The Impact of Asymmetric Information on Communication Risk in Construction Projects

Authored by

Anita Ceric
THE IMPACT OF ASYMMETRIC INFORMATION ON COMMUNICATION RISK IN CONSTRUCTION PROJECTS

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ABSTRACT

Good communication between key participants is essential for the success of every construction project. This involves sharing relevant information between them. It is commonly assumed that all participants cooperate and exchange information in order to achieve project’s goals. However, there is a potential conflict of interests between participants because they all have their own interests, as well. Also, the project owner and the contractor do not have access to all information available to their project managers and vice versa. The two project managers will share information only when they are willing to do so. This situation, in which one of two parties is better informed than the other, is known in economics as the principal-agent problem.

In this paper I address the impact of a multiple principal-agent problem on communication risk in construction projects. I focus on communication issues between the project owner and his or her project manager, the contractor and his or her project manager, as well as between the two project managers. These are the key four parties in any construction project. In construction projects, the principal-agent problem is even more pronounced than is usually the case because of their short-term employment relationship. This problem is characterized by three issues concerning the relationship between the principal and the agent: adverse selection, moral hazard, and hold-up. Asymmetric information is common to all three.

An exploratory survey was conducted in order to establish an understanding of the relative importance of the above communication risks considered in the literature. The respondents were project managers with considerable experience in the construction field. They agree that the main relationship in a construction project before the contract is signed is that between the project owner and contractor; however, they point out that the main relationship after the contract is signed is that between the project owner’s and contractor’s project managers. This stands to reason, and yet it is a novel result in the literature on project management.

KEYWORDS: principal-agent theory, asymmetric information, communication risk, construction projects, project management

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INTRODUCTION

Good communication between project participants is crucial for project success. Poor communication is one of the most common project risks (Ceric, 2003; Zerjav and Ceric, 2009). Communication within construction projects is a multifaceted phenomenon spanning multiple disciplinary levels, multiple organization levels, and multiple perspectives and interpretations. Participants need to collaborate, share, collate and integrate significant amounts of information to realize project objectives (Emmitt and Gorse, 2006; Emmitt 2010).

The situation in which one of the two parties is better informed than the other is well known in economics as the principal-agent problem (e.g., Jäger, 2008). Delegation of tasks establishes a principal-agent relationship between owner and manager, where the principal (project owner) depends on the agent (contractor or project manager) to undertake a task on the principal’s behalf (Müller and Turner, 2005). One can act on assumption that an agent will try to maximize his or her own benefit even when that may involve a higher damage to the client (Schiég, 2008). This problem is characterized by three issues concerning the relationship between the principal and the agent: adverse selection, moral hazard, and hold-up. It has long been recognized that a problem of moral hazard arises when individuals engage in risk sharing under conditions such that their own actions affect the probability distributions of the outcomes. This situation is common in the delegation of decision-making responsibilities (Holström, 1979).

Many papers on this subject can be found in the construction literature. The most important among these papers have been classified here by key principal-agent theory issues—adverse selection, moral hazard, and hold-up (Table 1). So far, moral hazard has attracted most attention in the construction field, followed by adverse selection. At this time, the hold-up issue trails far behind.

In this paper, the multiple principal-agent problem in construction projects is addressed. The three issues mentioned above are central to the argument. What makes this paper different from those published so far is that the focus here will be on communication issues between four parties involved in construction projects: project owner, contractor, and their project managers. In the literature we can find “classical” principal-agent theory applied to construction projects that discusses issues between the project owner and his or her project manager, as well as the contractor and his or her suppliers, but none have discussed, as far as I am aware, the relationships and communication risks of all four parties mentioned above, who play the most important role in every construction project.

Of course, other participants may play important roles in construction projects. These include consultants, such as designers, and sub-contractors. However, the four parties discussed here play key roles in all construction projects. This is why they have been selected for special attention in this paper.

In the pages that follow I first introduce the principal-agent theory framework in construction projects. Special emphasis is placed on the communication risk in connection with asymmetric information. Then I present the exploratory survey of project managers, whose opinions about communication risks are central to this paper because they play key roles in all construction projects. The main findings of the survey follow. The paper closes with conclusions that focus on future research.
<table>
<thead>
<tr>
<th>ADVERSE SELECTION</th>
<th>MORAL HAZARD</th>
<th>HOLD-UP</th>
</tr>
</thead>
</table>

Table 1: Key construction-related literature by main issues in principal-agent theory
PRINCIPAL-AGENT THEORY FRAMEWORK FOR CONSTRUCTION PROJECTS

The owner of a project is the person or group who provides the financial resources for its delivery, accepts the project milestones, and project completion (Project Management Institute, 2000). Project owner hires a contractor to perform all the activities required to complete the project (Figure 1).

PO: Project Owner
C: Contractor

Also, the project owner and the contractor delegate their tasks to their project managers. According to Oxford Dictionaries Online (2010), a project manager is “the person in overall charge of the planning and execution of a particular project.” Therefore, there are four different parties involved in the project even before its execution starts (Figure 2). It should be noted that the contractor’s project manager is understood here as the person who is in overall charge of a particular project on contractor’s behalf irrespective of his or her title. Namely, in some business environments this role is played by consultants.

PO: Project Owner
C: Contractor
PM: Project Manager

However, it is important to note that project owner’s and contractor’s project managers play important roles in any construction project even though they are not in a contractual relationship with each other (Figure 3). They can be praised or blamed for success or failure of
the project and they thus have a great moral responsibility (Corvellec and Macheridas, 2010). Because they are so important for the success of any project, I have decided to explore their perceptions of communication risks between the key participants in construction projects. In addition, as far as I am aware through the literature search, this has not been done before.

PM$_{po}$: Project owner’s project manager
PM$_{c}$: Contractor’s project manager

It is commonly assumed that all participants in the project will work smoothly together in order to achieve the same goal. However, there is a potential conflict of interest between the participants because they all have their self interests, too. The relationship between all the above mentioned participants taken together is shown in Figure 4. These are the key parties to any construction project. Considering only pairs of these parties, as is commonly the case in the existing literature, obscures the complexity of these relationships. The relationship between project managers, which is central in this paper, is thus set in its proper context.

In this case, the project owner acts as principal in relation to both his or her project manager and contractor as agents, and the contractor acts as principal in relation to his or her project manager. So, there are two principals and three agents, where the contractor is both principal and agent. This is why this complex set of relationships can be called a multiple principal-agent problem that needs to be addressed in the context of human resources.
management. Again, Figure 4 shows the key relationships that occur in every construction project.

Now, the project owner provides the financial resources and hires the contractor. This is the key relationship in this case. According to Turner and Müller (2004), the owner is particularly interested in the following:

1. the end deliverable will meet their functional requirements
2. the right project process is being followed to successfully deliver the required end deliverables in the optimum way
3. the project will meet the required quality, budget and schedule requirements
4. appropriate control mechanisms are in place to achieve the above
5. the project manager is behaving in a professional and trustworthy manner

Project owner hires a project manager in order to achieve the goals of the project. He or she works closely with the contractor’s project manager and monitors all the actions that contractor’s project manager takes to achieve the goal of the project, but also to satisfy his or her employer. Project owner and contractor communicate in two ways: directly and indirectly — through their project managers. Although all four parties ostensibly have the same goal, they have their self interests, as well. Some of the information will be shared only when they are willing to do so.

The situation in which one of the two cooperation partners is better informed than the other is characterized by asymmetric information (Schieg, 2008). The concept of asymmetric information is of great value to modern economic theory (Stiglitz, 2000). After Akerlof (1970), much has been written on this subject. Isenberg (2003) claims that even though most asymmetricians cite Akerlof, it appears that Stiglitz and Weiss (1981) pioneered its formulation in credit-market terms. However, we will leave this discussion to the economists and asymmetric information will be used here only to identify potential sources of communication risk in construction projects.

Asymmetric information and its applications can be found in a large number of papers and books published, but only a few literature sources will be used here for explanatory purposes. In particular, I have relied on Jäger (2008) and Schieg (2008).

Asymmetric Information and Communication Risk

The asymmetries apply whenever the principal and the agent are not in possession of the same information at the same time. In construction projects, we have four key parties who work together, and it is assumed that they will share important information in order to meet main project’s targets: time, cost, and quality. But, because of self interest, they will not be willing to share all the information all of the time. Specifically, the following types of information asymmetries apply for acting persons: hidden characteristics, hidden information, and hidden intention. Respectively, these three types of information asymmetries generate following risks: adverse selection, moral hazard, and hold-up.

Adverse selection describes information asymmetries when the principal does not have the exact qualifications of the agent. It occurs before the contract is signed and the result can be the wrong choice of the contractual partner. In the case of the moral hazard there are information asymmetries after contract is signed. The principal cannot control all the agent’s activities and an information imbalance in favour of the agent can occur. If the agent uses this situation
opportunistically, then this type of asymmetric information is called moral hazard. If the principal makes large investments in money or other resources because of the trusty relationship with the agent, and if these investments get lost in case that the agent acts uncooperatively, these result with the problem called hold-up. The principal already made an irreversible investment and this enables the agent to confront him with excessive demands, for instance.

**Asymmetric Information in Construction Projects**

Based on the principal-agent theory, the relationships between project owner and contractor and the two project managers are systemized according to related asymmetric information and corresponding type of risks. Hidden characteristics are associated with adverse selection; hidden action and/or hidden information are associated with moral hazard; and hidden intentions are associated with hold-up.

Hidden characteristics cause the adverse selection problem before contract is signed between involved parties. It means that the project owner does not have all the information about the contractor before the contractor is hired. Similarly, the project owner does not have all the information about his or her project manager before hiring. The same holds for the contractor and his or her project manager. Therefore, in the case of adverse selection we have three different parties involved and three information asymmetries. The adverse selection problem occurs in the early phases of the project. Generally, these phases are the most important from the risk point of view. The early phases of a project are of particular interest because the level of influence on total project costs is highest early on, whereas the impact of early decisions on total project costs is the highest (Hendrickson and Au, 1989). The potential influence of stake-holders is also highest in the early project phases, before a detailed agenda is set and the cost for making changes is low (Kolltveit and Grønhaug, 2004).

Hidden information or hidden action causes the moral hazard risk. This occurs after contract is signed between involved parties. For example, the client cannot be sure that firms, once hired, will fully mobilize their capabilities on the client’s behalf or on behalf of other clients of theirs (Winch, 2000). In our case, four parties are potentially involved in the moral hazard problem. After the contract is signed and the project owner has hired the contractor and his or her project manager, and after the contractor has hired his or her project manager, they cannot be sure that all information will be shared in an appropriate way because of their self interest. People will not act in the interest of others, their principals or partners, to the exclusion of their own preferences (Eisenhardt, 1989; Jensen, 2000). The moral hazard problem also occurs between two project managers because they have their self interest, as well.

Hidden intentions can cause hold-up problems. The project owner can invest some money at any stage of the project and trust that the contractor will cooperate, but it can happen that the contractor will act opportunistically. After the project owner realizes that the contractor is behaving opportunistically, it can be too late for the project owner to withdraw investment.

**Risk Minimization**

There are several ways to minimize risks that arise from adverse selection, moral hazard and hold-up problems. These are known as screening and monitoring (Jäger, 2008; Schieg, 2008). The purpose of screening is to gather information of use to the principal in an effort to learn more about the agent’s qualifications — for instance, references, certificates, work probes, and
credit worthiness. Similarly, the purpose of monitoring the agent is to ascertain that he or she is behaving in accordance with the contract. As both of these are costs, they are known in the literature as “agency costs.”

EXPLORATORY SURVEY

An exploratory survey was used to establish the relative importance of communication risk sources and types of relationship in construction projects (Appendix). Since this research is exploratory in nature, a questionnaire survey was considered an appropriate tool (Bailey et al., 1995). The objective was to establish an understanding of the relative importance of a number of communication risks established in the literature. The respondents were project managers with considerable experience in the field. They were selected for this study because they play central roles in all construction projects.

Twenty-seven project managers participated in the survey. Several of them were involved in an initial pilot survey to ensure its comprehensibility. On the average, the respondents had about fourteen years of experience. The projects they managed had an average value of about $1 billion. Collectively, they worked on construction projects in a wide range of countries on most continents. The respondents were asked to offer their perceptions, and they felt comfortable with doing so.

There were five main questions, which were divided into two sections. The first section concerned three sources of information asymmetry (adverse selection, moral hazard, and hold-up), while the second concerned two types of communication risk minimization (screening and monitoring). The questions were formulated in such a fashion that the above were introduced only descriptively, so as to avoid the recognition of key concepts from the literature by the respondents. The respondents were asked to rate the importance of each issue addressed in five questions in terms of the four relationships between the key project parties. The scale used was from one to nine, where the highest value was considered to be most important.

COMMUNICATION RISKS

The results will be presented starting with the last section of the survey, in which the respondents were asked to list specific communication risks between the project parties, as well as to list most appropriate risk-minimization approaches in each case. The most important responses are presented in this section so as to give substance to the argument. The bulk of pertinent responses refer to the relationship between the project owner and contractor, on the one hand, and the project owner’s and contractor’s project managers, on the other. The latter relationship deserves special attention, as will be argued in the next section. So far, this relationship has not received sufficient notice from the research community concerned with the construction field.

Project Owner-Contractor

According to one respondent, there is “no direct communication because project manager acts as a buffer in between parties. Appropriate communication protocol must be set up.” Another respondent suggests that “all critical issues should be openly discussed without hidden agendas
due to very complex nature of construction process.” Yet another states that “the highest risk is inability of the owner to clearly explain what is expected from the contractor—unclear scope definition, vague expectations, etc.” Two respondents mention “incomplete progress reports” and “incomplete contract and design documents.” What is needed, according to one respondent, is “clear and consistent change management from the project owner’s side.”

Project Owner-Project Owner’s manager

One respondent states that there is a “lack of on-time reports.” Another states that “clear definitions of responsibilities” are needed.

Contractor-Contractor’s project manager

According to one respondent, “the project manager should be assigned from the core of organization, so that he would be in position to make better assessment concerning possible conflicts and guide the higher management.”

Project Owner’s project manager-Contractor’s project manager

Six respondents state that “this relationship is the most important” after the contract is signed. According to one of them, “project owners and contractors usually have more than one project, so it is most important for their project managers to work together.” Another respondent argues that “this relationship is the most subjective one.” According to one respondent, “the social relationship should extend outside of the project—i.e. by means of their families.” Another respondent suggests that “both project managers should have the same level of authority; if this is not the case, the decision making process can be negatively affected.” According to one respondent, “the main risk is that the project owner asks for improvements regarding the project that he assumes are included in the project, but the contractor assumes that they should be paid on top of the project.”

MAIN FINDINGS

The main findings of the survey can be presented in two steps. The first concerns the first four questions, whereas the second concerns the fifth question. In the first four questions, the first three of which concern sources of communication risks and the forth concerns risk minimization (see Appendix), the responses clearly show that the most important relationship in any project is that between the project owner and the contractor. This is shown by the highest mean values of responses and low standard deviations between them (Table 2). The second most important relationship in these four questions was that between the project owner and his or her project manager. This could have been expected from the current literature.

In the case of all five questions it is also interesting to note that the standard deviation of ratings of different relationships was highest in the case of the relationship between project owner’s and contractor’s project managers. This shows that respondents were least in agreement concerning their own role in the management of construction projects.
Now, the responses to the last question, which concerns risk minimization after contracts are signed between the main parties, show a surprising result: the most important relationship is that between project owner’s and contractor’s project managers. This is shown by the highest mean value. However, as already noted, the standard deviation for this question is still the highest. Anyhow, the highest mean is a surprising result. It shows that the relationship between project managers as shown in Figure 4 has thus far been neglected in the literature.
<table>
<thead>
<tr>
<th>Survey Question/Relationship</th>
<th>Project owner - Contractor</th>
<th>Project owner - Project owner’s project manager</th>
<th>Contractor - Contractor’s project manager</th>
<th>Project owner’s project manager - Contractor’s project manager</th>
</tr>
</thead>
<tbody>
<tr>
<td>Contract partner’s qualifications are not fully known before contract is signed between parties</td>
<td>Mean 7.48</td>
<td>6.85</td>
<td>6.12</td>
<td>5.96</td>
</tr>
<tr>
<td>Standard deviation</td>
<td>2.26</td>
<td>1.93</td>
<td>2.22</td>
<td>2.44</td>
</tr>
<tr>
<td>Behavior of contract partner cannot be fully assessed after contract is signed between parties</td>
<td>Mean 7.30</td>
<td>6.96</td>
<td>6.24</td>
<td>6.96</td>
</tr>
<tr>
<td>Standard deviation</td>
<td>1.54</td>
<td>1.48</td>
<td>1.76</td>
<td>1.80</td>
</tr>
<tr>
<td>Contract partner’s intentions are not fully known after contract is signed between parties</td>
<td>Mean 7.41</td>
<td>6.85</td>
<td>6.48</td>
<td>7.04</td>
</tr>
<tr>
<td>Standard deviation</td>
<td>1.72</td>
<td>1.96</td>
<td>1.44</td>
<td>2.07</td>
</tr>
<tr>
<td>Gathering information to learn about partner’s behavior before contract is signed between parties</td>
<td>Mean 8.41</td>
<td>7.23</td>
<td>6.68</td>
<td>6.08</td>
</tr>
<tr>
<td>Standard deviation</td>
<td>1.05</td>
<td>1.58</td>
<td>1.93</td>
<td>2.23</td>
</tr>
<tr>
<td>Gathering information to learn about partner’s behavior after contract is signed between parties</td>
<td>Mean 7.15</td>
<td>6.81</td>
<td>6.56</td>
<td>7.27</td>
</tr>
<tr>
<td>Standard deviation</td>
<td>1.97</td>
<td>1.92</td>
<td>1.94</td>
<td>2.16</td>
</tr>
</tbody>
</table>

Table 2. Results of the explorative survey questionnaire.
CONCLUSIONS

The relationships between the four parties shown in Figure 4 have been examined in this paper only from the horizontal axis upwards. This involves the perspective of the principals involved. The lower part of the diagram, showing the perspective of the agents, needs to be explored in the future. In terms of the principal-agent theory, this primarily concerns risk minimization strategies by all agents involved. In particular, this involves signalling and reputation — that is, marketing and good performance (Jäger, 2008).

Future research should also consider more complex relationships between construction project participants. In particular, this involves consultants, such as designers, as well as subcontractors, of which there are many in construction projects.

Of course, the relationships shown in Figure 4 are of great interest to human resource management as a field. Relationships that remain outside firms forming project teams are of special interest. In particular, the relationship between project owner’s and contractor’s project managers and their teams remains an unexplored area within human resource management.

Akerlof and Shiller (2009) offer many a guideline for further research into behavioral economics in general. This is a field with many promises in project management as applied to the construction field. They are concerned with notions such as confidence, fairness, corruption and bad faith, and money illusion. All of these examples are replete with incidences of asymmetric information. Assuming such problems away only make actual problems that much more difficult to resolve.

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REFERENCES


APPENDIX: SURVEY QUESTIONNAIRE

COMMUNICATION RISKS IN CONSTRUCTION PROJECTS — INTRODUCTION

This research has to do with the relationship between the project owner, contractor, and their project managers (see diagram below). These four parties are crucial to the success of every project. This research focuses on risks associated with their communication. Research to date has shown that communication is of vital importance to the success of construction projects. The focus here is on information asymmetry in the project-management process. An example of information asymmetry is when one party does not fully know what the other knows or does. It has been shown that this form of asymmetry is central to explaining key problems in many other fields. Extending this research to construction management may in time contribute to its further development.

![Diagram of project management relationships]

PO: Project owner
C: Contractor
PM_{po}: Owner’s project manager
PM_{c}: Contractor’s project manager

SURVEY QUESTIONS

A. General information

Note that all private information will remain confidential. Only statistical data pertaining to all respondents will be made public.

1. Name:
2. Educational background:
3. Professional qualifications:
4. Current job title:
5. Years of experience in project management:
6. Value of largest project managed in $US:
7. Countries where worked:

B. Information asymmetry – Sources of communication risk

Note that information asymmetry changes once the contracts between different parties involved in a project are signed. Only three contracts are involved in the process as described in the diagram above. These are contracts between the project owner and contractor, as well as contracts between them and their project managers.

Please use the scale from 1 to 9 (where 9 is “most important”) to rate the importance of each relationship between project parties in terms of communication risk involved:

<table>
<thead>
<tr>
<th>From – To</th>
<th>Project owner - Contractor</th>
<th>Project owner - Owner’s project manager</th>
<th>Contractor - Contractor’s project manager</th>
<th>Owner’s project manager - Contractor’s project manager</th>
</tr>
</thead>
<tbody>
<tr>
<td>Contract partner’s qualifications are not fully known before contract is signed between parties</td>
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<tr>
<td>Behavior of contract partner cannot be fully assessed after contract is signed between parties</td>
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</tr>
<tr>
<td>Contract partner’s intentions are not fully known after contract is signed between parties</td>
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<td></td>
<td></td>
</tr>
</tbody>
</table>

Please comment on the communication relationships above that you consider most important:

C. Risk minimization – Ways to reduce information asymmetry

As in Part B above, information asymmetry changes once the contracts between different parties involved in a project are signed. Again, there are only three contracts involved: between the project owner and contractor, as well as contracts between them and their project managers.

Please use the scale from 1 to 9 (where 9 is “most important”) to rate the importance of each relationship between project parties in terms of communication-risk minimization:

<table>
<thead>
<tr>
<th>From – To</th>
<th>Project owner - Contractor</th>
<th>Project owner - Owner’s project manager</th>
<th>Contractor - Contractor’s project manager</th>
<th>Owner’s project manager - Contractor’s project manager</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gathering information to learn about partner’s behavior before contract is signed between parties</td>
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</tr>
<tr>
<td>Gathering information to learn about partner’s behavior after contract is signed between parties</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Please comment on the communication relationships above that you consider most important:

D. Communication risks

Please list specific communication risks between the project parties that you consider most important for project success. If possible, also list most appropriate risk-minimization approaches in each case.

Project owner – contractor:
Project owner – Owner’s project manager:
Contractor – Contractor’s project manager:
Owner’s project manager – Contractor’s project manager: