoshal & Moran, 1996). Because it is difficult and costly to distinguish between opportunistic and non-opportunistic actors, the decision maker should behave *as if* all actors are opportunistic in transactional exchanges. From a TCE perspective it is thus important to design contracts and control mechanisms that minimize the will of and opportunities for other actors to be opportunistic. RC has a more positive view of decision makers, arguing that transactions are mostly embedded in relationships (Noteboom, 1996), which may affect decisions towards less self-interest seeking and more collective thinking in relational exchanges. As such, RC criticizes the *as if* assumption in TCE and highlights the importance of relational norms based on trust and reciprocity as phenomena that may discourage transaction partners from behaving opportunistically. Several scholars argue for a more tempered view of human nature, based on both these perspectives, recognizing the importance of both opportunism and relational aspects, such as trust (Noteboom, 1996; Joshi & Stump, 1999; Lado et al., 2008). Hence, in this paper we merge the TCE and RC perspectives in order to reflect on how transacting partners can design governance mechanisms that discourage opportunistic behaviors both in transactional and relational exchanges.

The challenge of managing opportunism is greater in complex transactions characterized by high asset specificity since opportunistic behavior in such transactions cannot simply be responded to by termination of the relationship, due to high switching costs (Williamson, 1985). Hence, it is especially interesting and relevant to investigate policies and strategies for managing opportunism in complex procurements. Furthermore, prior studies on opportunism have mostly focused on the firm level (Wathne & Heide, 2000) and the supplier side (Lado et al., 2008). However, Hawkins et al. (2008) highlight the importance of discussing opportunism also at the buyer side of a relationship and at both firm and individual levels, since trust and opportunism often are related to behaviors conducted by individuals within the firms. Accordingly, a firm's opportunistic tendencies may either be exacerbated or alleviated by individuals' behaviors (Wathne & Heide, 2000).

In this conceptual paper we reflect on different ways to mitigate opportunistic behaviors at both the buyer and supplier side in complex transactions and at both firm and individual levels. We have chosen to focus our attention on client-contractor relationships in the construction industry for two main reasons. First, construction projects entail complex procurements involving interdependences among many different technologies, sub-systems, actors and their activities. Second, many prior studies in the construction industry have characterized client-contractor relationships as adversarial and opportunistic, and in need for more cooperative governance arrangements (Ng et al., 2002; Naoum, 2003). Hence, it seems valuable to reflect on how a broad range of policies and strategies for managing opportunism can be deployed in construction projects.

2. The concept of moral hazard

2.1 The basic definition

Moral hazard is typically defined as "post-contractual opportunism". Opportunism implies that actors are self-interest seeking with guile; they will deviate from the letter and the spirit of an agreement when it suits their purpose (Williamson, 1985). Two parties are assumed to have entered into a contract and agreed upon various rights and obligations. The parties have however different interests and as there might be incomplete and/or asymmetric information one party can act from its own interest, at the cost of the other party. Typically the result is an inefficient situation as the cost for the other party is higher than the gain for the opportunistic party, otherwise they could have agreed and contracted on this outcome.

Baker (1996: p. 240) discusses the history of the concept and argues that the origin of the concept of moral hazard comes from

"the nineteenth-century fire insurance trade, where it grew from seeds planted in probability theory and marine insurance. Like the concept of moral hazard today, the nineteenth-century concept of moral hazard had both a technical meaning and a larger cultural significance. For nineteenth-century insurers, "moral hazard" represented an unwholesome mix of bad character and temptation which the insurers had a responsibility to ferret out from the insurance enterprise. The concept's significance lay not in the recognition that

insurance could have undesirable consequences (which was widely believed at the time), but instead in the claim that the undesirable consequences could be controlled”.

Moral hazard is typically seen as occurring in a Principle-Agent relationship where the “Principle” (e.g. a construction client) wants the “Agent” (e.g. a construction contractor) to do a certain thing, but where the Agent, because of moral hazard, do not behave or deliver the product/service as expected or agreed.

It should however be underlined that there is also a moral hazard problem from the Agent’s perspective. This is because also clients may behave opportunistically in an inter-organizational relationship (Hawkins et al., 2008). A simple case is where the contract stipulates that the Agent shall carry out a certain work and then get a contracted payment, but where the Principle does not pay as agreed. In most relations it can therefore be what is called “Double Moral Hazard” where both the Principle and the Agent may act opportunistically (see e.g., Demski & Sappington, 1991, and Gurtler & Kräkel, 2007).

2.2 External and internal moral hazard

It is important to underline that moral hazard problems can occur both in employment contracts and in contracts between organizations. In order to make this clear we will introduce and discuss the terms internal and external moral hazard.

External moral hazard is the classical case when one organization behaves in an opportunistic way towards another organization, for example the contractor does not carry out the work in a way that was expected according to the contract, or the client does not pay the contractor according to the agreement.

Internal moral hazard is defined as moral hazard *within* an organization and this can occur on a number of different levels, for example by the CEO in relation to the board and between the CEO and managers at lower levels or between these managers and the workers on the construction site. It is common that the contractor hires various subcontractors, but in order to simplify the discussion the relation between the contractor and the subcontractors will be seen as internal relations. The whole contractor structure (i.e., the supply chain) will be seen as one supplier organization and all moral hazard problems within this supply chain will be called internal moral hazard problems on the contractor side. In the same way the client organization will be seen as one organization.

3. Examples of possible moral hazard problems in construction projects

Prior literature on opportunism in inter-organizational relationships provides many examples of opportunistic behaviors that can be both (i) active (e.g., stealing, cheating, breach of contract, distorting data, making false threats and promises, cutting corners, delivering substandard products, cover ups, deceiving, and misrepresenting, and (ii) passive (e.g., shirking, late payments, and withholding information) (Parkhe, 1998; Wathne & Heide, 2000;

Hawkins et al., 2008). In this section we provide examples of both active and passive opportunistic behaviors in a construction project context by dividing opportunism into external/internal and related to client/contractor behaviors.

3.1 External moral hazard

Possible opportunistic behavior by the contractor:

- Not doing the best he can, not careful, lack of effort
- Replace more expensive parts with cheaper parts that have lower quality
- Reports that more work has been executed than what has actually been done (e.g., in cost-plus or unit price contracts)

However, it may be difficult to determine if unsuitable behaviors involve opportunism or lack of knowledge. Mokhlesian (2014) points out that what might look like low effort and opportunistic behavior by the contractor might actually be the result of misunderstandings of the client's demand.

Possible opportunistic behavior by the client

- Do not pay on time
- Demands work that was not to be expected according to the contract
- Refuse to approve of work even if it is done according to the contract

3.2 Internal moral hazard

In a study of purchasing professionals' opportunistic behavior it was found that individuals' opportunism was affected by their own honesty/integrity, subjective expected utility, and managers' willful ignorance (Hawkins et al., 2008). There are many ways in which individuals may behave opportunistically in internal relations:

Possible opportunistic behavior in the client organization:

- Employee enters into a contract without necessary approval
- Employee selects contractor without following internal rules
- Employee approves of work even if it has not been done according to the contract

The opportunistic behavior can be the result of low effort, lack of knowledge or some form of bribery. In addition, Borenstein et al. (2012) discuss internal moral hazard problems in terms of "career concerns" and argue that personnel that are risk-averse and afraid of how the outcome might affect their careers, may avoid the value-maximizing alternative and instead choose a safer option. Jonsson (2010) gives examples of similar mechanisms. Hrab (2004: p. 70) argues that one general problem in public procurement is incentives inside the public sector and that it "requires a framework that creates incentives for the public sector to effectively develop, implement and assess service quality arrangements".

Possible opportunistic behavior in the contractor organization:

- Employee does not follow orders concerning for example quality of work and security arrangements
- Employee does not follow rules concerning for example selection of subcontractor
- Employee does not supervise work in a way that was agreed

4. Policy options

In this section we discuss how eight different policies or strategies for governing transactions may be used to deter opportunistic behaviors. The policies can either relate to features determined (i) *ex ante* (i.e., before the contract is signed), or decisions that concern behavior (ii) *ex post* (i.e., after the contract is signed).

To the first group of policies belong long-term relationships in repeated games, selection mechanisms, length of contract in a single game, detailed contracts, and payment systems. To the second group belongs monitoring, relational norms, and mutual investments. Even if many of these policies primarily are formulated for external moral hazard problems they are also relevant for internal moral hazard problems as will be exemplified below.

4.1 Repeated games through long-term relationships – “the Shadow of the Future”

Long-term relationships can create long-term benefits of collaboration that can be greater than the short-term benefits of opportunism, due to the shadow of the future (Rokkan et al., 2003). The shadow of the future is therefore a critical aspect affecting opportunism since it provides an opportunity to reward good behavior and punish opportunistic behavior (Heide & John, 1990; Laffont & Tirole 1993). One of the central results in game theory is that it is easier to get “cooperation”/“good behavior” in repeated games, due to the shadow of the future (see e.g., Axelrod, 1984). Long-term contracts connect subsequent games into a long series of rounds, together constituting one extended/repeated game (Brandenburger & Nalebuff, 1996).

The mechanism behind this strategy is simply that a party to a contract may not act opportunistically, even if the contract is incomplete and/or monitoring is incomplete, if that means that there is risk of losing future business opportunities. The repeated games mechanism can in principle be used in all the potential moral hazard situations described above, both for internal and for external moral hazard problems. People can be promoted and/or be promised higher wages in the future if they behave well today, while the risk of opportunistic behavior may be higher in short-term employment relations or where there are no career opportunities. Palm (2015) describes a case where a company changed from a “flat” organization structure to an organization with more hierarchical levels just to create promotion opportunities. As mentioned, business relations can be prolonged or terminated depending on how well the party has performed in the current contract and in earlier contracts.

In the construction industry, this classical strategy for managing opportunism is not as widely spread as in other industries, due to lack of long-term contracts. Since relationships in the

construction industry are mostly focused on short-term benefits in single projects, the parties may attempt to lever what they can out of the existing contract, resulting in opportunistic behavior in adversarial relationships (Voordijk et al., 2000; Cox & Thompson, 1997). However, repeated games also exist in the construction industry when the players perceive the chance of collaborating again in the future to be high (Eriksson, 2007). One way to formalize and make the repeated game mechanism more credible is to include explicit options in the contract, that is, an option that the contractor also will get a future contract (or a prolonged contract) if the client is satisfied with the performance of the contractor (see e.g., Lind & Mattsson, 2008). However, from a game theoretic perspective options does not provide motivation to cooperate in the last round of the game, that is, during the last project in a series of projects there is no deterrence of opportunistic behavior (Eriksson, 2015).

Another way to make players (suppliers) connect games is to let the partner selection processes be affected by prior experiences with and performances of the suppliers (see section 4.2 below). For private clients, it is not necessary to be able to prove for a third party – for example a judge in court – that the other party has not fulfilled their obligations in a satisfactory way. It is enough that the Principal has indications that the Agent hasn't behaved according to the agreement, and take measures, for example by delaying a future contract or terminating a relationship. For public clients, however, it is important to register and document opportunistic behaviors so that suppliers that have behaved opportunistically and performed poorly can be excluded in the pre-qualification stage of future procurements (Eriksson & Hane, 2014).

In several articles that have analyzed highway procurement in California it is argued that it can be rational to use more negotiations and relational contracts and not only auctions (Gil & Marion, 2009; 2012). The main argument for this is that when the procurement concerns complex objects, creating incentives through repeated interaction is one possibility. They also show empirically that expected future relations affect bidding behavior. Similar arguments on a more general level can be found in Spagnolo (2012). Tadelis (2012) sees this use of negotiations and the shadow of the future as an important lesson for public procurement design from procurement in the private sector.

There are a number of limitations that can make it difficult to use the repeated game mechanism.

- The client may not need this specific kind of work in the near future.

In this case the repeated game mechanism can only work if the client can give information to other clients about the performance of the contractor. This mechanism can be found on a number of Internet sites, such as travelling sites, where former customers grade the performance of the company (e.g., a hotel) and clients in the construction industry can build similar systems. There are however obvious problems concerning the reliability of the information.

- The client must be able to credibly signal that they will take performance into account.

Here there are also a number of problems. As abovementioned, there might be legal rules, e.g., in public procurement, which make it difficult to take non-verifiable information into account. The client may need to develop a credible verifiable information system in order to be able to take earlier performance into account and this can be costly. There can also be measurement problems that can make the contractor unsure about whether the client will know how well they have performed. Finally there can be internal moral hazard on the client side that may lead to false reporting of the performance of the client. Jonsson (2006) discuss cases where staff at lower level get punished if they monitor to intensely and/or report quality problems in contractor performance as that may delay a project – and top management have promised that the project should be completed at a certain date. The repeated game mechanism presupposes both that the quality of the contractor can and will be measured in a correct way and that this information actually is taken into account when the client makes decisions in the future. Warsame (2007) reports a case where a client found out that a contractor had misbehaved but still continued to use the contractor as the client was afraid that other contractors also would misbehave –and in ways that they may not spot. These problems could lead to a “low-effort-equilibrium” where companies continue to get work even if they misbehave because everyone else is also expected to misbehave.

- The contractor or the staff of the contractor may not care about future work from the client (and either believes that the client cannot credibly signal to others or that others do not care about such signaling).

A classical case is where a company knows that it is about to go bankrupt, and then it can be rational for them to take more risks and produce with low quality even if that could reduce future work possibilities. Internal moral hazard problems on the contractor side can occur if the specific employee believes that even if the company will be punished by bad behavior, it will not affect this employee, e.g., because they plan to quit and work for another company (and believe that the low effort work at the current employer will not affect their own future career in another company). Warsame et al. (2013) and Brunes & Lind (2014) discuss that disclosing more information on the individual level about “who did what” in a project can strengthen the reputation mechanism on the individual level.

4.2 Selection mechanisms (in single games)

Assume that for some reason the repeated games alternative is not expected to work well or that it at least need to be supplemented with other mechanisms. In this section the focus is on contractor selection criteria, and we will only briefly touch upon the reverse problem - client selection. A recent Swedish study, however, confirms that contractors normally think about if they want to work for a certain client, or if the client is too unreliable and too risky to work with because of moral hazard problems on the client side (Eriksson & Hane, 2014). Evaluation of applicants for a time limited job (e.g., temporary staffing for a particular project) is the internal moral hazard version of this, but this will not be discussed separately.

In RC-literature a straightforward way of managing opportunism is to select suppliers that are not opportunistically inclined (Wathne & Heide, 2000). Hence, partner selection

processes address both motivation and capability, aiming to choose suppliers that are both willing and competent to perform according the buyer's requirements (Heide & John, 1990).

Behavior in earlier projects is of course one selection mechanism, but in this section it is assumed that there for some reason is a single game – the client needs a contractor to do something and the client has not used any of these contractors earlier (or only many years ago) and they do not plan to use them in the near future. A detailed discussion on selection criteria for defense procurement in the UK can be found in de Fraja & Hartley 1996.

Many public clients seem to work in two stages, first some general prequalification rules and then in the second step, one contractor is selected. The strategy is based on the idea that as the public procurement typically is open for everyone, there is first a need to exclude some companies that seem unlikely to carry out the work in a satisfactory way. As described in for example Bajari et al. (2014) private procurement often seems to start with creating a “short-list” of companies judged to be generally qualified, and then only these companies are invited to submit a tender. Bajari et al. further argue that negotiated contracts are more common in the private sector, but also note that there might be a conflict between this and the risk for corruption. Reduced risk for external moral hazard could increase the risk for internal moral hazard. They write: "An important policy issue is whether it is possible to construct a mechanism that balances ex post adaptation costs with the potential for corruption. To the best of our knowledge, this question has not been explored in the existing theoretical literature. Our research suggests that developing such a mechanism could dramatically improve efficiency in public sector procurement" (Bajari et al., 2014: p. 1318).

The prequalification stage in public procurement has similarities to creating this short-list in the private sector, even though earlier performance seems to play a large role in the creation of the short list, but typically are only included as general conditions in the public sector prequalification criteria. Prequalification criteria include for example: No criminal record, e.g. no tax fraud, earlier experience of work in the specific area and/or an organization of suitable size and with necessary competence

Selection criteria are for example: Only price, a combination of price and various “quality indicators”. This can be designed as a point system where different qualities are evaluated and each contractor is given a certain number of points, which are added up with a certain weight system. Commonly, these softer quality indicators focus on the competence and capacity of contractor's staff.

There is a tradeoff between Prequalification criteria and Selection criteria if they are looked at from a moral hazard perspective. It is well known that choosing the contractor with the lowest price is risky from a moral hazard perspective (see e.g., Eriksson, 2010). The contractor may have underestimated the problems of carrying out the task and realize after a while that it will be difficult to make a profit out of the project (“the winner's curse”). Therefore they will try to “cut corners” and deliver a product of lower quality in ways that can be difficult to find out for the client. If there are stricter prequalification criteria only the knowledgeable companies will remain after prequalification, and then choosing according to lowest price would be less risky. If prequalification criteria are set rather low, then it becomes more important to include various “quality criteria” in the selection of contractor.

Internal moral hazard problems may also affect the choice of procedure. If it is expected that the staff (or the organization) as a whole will not carry out the evaluation of the qualities of the companies in a fair way, then one alternative is to use only the price as selection criteria and then try to reduce (external) moral hazard problems in other ways. Instead of finding a contractor that the client believes is reliable, the client tries to design a contract that will work even if the contractor is known to behave opportunistically (see Section 4.4 below).

If the client knows that there might be internal moral hazard problems on the contractor side, and also difference in competence within the contractor organization they may want to specify who on the contractor side that should be responsible for the project. These clauses are however problematic from a moral hazard perspective if the contractor still at a later stage can change the staff. If the selected person dies or quits there is no alternative but to change the person responsible, but in other cases there might be changes in priorities and reallocation of staff within the contractor organization. Here it is easy to see that there might be incentives for the contractor to say that person A will be responsible – a person that is respected by the client – even if they know that it is very unlikely that person A actually will be responsible for the project. Penalties of some kind must then be included to make the contract more credible.

4.3 The length of the contract in a single game

Assume that for some reason the mechanisms described above are not judged to be good enough, or at least that further mechanisms to “guarantee” good performance are necessary. One alternative is then to give the contractor responsibility for a longer period of time, e.g. through:

A bundled contract: If the worry is that the contractor, because of asymmetric information and opportunistic behavior, will deliver a product of lower quality that will lead to higher operation and maintenance cost, then one strategy is to write a bundled contract that includes construction and operation/maintenance for a number of years.

Longer warranties: Another way to reduce the risk discussed above is to include a longer warranty period, so long that any problems related to low quality of the work will surface.

There are, however, some common problems with long-term contracts, and at least partly independent of whether they are in the form of a guarantee or in the form of a bundled contract:

- The contractor may go bankrupt during the contract period, and perhaps even be aware of this possibility during the construction period.

- It might be difficult to specify the conditions for the warranty or for the quality of the operation of the facility, for example in situations with changing traffic flow and drivers not following rules (e.g. driving with too heavy trucks). When there is a warranty an additional problem is that how operation and maintenance are carried out will affect the quality of the

road, and a contractor may blame quality problems to mistakes made by the operator. Warranties are also sensitive for client opportunism. The client may behave opportunistically by not using the constructed product correctly and then refer to the warranty when the product malfunctions.

- Internal moral hazard problems within the contractor organization. Leiringer et al. (2009) and Leiringer and Schweber (2010) describe a situation where the construction division in a company sees itself as a separate company and do not care very much if they create problems for the operation and maintenance part of the organization. The individuals working in the company may also know that they may not work in the company when problems might occur in the future.

4.4 The level of detail in contract

Another dimension of the contract design that affects the possibilities for the contractor to behave opportunistically is how detailed the contract and the product specifications are made. Detailed contracts that specify all possible contingencies decrease the need for subjective judgments and decrease the possibilities for the supplier to act opportunistically. In complex transactions, however, it becomes increasingly difficult and costly to write detailed contracts that include all possible contingences (Artz, 1999; Houston & Johnson, 2000). Hence, detailed contracts may be difficult to develop and enforce in construction projects. As always there are differences in degree and Bajari et al. (2014, p 1317) argues that "since the source of these costs is the incompleteness of project design and specifications, an obvious policy implication is to consider increasing the ex ante costs and efforts put into estimating and specifying projects before they are let out for bidding."

Pertola (2013) who discusses lighting issues, argues that many contracts include clauses that make it possible for the contractor to replace a certain product with something of similar quality, but that in reality this means that they replace it with something of lower quality – and may get away with it because the difference is not verifiable. One solution for this is to specify exactly the products that shall be used.

Making the contract more detailed is of course also costly, both in terms of direct cost for writing the contract, but as discussed in Nyström et al. (2014), there are also advantages to leaving certain things open. The contractor can then adapt construction to their specific skills or use their established supply channels.

4.5 Payment systems: bonds, penalties and bonuses

A classic tool in the TCE framework to deter opportunism is "to administer incentives that reduce the payoff from opportunistic behavior" (Wathne & Heide, 2000: p. 44). Incentives may be based upon payment systems, that is, how the suppliers (and employees) are rewarded and punished for good and bad behavior/performance. The basic underlying logic of this policy option is to align the parties' individual interests by creating an incentive

structure that makes the long-term gains from strong efforts and cooperative behavior exceed the short-term payoff from opportunism and poor efforts (Wathne & Heide, 2000).

The general payment mechanism in the contract between a client and a contractor is one aspect in this context (see e.g., Borg & Lind, 2014). Cost plus contracts has obvious moral hazard problems, since they may lead to shirking and work delays if contractors are satisfied with getting their costs covered, for example in an economic downturn. Fixed price contracts, in contrast, put most of the risk on the contractor. This might lead to other forms of opportunistic behavior if the contractor has underestimated the cost, e.g. trying to reduce quality to save money. Bajari & Tadelis (1999; 2001) argue that moral hazard problems in construction can increase in fixed price contracts, especially if the contractor's bid is too low (see also Warsame (2012) who discusses that this can lead to quality problems which is one form of moral hazard). Unit price contracts allocate risk between the parties but open up for moral hazard problems in the reporting of the quantities that actually have been carried out (see Bruner & Mandell 2013).

One type of monetary mechanism that can reduce moral hazard is to demand that the contractor (or the client if the contractor fears that the client will not pay) "*put up a bond*" (Milgrom & Robert 1992). This can also take the form of a bank guarantee, and the idea is of course that if the client fear that the contractor will not carry out the work in a satisfactory way, the client can take the bond and finalize the work. If the client demand a "bond" from the contractor this however increases the risk for moral hazard by the client. The client may say that they have the right to keep the bond even if this is not actually so. Verification problems can increase this kind of risk.

Penalties and *bonuses* are another possible strategy. Lewis & Bajari (2011) studied empirically the effect of time penalties and estimate considerable welfare gains from this in highway procurement in California. They also discuss the tradeoff between incentives and reputational concerns.

Incentives, penalties, and bonuses are also connected to monitoring, which will be discussed in a separate section below, since it is hard to imagine monitoring without some form of penalties/bonuses, or penalties without some form of monitoring. If the monitoring party finds out that a certain work has not been done with the quality contracted, one can imagine that the contractor has to redo the work so it fulfills the quality demanded. In some situations this might not be rational as the cost of doing so would be higher than the value of the increase in quality. In that case a penalty would be the rational solution – and the penalty should be set higher than the marginal cost of producing the increased quality from the beginning. Otherwise the contractor would choose to produce with lower quality and take the penalty. In other cases, such as a project delay, it is not possible to "redo the work" and a monetary penalty is the logical alternative.

If the initial contract stipulates a certain quality and a certain payment, then bonuses can be used if the contractor produces with higher quality than agreed, e.g. if the project is ready before the agreed time, or if the contractor has come up with an innovative solution that may give long run advantages for the client.

Incentives and bonuses may also be used to mitigate internal moral hazard. Various more or less criticized systems for bonus payments have been used for employees in the financial sector (see Milgrom & Roberts, 1992, for historical examples). In construction projects bonus payments have been used to motivate workers to perform extra ordinary efforts and discourage shirking when production time is critical (Eriksson, 2015).

Verifiability is a general problem when adopting this strategy of using incentives like penalties and bonuses; the more difficult it is for a buyer/employer to evaluate the performance of a supplier/employee (and conversely, to detect opportunism) the lower the value of this type of policy as an enforcement device (Wathne & Heide, 2000). Problems with verifiability can also create uncertainty for the contractor. Is there a risk that they will have to pay a penalty even if they do everything right? Will they really get the bonus if they perform better than contracted? Palm (2015) describes an interesting case in a real estate management contract where the contract stipulates that the contractor can get a bonus if the client is satisfied with the work. No criteria at all are however specified, and an argument for this is that the contractor cannot cheat the client by performing well in the specified dimensions and bad in other. This type of bonus system will of course only work if the client has a reputation for being fair, and wants to keep up that reputation.

Another issue is if bonuses for higher quality should be used (except time bonuses). If the client wants higher quality, why wasn't a higher quality required in the contract from the beginning? A possible answer is that the contractor is uncertain about the marginal cost of higher quality during the tendering stage and thinks that this marginal cost is higher than the value of increased quality. Knowing that the contractor may be wrong in this and that the marginal cost actually is lower, the client could add a bonus (lower than the marginal value of higher quality) and then the contractor would produce the higher quality if the marginal cost is lower than the bonus, which can be assumed to be known by the contractor during the construction stage.

4.6 Monitoring intensity

A traditional tool to reduce the risk of moral hazard is increased monitoring intensity (Houston & Johnson, 2000; Wathne & Heide, 2000). Monitoring the agent's behavior increases the possibility to detect opportunistic behavior and match rewards and sanctions accordingly (Wathne & Heide, 2000). Monitoring can take many forms. A representative of the client (or employer) can visit the site without prior information and check how things are carried out. As mentioned in Lind & Nyström (2011) the work can be documented, for example by photographs and films and it is possible with the technology of today to continuously monitor construction sites with cameras. This means, for example, that the client can monitor all aspects of the work in real time from their office.

Monitoring is not only about "looking", it can also be to carry out various test during the construction period and during a warranty period to see that various quality targets have been fulfilled. Karlsson & Wennström (2012) describe a number of aspects that were measured in a project that involved both construction and operation/maintenance, and was procured using functional demands.

It should be underlined that monitoring here means monitoring by the client or the employer. In some cases there are “quality systems” where the contractor documents quality without the direct involvement of the client. From a moral hazard perspective these systems seem rather risky, unless there are other mechanisms that reduce moral hazard.

Hansson (2012) argues that one role of private companies is to monitor public procurement and that these companies can be seen as "private whistleblowers". They may be able to fulfill this role better than civil servants that may fear sanctions to a large extent. Similar arguments can be found in Racca et al. (2011).

Monitoring is costly in several ways. The obvious cost is that it takes time for the client to control the contractor/employee, but there can also be more indirect costs, especially if people do not like to be controlled. In that case the contractor would have to demand a higher price if they know that they will be monitored as they would have to compensate the employees with higher pay. Many studies also suggest that intense monitoring can cause frustration and decrease trust and shift the relationship towards less collaboration and more arm-length interaction, which in turn may increase the partner's propensity to behave opportunistically (Ghoshal & Moran, 1996; Wathne & Heide, 2000; Malhotra & Lumineau, 2011). Furthermore, in complex transactions with performance ambiguity, increased monitoring may be inefficient since it is difficult to identify and distinguish between suitable and opportunistic behavior (Heide & John, 1990; Stump and Heide, 1996; Houston & Johnson, 2000). Lind & (2011) question this and argue that what is observable also is verifiable.

Falk & Kosfeld (2006) discuss a more subtle cost of control. If the contractor (or employee) has found out a smart way to do a certain thing they may want to keep this a secret as long as possible, and then they might not use this method if their work is closely monitored as information about their method then would be dispersed to other companies. If the contractor/employee does not want to use the most efficient method because of monitoring then this would increase the cost of the client further.

Monitoring may also be problematic from the perspective of internal moral hazard. Can the company be sure that the person that should do the monitoring really will monitor in predetermined ways? There might of course be direct bribes to look the other way, but also more subtle mechanisms can be at work. The monitor may become friend with the one monitored and therefore give a biased picture. As mentioned above there might also be signals from higher levels in the client organization not to monitor the contractor too closely in order to avoid delays.

4.7 Social norms based on trust and reciprocity in partnering relations

In RC-literature, socialization is a common strategy for managing opportunism by developing relational norms, aligning the values and goals of the buyer and supplier (Artz & Brush, 2000; Wathne & Heide, 2000), or the employer and the employee. Relational norms serve as codes of conduct, prescribing certain behaviors and discouraging others, which promote mutuality

of interest, and the creation of joint value rather than pursuit of individual goals and value claiming (Heide & John, 1992; Rokkan et al., 2003). Relational norms based on trust foster a spirit of cooperation that can lower the costs of a transaction by reducing the extent of opportunism and therefore also the need to safeguard against opportunism (Hagen & Choe 1998; Sako & Helper, 1998, Brown et al 2012). In addition, expectance of continued exchanges in a long-term relationship lowers ex post bargaining costs as a repeated game allows for more future opportunities to correct transaction inequities (Dyer, 1997). In relationships with reciprocity norms, an unfair situation or behavior will be remembered and corrected in the next transaction. Similarly, opportunistic behaviors can be retaliated in the next transaction.

Many scholars mean that detailed contracts and relational norms based on trust and reciprocity are substitutes. From this perspective, contracts may be interpreted as a sign of distrust, for which reason a strong focus on contracts will diminish trust (Bradach & Eccles, 1989). This can result in a negative spiral where detailed contracts leads to decreased trust and increased opportunism, which in turn increase the need for further coercion and even more detailed and legally binding contracts (Goshal & Moran, 1996). From the positive side of this perspective, increased trust will deter opportunism and thereby diminish the need for detailed contracts (Das & Teng, 1998) and monitoring (Parkhe, 1998). However, some studies have found that trust and relational norms can complement contracts in complex procurements (Powell, 1990; Woolthuis et al., 2005). If contracts are not perceived as strict legal safeguards, but rather as coordination mechanisms and signs of commitment, then trust and contracts can be complementary (Woolthuis et al., 2005; Nyström, 2007).

It is well-known from experimental studies that reciprocity is a strong force in human behavior (see e.g., Fehr & Gächter, 2000, for an early overview). One strategy to reduce moral hazard problems – from the perspective of both parties – is to try to establish a relation of trust and reciprocity. This is one core idea behind the idea of Partnering, see e.g. Nyström (2007). The possibility to establish this should be higher if there is a double moral hazard problem, as both parties then might fear an adversarial climate. Otherwise the contractor might see the client's demands for a partnering contract as only an opportunistic device, and not trust that the client will behave with reciprocity.

There are a number of practical procedures to establish a partnering relation and there might be reputation elements involved also, as some companies might have partnering as a business model and then lose reputation if they do not behave according to the reciprocity principle. Establishing and preserving trust is not easy and external circumstances may put too much pressure on the parties so that they primarily have to guard their own interest. Dalvén (2014) describes two large partnering projects and in one of them such external events with cost overruns and delays as consequences led to the collapse of the partnering model.

Problems may also be related to internal moral hazard problem on both client and contractor side as the staff involved in the project may not be loyal to the partnering model. Accordingly, Ouchi (1980) argue that socialization is not only relevant for mitigating opportunism between transacting partners but for internal moral hazard too. Internal socialization can make workers accept organizational goals as their own (Ouchi, 1980).

Hence, it is important to socialize internal staff and establish relational norms within the organization before trying to rely on this policy option when collaborating with other organizations.

4.8 Mutual relation specific investments

In classical TCE, relation specific investments create dependence and vulnerability to opportunistic behavior and therefore such investments need to be safeguarded by detailed and legally binding contracts (Williamson, 1979; 1985). However, in more recent studies, relation specific investments have been found to reduce opportunism in certain circumstances. The logic behind this is that relation specific investments will provide benefits not only for the investor but also for the receiver and thereby increase switching costs for both actors, which will decrease their propensity for opportunistic behavior (Rokkan et al., 2003).

In their study of 198 buyer-supplier relationships in the building material industry Rokkan et al. (2003) found that in line with TCE arguments specific investments made by one of the partners may promote opportunism in short-term arm-length relationships. However, in more long-term collaborative relationships characterized by strong relational norms, relationship specific investments decrease opportunism (Rokkan et al., 2003). To promote relation specific investments, there need to be a long-term contract or a norm of reciprocity in place so that the part doing the investment can anticipate a longer payback period (Dyer, 1997). Hence, there are positive interaction effects among the three policies of long-term contracts, relational norms and relation specific investments.

Other studies have shown that mutual investments made by both partners increase their mutual dependence, which will decrease their propensity to behave opportunistically (Williamson, 1985; Moran & Ghoshal, 1996; Artz, 1999; Joshi & Stump, 1999). Mutual investments from both parties will create a situation where both parties risk their investments if they behave opportunistically (Heide & John, 1990). Hence, relation specific investments increase the shadow of the future and the expectation of future interaction, which deters opportunism and promotes collaboration (Heide & Miner, 1992; Parkhe, 1993; Dyer, 1997).

5. Concluding discussion and future research

In this paper we have described how eight types of strategies may reduce the risk of both external and internal moral hazard. In this section it is discussed how these different strategies are connected and may be grouped into two ideal types; hard/formal and soft/informal strategies (see Section 5.1). Furthermore we discuss when these two ideal types may be used; in what situations they are most appropriate (see Section 5.2). We also discuss how internal and external strategies are connected in Section 5.3.

5.1. Two ideal types of strategies for handling moral hazard problems

In several articles (e.g., Bajari, MacMillan & Tadelis, 2008) the choice is described in simplified terms as “Auctions vs negotiations” and maybe the choice can more generally be described in simplified terms as “hard/formal” strategies in arm-length relationships versus “soft/informal” strategies in collaborative relationships.

The ideal type of a hard/formal strategy would then be characterized by:

- detailed specification documents
- strict prequalification rules
- contractor selected by auction/lowest price
- strict monitoring related to penalties.

The ideal type of soft/informal strategy would then be:

- more general specifications and flexible contracts
- choose contractor that has good reputation and that is dependent on good reputation (“shadow of the future”), good relations between client and contractor since earlier projects.
- negotiations about the price
- less monitoring and less use of penalties
- strong social norms based on trust and reciprocity
- Mutual relationship specific investments

These two ideal strategies are summarized in Table 1, where the 8 different types of strategies to reduce moral hazard are grouped in two columns. The focus is here primarily on external moral hazard and the client-contractor relation, but it is easy to reformulate in the context of employer/employee relationships.

Table 1. Two main types of strategies for handling moral hazard

	Hard/formal strategies	Soft/informal strategies
Shadow of the future	<i>Not important: Short-term relationship in one single project</i>	<i>Important: Long-term relationship spanning several projects</i>
Selection mechanisms	<i>Strict prequalification rules and contractor determined by auction/lowest price</i>	<i>Partners are selected based on capabilities and prior experience</i>
Length of contract in each project	<i>Short and limited contracts for each project stage</i>	<i>Longer and broader contracts spanning several project stages</i>
The level of detail in contract	<i>Detailed contracts and specification documents</i>	<i>General and flexible contracts and specification documents</i>
Payment systems	<i>Fixed price or cost reimbursement with penalties</i>	<i>Cost reimbursement coupled with incentives/bonuses</i>
Monitoring intensity	<i>Strict monitoring related to penalties</i>	<i>Less monitoring, random inspections</i>
Social norms	<i>Social norms are not actively established</i>	<i>Partners work actively to establish strong social norms</i>
Relation specific investments	<i>Relation specific investments are avoided</i>	<i>Inter-dependent partners make relation specific investments</i>

As discussed above there might be positive interaction effects among different policies, for example between long-term contracts, relational norms and relation specific investments.

5.2. The suitability of the two ideal types of strategies – a contingency perspective

In small, standardized and simple projects of one-off nature, the hard/formal strategy should be suitable. The one-off nature entails that the shadow of the future is short, which increases the need for addressing moral hazard problems in other ways. Since the project is simple and standardized it is rather easy to prepare detailed contracts and design documents that foresee most potential future contingencies. Furthermore, since the project is quite straightforward to manage, the selection of contractor is not crucial; there are many possible contractors to choose from and the selection can therefore be based on lowest price. Payment can then be in terms of a fixed price, or cost reimbursement if the client wants to enhance changes in the scope or content of the project. Penalties may be used connected to time, to mitigate shirking when reimbursement payment is used. In order to make sure that the specified quality is obtained in fixed price contracts, intense monitoring of contractors behaviors and output may be called for. Due to the simple and standardized nature of the project such monitoring is not overly difficult or costly. In cases with cost reimbursement the monitoring may also focus on efficiency and economic aspects, in order to detect potential shirking or cheating. Because of the intense monitoring, the establishment of social norms is not required and the simple, standardized, and one-off nature of the project entails that relation specific investments are unsuitable.

At the other extreme, in large, complex, recurring, and customized projects with high uncertainty, moral hazard may be handled by more soft/informal strategies. Professional clients with a continuous demand for similar projects may rely more heavily on the shadow of the future to handle moral hazard. This should be especially effective when it is possible to group several sequential similar projects into a series of projects governed by one large contract or by options to enter subsequent contracts as long as the contractor's performance is satisfactory. In cases where it is not possible to rely heavily on the shadow of the future the selection of a competent and trustworthy contractor becomes even more relevant. Bid evaluations may then be based on multiple criteria rather than lowest price. The contract can also be lengthened by bundling construction and maintenance to strengthen the contractor's motivation to build a sustainable product with high quality. Due to the high complexity and uncertainty, detailed contracts that specify all contingencies are not possible. Instead more general and flexible contracts are formulated and incentives/bonuses may be utilized to strengthen the contractor's motivation to perform well, both in terms of costs/time and quality. The high complexity and uncertainty together with general and flexible contracts makes monitoring both difficult and less effective. Instead it is important to establish social norms that guide the partners towards mutually acceptable behaviors. Due to the high complexity and customization, mutual relationship specific investments are often required, which in turn reduce the risk for opportunistic behavior.

5.3. Inter-connections between internal and external strategies

It is also relevant to reflect on potential connections between the way an organization tries to reduce internal moral hazard and how they try to reduce external moral hazard. One observation from the debate about public procurement is that if it is believed that it is difficult to control internal moral hazard problems, then that can be an argument for using a hard/formal strategy externally. Such a strategy leaves less room for the judgment by the clients' staff and reduces the risk of internal moral hazard. There are, however, other alternatives for reducing internal moral hazard, e.g. more monitoring and economic incentives (including the risk of being fired) so it is not clear that there is a strong relation between lack of trust of the staff and choice of a hard/formal procurement strategy.

There is no logical inconsistency between using hard/formal methods internally and using a soft/informal strategy in the external relations. Both top management on the client side and on the contractor side may prefer a soft/informal procurement strategy, but may not trust that their staff wants to implement such a strategy and therefore top management introduce stricter monitoring and penalties internally, at least during an early period. Such a hard/formal internal strategy may involve monitoring of collaborative behavior and exchange of a non-collaborative project manager for a more collaborative one if required in a project governed by soft/informal external strategies (Eriksson, 2015). After a while one might think that self-selection processes will lead to a situation where the staff in a company that uses a soft/informal strategy also believes in this strategy and are loyal to top management, and then softer/informal methods can be used also internally. An interesting case here is the Swedish company NCC that after being involved in a large cartel case switched into making "Partnering" a central concept in their strategy. Our hypothesis is that

this initially demanded rather hard/formal strategies internally to reduce the risk for internal moral hazard problems.

Another case where different strategies may be used internally and externally is when a client with soft/informal internal strategies uses hard/formal strategies in their relation to contractors, if the client has not been able to build up long term relations and cannot trust the contractors.

5.4 Research questions

There are of course a number of specific research questions about the design and use of each of the 8 strategies described above. From the perspective of this paper it is especially interesting to look at the relations between the strategies and how different strategies can be combined. There might for example be interesting combinations of the two ideal types – hard/formal vs soft/informal - where an actor uses some hard and some soft strategies. Looking at different types of construction projects and how different combinations of strategies are used can shed light on this, and also test the contingency approach above. Is it possible to identify situations where a clean hard or a clean soft strategy is used or is it common with combinations of the two?

The argument that both internal and external moral hazard problems must be taken into account also open up a number of research questions like the ones sketched above. Is there a correlation between using soft internal strategies and using soft external strategies, or are these independent of each other? Studying organizations that want to change their external strategies to see if this also means changes in the internal strategies would be interesting in this context. Comparing public and private procurement can shed light on several of these issues. A first step is to look closer at how they differ for different types of procurement situations. Tadelis (2012) argues for example that private companies use more of negotiations than public agencies. If there are differences, it is interesting to investigate why these differences can be observed. Is it driven by public procurement laws or are there other differences, e.g. that private companies use more formal and tougher strategies to reduce internal moral hazard problems and that they therefore can use softer and more informal strategies in relation to external contractors.

International comparison would also be very interesting, looking both at the private sector in different countries and the public sector in different countries. This would also make it possible to see if there are any relations between the strategies used in the private sector in a specific country and the strategies used in the public sectors in a specific country.

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